

Introduction

The following curriculum is primarily for Science content. However, there are numerous interdisciplinary links to other content areas. This curriculum reflects the New York State *Learning Standards for Mathematics, Science, and Technology*. This document contains specific content for instruction in grades 5-8. In order to view the Essential Questions overview for the school, the teachers also utilize the “Grade Level Curriculum Themes” document to see the K-8 macro view of the spiraling curriculum. [Grades 7 and 8 are presented together as the content is divided by Physical Setting (Gr 7) and the Living Environment (Gr 8) for a complete year to allow for greater depth of study.]

This Scope and Sequence document consists of five areas which are congruent with the New York State *Learning Standards for Mathematics, Science, and Technology*. They are **Scientific Inquiry** (from Standard 1: Analysis, Inquiry and Design), **Physical Setting** and **The Living Environment** (Standard 4: Science), **Interconnectedness** (Standard 6: Common Themes), and **Interdisciplinary Problem Solving** (Standard 7). Each NYS Standard is divided into the appropriate Key Ideas and Performance Indicators, with integrated *Essential Questions* as well as sample tasks for each. While developing “Understanding by Design” units, teachers include the information from this curriculum into Stage 1 to include NYS Standard, Key Idea, Performance Indicator (using our standard codes) and Essential Question. After Assessments are developed in Stage 2, grade level teams of teachers develop Learning Activities (Stage 3) that are specifically aligned to this curriculum. [The sample tasks have been provided to guide teachers’ planning and lesson constructing. Teachers are encouraged to alter the sample tasks to meet the needs of their students in keeping with the Coalition of Essential Schools philosophy.]

The areas of **Physical Setting** and **The Living Environment** outlines specific declarative knowledge that students should explore in a constructivist approach. A suggested model for teaching science includes five essential phases: engagement, exploration, explanation, elaboration, and evaluation. One characteristic of a constructivist classroom is that time for teaching lessons will vary considerably, some requiring only one day, other lessons requiring several weeks.

The areas of **Scientific Inquiry**, **Interconnectedness**, and **Interdisciplinary Problem Solving** should be taught within the context of the **Physical Setting** and **The Living Environment** areas so that students can discover and construct an understanding of natural phenomena. In a “nutshell,” the performance indicators in these areas contain the “how” of science as the sample tasks in Physical Setting and The Living Environment contain the “what.”

In addition, sample tasks have been suggested that integrate Standard 5: Technology to include the areas of **Engineering Design; Tools, Resources, and Technological Processes; Computer Technology; Technological Systems; Impacts of Technology; and Management of Technology**. While these sample tasks are specific, they are meant to be a starting point to integrate technology. Other content area documents will also include performance indicators from this NYS Standard.

SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 1: Analysis, Inquiry, and Design Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions. **(MST-1)**

SCIENTIFIC INQUIRY

Key Idea: SI.1.1 The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.		
Grade 5	Grade 6	Grade 7/8
<p><i>Performance Indicators</i></p> <ol style="list-style-type: none"> 1. Students formulate questions independently with the aid of references appropriate for guiding the search for explanations of everyday observations. <ol style="list-style-type: none"> a. Formulate questions about natural phenomena b. Identify appropriate references to investigate a question c. Refine and clarify questions so that they are subject to scientific investigation. 2. Students construct explanations independently for natural phenomena, especially independently by proposing preliminary visual models of phenomena. <ol style="list-style-type: none"> a. Independently formulate a hypothesis. b. Propose a model of a natural phenomenon. c. Differentiate among observations, inferences, predictions, and explanations. 3. Students represent, present, and defend their proposed explanations of everyday observations so that they can be understood and assessed by others. 4. Students seek to clarify, to assess critically, and to reconcile with their own thinking the ideas presented by others, including peers, teachers, authors, and scientists. 		

NOTE: The indicators above are repeated purposely. It should be made clear that mathematical analysis should overlap the specific skills and content in all other standards and should be addressed at every grade level.

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SCIENTIFIC INQUIRY

Key Idea: SI.1.2 Beyond the use of reasoning and consensus, scientific inquiry involves the testing of proposed explanations involving the use of conventional techniques and procedures and usually requiring considerable ingenuity.

Grade 5	Grade 6	Grade 7 / 8
<p><i>Performance Indicators</i></p> <ol style="list-style-type: none"> 1. Students use conventional techniques and those of their own design to make further observations and refine their explanations, guided by a need for more information. <ol style="list-style-type: none"> a. Demonstrate appropriate safety techniques. b. Conduct an experiment designed by others. c. Design and conduct an experiment to test a hypothesis. d. Use appropriate tools and conventional techniques to solve problems about the natural world, including: measuring, observing, describing, classifying, and sequencing. 2. Students develop, present, and defend formal research proposals for testing their own explanations of common phenomena, including ways of obtaining needed observations and ways of conducting simple controlled experiments. <ol style="list-style-type: none"> a. Include appropriate safety procedures. b. Design scientific investigations (e.g., observing, describing, and comparing; collecting samples; seeking more information, conducting a controlled experiment; discovering new objects or phenomena; making models) c. Design a simple controlled experiment. d. Identify independent variables (manipulated), dependent variables (responding), and constants in a simple controlled experiment. e. Choose appropriate sample size and number of trials. 3. Students carry out their research proposals, recording observations and measurements (e.g., lab notes, audio tape, computer disk, video tape) to help assess the explanation. <ol style="list-style-type: none"> a. Use appropriate safety procedures. b. Conduct a scientific investigation. c. Collect quantitative and qualitative data. 		

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SCIENTIFIC INQUIRY

Key Idea: SI.1.3 The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena.		
Grade 5	Grade 6	Grade 7 / 8
<i>Performance Indicators</i>		
<ol style="list-style-type: none"> 1. Students design charts, tables, graphs and other representations of observations in conventional and creative ways to help them address their research question or hypothesis. <ol style="list-style-type: none"> a. Organize results, using appropriate graphs, diagrams, data tables, and other models to show relationships. b. Generate and use scales, create legends, and appropriately label axes. 2. Students interpret the organized data to answer the research question or hypothesis and to gain insight into the problem. <ol style="list-style-type: none"> a. Accurately describe the procedures used and the data gathered. b. Identify sources of error and the limitations of data collected. c. Evaluate the original hypothesis in light of the data. d. Formulate and defend explanations and conclusions as they relate to scientific phenomena. e. Form and defend a logical argument about cause-and-effect relationships in an investigation. f. Make predictions based on experimental data. g. Suggest improvements and recommendations for further studying. h. Use and interpret graphs and data tables. 3. Students modify their personal understanding of phenomena based on evaluation of their hypothesis. 		

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SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 4: Science Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. **(MST-4)**

PHYSICAL SETTING

<p>Key Idea: P.4.1 The Earth and celestial phenomena can be described by principles of relative motion and perspective.</p> <p>Performance Indicator: P.4.1a Students explain daily, monthly, and seasonal changes on Earth.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: P.4.1a <i>Students explain daily, monthly, and seasonal changes on Earth.</i> <i>EQ: How does climate affect plants and animals?</i></p> <ol style="list-style-type: none"> 1. Identifies climate as the average weather pattern over a time period. 2. Describes how climate affects the growth of plants and animals. 	<p>Performance Indicator: P.4.1a <i>Students explain daily, monthly, and seasonal changes on Earth.</i> <i>EQ: What are galaxies and stars?</i></p> <ol style="list-style-type: none"> 1. Describes different types of galaxies within our universe (<i>to include elliptical, irregular and spiral</i>). 2. Identifies and describes characteristics of stars (<i>to include temperature, color and life cycle</i>). 	<p>Performance Indicator: P.4.1a <i>Students explain daily, monthly, and seasonal changes on Earth.</i> <i>EQ: How is Earth impacted by our solar system?</i></p> <ol style="list-style-type: none"> 1. Describes the spatial relationship between the sun and Earth to explain daylight, darkness and seasons. 2. Describes the relative position of the sun, moon and Earth to produce tides, moon's phases and solar and lunar eclipses. 3. Compares and contrasts features, motions and orbits of the planets in our solar system.

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SCIENCE: 5-8 Intermediate Curriculum

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NYS Standard 5: Technology Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs. **(MST-5)**

PHYSICAL SETTING

Key Idea: P.4.2 Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.

Performance Indicator: P.4.2a Students explain how the atmosphere (air), hydrosphere (water), and lithosphere (land) interact, evolve, and change.

ALSO Key Idea: T.5.1 Engineering design is an iterative process involving *modeling* and *optimization* used to develop technological solutions to problems within given constraints.

Performance Indicator: Students identify needs and opportunities for technical solutions from an investigation of situations of general or social interest.

Performance Indicator: Students consider constraints and generate several ideas for alternative solutions, using group and individual ideation techniques (group discussion, brainstorming, forced connections, role play); defer judgment until a number of ideas have been generated; evaluate (critique) ideas; and explain why the chosen solution is optimal.

Performance Indicator: Students develop plans, including drawings with measurements and details of construction, and construct a model of the solution, exhibiting a degree of craftsmanship.

Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: P.4.2a Students explain how the atmosphere (air), hydrosphere (water), and lithosphere (land) interact, evolve, and change.</p> <p><i>EQ: How and why do changes occur within biomes?</i></p> <ol style="list-style-type: none"> 1. Describes the primary features and locations of the major land biomes (<i>tundra, taiga, temperate forest, tropical rain forest, desert and grassland</i>). 2. Identify the atmosphere and lithosphere including how their interaction and change impacts major biomes. 	<p>Performance Indicator: P.4.2a Students explain how the atmosphere (air), hydrosphere (water), and lithosphere (land) interact, evolve, and change.</p> <p><i>EQ: How do landforms change?</i></p> <ol style="list-style-type: none"> 1. Describes ways in which landforms are changed (<i>to include chemical and physical weathering, and erosion</i>). 2. Describes ways in which water can affect landforms (<i>to include river deltas, shorelines, and caves</i>). 3. Describes the action of glaciers and their relationship to soil and rocks. 4. Designs and models an environment that illustrates how land forms change. 	<p>Performance Indicator: P.4.2a Students explain how the atmosphere (air), hydrosphere (water), and lithosphere (land) interact, evolve, and change.</p> <p><i>EQ: How does geography affect how and where people live? (see SS.3.1)</i></p> <p><i>EQ: How is land impacted? (How and why does weathering and erosion occur?)</i></p> <ol style="list-style-type: none"> 1. Demonstrates an ability to interpret topographic maps and applies this knowledge to identify landforms. 2. Explains and cites examples of weathering and erosion of Earth materials by natural forces. 3. Reflects on needs for solutions to weathering and erosion. 4. Designs and models a possible solution for weathering and erosion in local area.

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NYS Standard 5: Technology Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs. **(MST-5)**

PHYSICAL SETTING

Key Idea: P.4.2 Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.

Performance Indicator: P.4.2b Students describe volcano and earthquake patterns, the rock cycle, and weather and climate changes.

ALSO Key Idea: T.5.2 Technological tools, materials, and other resources should be selected on the basis of safety, cost, availability, appropriateness, and environmental impact; technological processes change energy, information, and material resources into more useful forms.

Performance Indicator: Students choose and use resources for a particular purpose based upon an analysis and understanding of their properties, costs, availability, and environmental impact.

Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: P.4.2b Students describe volcano and earthquake patterns, the rock cycle, and weather and climate changes.</p> <p><i>EQ: How does climate affect plants and animals?</i> <i>EQ: How and why do changes occur within biomes?</i></p> <ol style="list-style-type: none"> 1. Describes weather (causes and effects) and climate (<i>to include pressure systems and air masses</i>). 2. Utilizes instruments to measure weather conditions (<i>to include air temperature, rainfall, humidity, air pressure and wind speed</i>). 3. Identifies technology used by meteorologists to predict weather patterns (<i>to include radar and weather satellites</i>). 	<p>Performance Indicator: P.4.2b Students describe volcano and earthquake patterns, the rock cycle, and weather and climate changes.</p> <p><i>EQ: How do landforms change?</i></p> <ol style="list-style-type: none"> 1. Describes the process of the formation of igneous, sedimentary, and metamorphic rocks. 2. Classifies rocks based on attributes (<i>to include color, hardness, and luster</i>). 	<p>Performance Indicator: P.4.2b Students describe volcano and earthquake patterns, the rock cycle, and weather and climate changes.</p> <p><i>EQ: How is land impacted?</i></p> <ol style="list-style-type: none"> 1. Explains causes and effects of earthquakes. 2. Explains causes and effects of volcanoes. 3. Relates earthquakes, volcanoes, mountain building and features of sea floor to the theory of plate tectonics. 4. Describes how physical characteristics can be used to identify and determine the origin of minerals and rocks. 5. Describes methods by which relative and absolute ages of rock layers and fossils are determined. 6. Describes the geological time scale.

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PHYSICAL SETTING

Key Idea: P.4.3 Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.

Performance Indicator: P.4.3a Students observe and describe properties of materials, such as density, conductivity, and solubility.

ALSO Key Idea: T.5.3 Computers, as tools for design, modeling, information processing, communication, and system control, have greatly increased human productivity and knowledge.

Performance Indicator: Students use a computer system to connect to and access needed information from various Internet sites.

Performance indicator: Students use a computer as a modeling tool.

Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: P.4.3a Students observe and describe properties of materials, such as density, conductivity, and solubility.</p> <p><i>EQ: How is matter classified?</i></p> <p>1. Describes and compares the properties of different types of substances (<i>to include color, odor, phases, density, solubility, conductivity, hardness, and boiling and freezing points</i>).</p>	<p>Performance Indicator: P.4.3a Students observe and describe properties of materials, such as density, conductivity, and solubility.</p> <p><i>EQ: How can matter change?</i></p> <p>1. Compares the relationship between elements, compounds and mixtures (<i>a solution and a suspension</i>).</p> <p>2. Constructs explanations, independently, to explain changes in matter (see also P.4.3b).</p> <p>3. Explores various materials to determine levels of density, conductivity, and solubility.</p> <p>4. Uses Internet to access information (<i>eg., density, conductivity, and solubility</i>) for use in material exploration.</p>	<p>Performance Indicator: P.4.3a Students observe and describe properties of materials, such as density, conductivity, and solubility.</p> <p><i>EQ: How is matter changed to effect solubility and density?</i></p> <p>1. Describes properties and types of solutions along with factors that affect solubility.</p> <p>2. Explore the concept to density (<i>to include equal volume, greater mass, denser mass, and buoyancy</i>).</p> <p>3. Describes and classifies matter according to properties and changes of phase (see also P.4.3b).</p>

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NYS Standard 5: Technology Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs. (MST-5)

PHYSICAL SETTING

<p>Key Idea: P.4.3 Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.</p> <p>Performance Indicator: P.4.3b Students distinguish between chemical and physical changes.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>No indicators at this grade level for THIS performance indicator.</p>	<p>Performance Indicator: P.4.3b Students distinguish between chemical and physical changes. <i>EQ: How can matter change?</i></p> <ol style="list-style-type: none"> 1. Identifies that new products are formed in chemical reactions. 2. Explores kinds of changes matter undergoes (<i>physical and chemical change</i>) (see also P.4.3a). 	<p>Performance Indicator: P.4.3b Students distinguish between chemical and physical changes. <i>EQ: How is matter changed to effect solubility and density?</i></p> <ol style="list-style-type: none"> 1. Uses pH to compare and contrast acids and bases and applies this knowledge to acid/ base reactions. 2. Describes and classifies matter according to physical and chemical changes (see also P.4.3a).
<p>Key Idea: P.4.3 Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.</p> <p>Performance Indicator: P.4.3c Students develop their own mental modes to explain common chemical reactions and changes in states of matter.</p> <p>ALSO Key Idea: T.5.3 Computers, as tools for design, modeling, information processing, communication, and system control, have greatly increased human productivity and knowledge.</p> <p>Performance Indicator: Students use a computer system to connect to and access needed information from various Internet sites.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: P.4.3c Students develop their own mental modes to explain common chemical reactions and changes in states of matter. <i>EQ: How is matter classified?</i></p> <ol style="list-style-type: none"> 1. Develops an understanding of the concept of atoms, elements, compounds and molecules. 	<p>Performance Indicator: P.4.3c Students develop their own mental modes to explain common chemical reactions and changes in states of matter. <i>EQ: How can matter change?</i></p> <ol style="list-style-type: none"> 1. Uses HyperStudio, Power Point, or similar software to present models of various elements, compounds, and mixtures. 2. Constructs explanations, independently, to explain common chemical reactions. 	<p>Performance Indicator: P.4.3c Students develop their own mental modes to explain common chemical reactions and changes in states of matter. <i>EQ: What are basic elements?</i></p> <ol style="list-style-type: none"> 1. Cites supporting evidence for the atomic theory of matter and describes the arrangement of elements on the periodic table. 2. Compares and contrasts elements and compounds. 3. Interprets and applies Archimedes' principle.

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NYS Standard 5: Technology Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs. (MST-5)

PHYSICAL SETTING

<p>Key Idea: P.4.4 Energy exists in many forms, and when these forms change energy is conserved.</p> <p>Performance Indicator: P.4.4a Students describe the sources and identify the transformations of energy observed in everyday life.</p> <p>ALSO Key Idea: T.5.2 Technological tools, materials, and other resources should be selected on the basis of safety, cost, availability, appropriateness, and environmental impact; technological processes change energy, information, and material resources into more useful forms.</p> <p>Performance Indicator: Students process energy into other forms and information into more meaningful information.</p> <p>ALSO Key Idea: T.5.4 Technological systems are designed to achieve specific results and produce outputs, such as products, structures, services, energy, or other systems.</p> <p>Performance Indicator: Students assemble, operate, and explain the operation of simple open- and closed-loop electrical, electronic, mechanical, and pneumatic systems.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: P.4.4a Students describe the sources and identify the transformations of energy observed in everyday life.</p> <p><i>EQ: How is energy conserved?</i></p> <ol style="list-style-type: none"> Identifies fossil fuels as nonrenewable resources. <p><i>EQ: How and why do changes occur within biomes?</i></p> <ol style="list-style-type: none"> Describes sources of energy available and/ or used in different biomes. 	<p>Performance Indicator: P.4.4a Students describe the sources and identify the transformations of energy observed in everyday life.</p> <p><i>EQ: How is heat energy created, conserved and transmitted?</i></p> <ol style="list-style-type: none"> Explores transformations of energy in everyday occurrences. Processes energy into other forms (eg., assemble a solar cooker to convert light energy to heat energy). 	<p>Performance Indicator: P.4.4a Students describe the sources and identify the transformations of energy observed in everyday life.</p> <p><i>EQ: How is electricity conserved and transmitted?</i></p> <ol style="list-style-type: none"> Relates Ohm’s law to electric current, voltage and resistance (see also P.4.4d). Applies the law of conservation of energy to potential and kinetic energy (see also P.4.4e). Explains the operation of a open-loop and closed-loop electrical system using everyday items.
<p>Key Idea: P.4.4 Energy exists in many forms, and when these forms change energy is conserved.</p> <p>Performance Indicator: P.4.4b Students observe and describe heating and cooling events.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>No indicators at this grade level for THIS performance indicator.</p>	<p>Performance Indicator: P.4.4b Students observe and describe heating and cooling events.</p> <p><i>EQ: How is heat energy created, conserved and transmitted?</i></p> <ol style="list-style-type: none"> Recognizes that heat energy can be transferred from one object to another in the direction from higher temperature to lower temperature (to include conduction and convection). Identifies conductors and insulators of heat energy. 	<p>Performance Indicator: P.4.4b Students observe and describe heating and cooling events.</p> <p><i>EQ: How is electricity conserved and transmitted?</i></p> <ol style="list-style-type: none"> Describes methods of heat transfer (conduction, convection and radiation) and explains why some materials are better conductors of heat.

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NYS Standard 5: Technology Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs. (MST-5)

PHYSICAL SETTING

<p>Key Idea: P.4.4 Energy exists in many forms, and when these forms change energy is conserved. Performance Indicator: P.4.4c Students observe and describe energy changes as related to chemical reactions.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>1. No indicators at this grade level for <u>THIS</u> performance indicator.</p>	<p>Performance Indicator: P.4.4c Students observe and describe energy changes as related to chemical reactions. <i>EQ: How is energy created, conserved and transmitted?</i> 1. Identifies energy that results from chemical reactions.</p>	<p>Performance Indicator: P.4.4c Students observe and describe energy changes as related to chemical reactions. <i>EQ: How is electricity conserved and transmitted?</i> 1. Describes forms of energy changes that result from chemical reaction.</p>
<p>Key Idea: P.4.4 Energy exists in many forms, and when these forms change energy is conserved. Performance Indicator: P.4.4d Students observe and describe the properties of sound, light, magnetism, and electricity. ALSO Key Idea: T.5.4 Technological systems are designed to achieve specific results and produce outputs, such as products, structures, services, energy, or other systems. Performance Indicator: Students describe how subsystems and system elements (inputs, processes, outputs) interact within systems.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: P.4.4d Students observe and describe the properties of sound, light, magnetism, and electricity. <i>EQ: How is sound energy created, conserved and transmitted?</i> 1. Identifies that sound is caused by the vibration of particles in a medium and travels in waves. 2. Explores properties of sound waves (<i>to include frequency and amplitude</i>). 3. Identifies common features of sound (<i>to include volume and pitch</i>). <i>EQ: How is magnetic energy created, conserved, and transmitted?</i> 4. Explores the interactive relationship between electricity and magnetism. 5. Describes components of an electromagnet. 6. Identifies variables which contribute to the strength of an electromagnet.</p>	<p>Performance Indicator: P.4.4d <i>Students observe and describe the properties of sound, light, magnetism, and electricity.</i> <i>EQ: How is light energy created, conserved and transmitted?</i> 1. Describes sources and uses of light energy. 2. Recognizes that light usually behaves as a wave. 3. Identifies how visible light can be reflected, refracted and absorbed. 4. Relates visible light to the colors of the spectrum. 5. Describes the behavior (reflection, refraction and absorption) of light with matter. 6. Explains that visible light is composed of the colors of the spectrum.</p>	<p>Performance Indicator: P.4.4d <i>Students observe and describe the properties of sound, light, magnetism, and electricity.</i> <i>EQ: How is electricity conserved and transmitted?</i> 1. Relates sound energy to vibrating matter. 2. Describes the flow of electricity in simple, series and parallel circuits. 3. Relates Ohm’s law to electric current, voltage and resistance (<i>see also P.4.4a</i>). 4. Uses a systems diagram to model a system that contains either sound, light, or electricity.</p>

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PHYSICAL SETTING

<p><u>Key Idea: P.4.4</u> Energy exists in many forms, and when these forms change energy is conserved. <u>Performance Indicator: P.4.4e</u> Students describe situations that support the principle of conservation of energy.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>No indicators at this grade level for THIS performance indicator.</p>	<p><u>Performance Indicator: P.4.4e</u> <i>Students describe situations that support the principle of conservation of energy.</i> <i>EQ: How is energy created, conserved and transmitted?</i> 1. Describes the law of conservation of energy.</p>	<p><u>Performance Indicator: P.4.4e</u> <i>Students describe situations that support the principle of conservation of energy.</i> <i>EQ: How is energy a change?</i> 1. Applies the law of conservation of energy to potential and kinetic energy (<i>see also P.4.4a</i>).</p>
<p><u>Key Idea: P.4.5</u> Energy and matter interact through forces that result in changes in motion. <u>Performance Indicator: P.4.5a</u> Students describe different patterns of motion of objects.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p><u>Performance Indicator: P.4.5a</u> Students describe different patterns of motion of objects. <i>EQ: How is energy conserved?</i> 1. Identifies force as a push or a pull that acts on an object. 2. Recognizes effects of forces (<i>to include changes in speed or direction of motion</i>). 3. Explores the Laws of Motion by examining factors that affect motion (<i>to include mass, inertia, friction, speed and acceleration</i>).</p>	<p><u>Performance Indicator: P.4.5a</u> Students describe different patterns of motion of objects. <i>EQ: How is energy created, conserved and transmitted?</i> 1. Identifies patterns of motion. 2. Recognizes effects of forces upon objects.</p>	<p><u>Performance Indicator: P.4.5a</u> Students describe different patterns of motion of objects. <i>EQ: How is energy a change?</i> 1. Describes linear motion within the context of velocity and acceleration. 2. Interprets and applies Newton’s 3 laws of motion. 3. Describes the factors necessary to produce work.</p>

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SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 4: Science Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. **(MST-4)**

NYS Standard 5: Technology Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs. **(MST-5)**

PHYSICAL SETTING

<p>Key Idea: P.4.5 Energy and matter interact through forces that result in changes in motion.</p> <p>Performance Indicator: : P.4.5b Students observe, describe, and compare effects of forces (gravity, electric current, and magnetism) on the motion of objects.</p> <p>ALSO Key Idea: T.5.4 Technological systems are designed to achieve specific results and produce outputs, such as products, structures, services, energy, or other systems.</p> <p>Performance Indicator: Students select appropriate technological systems on the basis of safety, function, cost, ease of operation, and quality of post-purchase support.</p> <p>Performance Indicator: Students assemble, operate, and explain the operation of simple open- and closed-loop electrical, electronic, mechanical, and pneumatic systems.</p> <p>ALSO Key Idea: T.5.7 Project management is essential to ensuring that technological endeavors are profitable and that products and systems are of high quality and built safely, on schedule, and within budget.</p> <p>Performance Indicator: Students provide examples of products that are well (and poorly) designed and made, describe their positive and negative attributes, and suggest measures that can be implemented to monitor quality during production.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: : P.4.5b Students observe, describe, and compare effects of forces (gravity, electric current, and magnetism) on the motion of objects.</p> <p><i>EQ: How is energy conserved?</i></p> <ol style="list-style-type: none"> Identifies types and uses of simple machines (<i>to include levers, wheel and axle, inclined planes, gears, pulleys and wedges</i>). Compares and contrasts simple and compound machines. Plans, models, and tests a compound machine. Control the operation of a toy or household appliance by programming it to perform a task (<i>to include changes in speed or direction of motion</i>). <p><i>EQ: How is magnetic energy created, conserved, and transmitted?</i></p> <ol style="list-style-type: none"> Investigates the use of electromagnets in motors, electric bell and buzzers. 	<p>Performance Indicator: : P.4.5b Students observe, describe, and compare effects of forces (gravity, electric current, and magnetism) on the motion of objects.</p> <p><i>EQ: How is a machine a system?</i></p> <ol style="list-style-type: none"> Identifies uses of simple and compound machines in everyday life. Identifies a toy that contains a compound machine. Analyzes to describe how it could be made better at a lower cost. Constructs machines to show transfer of energy and work done (<i>to include variety of levers, wheels/axles, inclined planes, gears, pulley and wedges</i>). Assembles an electronic kit (<i>to include sensors and signaling devices</i>) that functions (<i>eg., alarm system, etc</i>). 	<p>Performance Indicator: : P.4.5b Students observe, describe, and compare effects of forces (gravity, electric current, and magnetism) on the motion of objects.</p> <p><i>EQ: How is energy a change?</i></p> <ol style="list-style-type: none"> Demonstrates an understanding that two or more simple machines make up a compound machine and explains how machines reduce effort. Relates free-fall of an object to orbital motion and weightlessness. Uses everyday experiences to explain projectile motion. Describes the behavior of pendulum motion and applies this to periodic motion.

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SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 4: Science Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. (MST-4)

NYS Standard 5: Technology Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs. (MST-5)

THE LIVING ENVIRONMENT

Key Idea: L.4.1 Living things are both similar to and different from each other and nonliving things.

Performance Indicator: L.4.1a Students compare and contrast the parts of plants, animals, and one-celled organisms.

ALSO Key Idea: T.5.3 Computers, as tools for design, modeling, information processing, communication, and system control, have greatly increased human productivity and knowledge.

Performance Indicator: Students use a computer system to connect to and access needed information from various Internet sites.

Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: L.4.1a Students compare and contrast the parts of plants, animals, and one-celled organisms.</p> <p><i>EQ: How and why do changes occur within biomes?</i></p> <ol style="list-style-type: none"> Identifies living organisms (<i>plants and animals</i>) from each of the major biomes. <p><i>EQ: How are vertebrates and invertebrates similar/ different?</i></p> <ol style="list-style-type: none"> Identifies characteristics of and classifies groups of vertebrates (<i>to include fish, birds, amphibians, mammals and reptiles</i>). Identifies characteristics of and classifies groups of invertebrates (<i>to include mollusks, annelids and arthropods</i>). 	<p>Performance Indicator: L.4.1a Students compare and contrast the parts of plants, animals, and one-celled organisms.</p> <p><i>EQ: How are living things made up of cells?</i></p> <ol style="list-style-type: none"> Utilizes a microscope to observe that living organisms are made up of cells (<i>to include single-celled and multi-cellular</i>). Compares and contrasts plant and animal cell: structure, function, and life processes (<i>to include cell division, cell respiration and osmosis</i>). 	<p>Performance Indicator: L.4.1a Students compare and contrast the parts of plants, animals, and one-celled organisms.</p> <p><i>EQ: (Review of living organisms essential questions from K-7.)</i></p> <ol style="list-style-type: none"> Uses Internet to research a species of plant, animal, and one-celled organism. Compares and contrasts each species using HyperStudio, Power Point, or similar presentation software. <p>**NOTE: This sample task is a culmination activity of study of Key Idea L.4.1 from K-8.</p>

Key Idea: L.4.1 Living things are both similar to and different from each other and nonliving things.

Performance Indicator: L.4.1b Students explain the functioning of the major human organ systems and their interactions.

Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: L.4.1b Students explain the functioning of the major human organ systems and their interactions.</p> <p><i>EQ: How do body systems function?</i></p> <ol style="list-style-type: none"> Identifies and describes systems of the human body (<i>to include digestive, respiratory, reproductive, nervous and circulatory</i>). <p>**NOTE: This sample task also applies to H.1.1 "Students know how basic body systems work and interrelate in normal patterns of growth and development."**</p>	<p>Performance Indicator: L.4.1b Students explain the functioning of the major human organ systems and their interactions.</p> <p><i>EQ: How do body systems interact?</i></p> <ol style="list-style-type: none"> Identifies and describes the major organ systems of the body. Describes how the major organ systems interact. 	<p>Performance Indicator: L.4.1b Students explain the functioning of the major human organ systems and their interactions.</p> <p><i>EQ: How are organisms organized from basic elements?</i></p> <ol style="list-style-type: none"> Classifies levels of organization in life forms from cell to tissue, to organ, to organ system, to organism.

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SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 4: Science Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. (MST-4)

THE LIVING ENVIRONMENT

<p>Key Idea: L.4.2 Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.</p> <p>Performance Indicator: L.4.2a Students describe sexual and asexual mechanisms for passing genetic materials from generation to generation.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>No indicators at this grade level for THIS performance indicator.</p>	<p>Performance Indicator: L.4.2a Students describe sexual and asexual mechanisms for passing genetic materials from generation to generation. <i>EQ: How do body systems interact?</i></p> <ol style="list-style-type: none"> Identifies the process of human reproduction (see L.4.4a). 	<p>Performance Indicator: L.4.2a Students describe sexual and asexual mechanisms for passing genetic materials from generation to generation. <i>EQ: How are organisms organized from basic elements?</i></p> <ol style="list-style-type: none"> Identifies other processes for reproduction in plants and animals (see L.4.4a).
<p>Key Idea: L.4.2 Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.</p> <p>Performance Indicator: L.4.2b Students describe simple mechanisms related to the inheritance of some physical traits in offspring.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>No indicators at this grade level for THIS performance indicator.</p>	<p>Performance Indicator: L.4.2b <i>Students describe simple mechanisms related to the inheritance of some physical traits in offspring.</i> <i>EQ: How are physical traits inherited?</i></p> <ol style="list-style-type: none"> Distinguishes between environmental and inherited characteristics. Identifies that genetic information is found within a cell's chromosomes. Describes how genetic traits are passed from parent to offspring (<i>to include cell division and dominant/ recessive traits</i>). (See also L.4.4d) 	<p>Performance Indicator: L.4.2b <i>Students describe simple mechanisms related to the inheritance of some physical traits in offspring.</i> <i>EQ: How are organisms organized from basic elements?</i></p> <ol style="list-style-type: none"> Describes how genes and chromosomes influence inherited traits in offspring. Explains the difference between dominant and recessive traits and uses the Punnet square to show re-combinations. Describes an organism's DNA pattern and outlines how this pattern can be altered by genetic engineering.

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SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 4: Science Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. (MST-4)

THE LIVING ENVIRONMENT

<p>Key Idea: L.4.3 Individual organisms and species change over time. Performance Indicator: L.4.3a Students describe sources of variation in organisms and their structures and relate the variations to survival.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: L.4.3a Students describe sources of variation in organisms and their structures and relate the variations to survival. <i>EQ: How does climate affect plants and animals?</i> <i>EQ: How and why do changes occur within biomes?</i></p> <ol style="list-style-type: none"> Explains how the physical structure of living organisms (plants and animals) complement that particular biome. Describes ocean water composition and how different salinity levels affect marine life. 	<p>Performance Indicator: L.4.3a Students describe sources of variation in organisms and their structures and relate the variations to survival. <i>EQ: What are simple organisms and how do they change?</i></p> <ol style="list-style-type: none"> Explains how organisms' (plants and animals) characteristics vary and change to survive in their environment. Identifies characteristics of simple organisms within the fungi, protist, and moneran kingdoms. Describes how fungi, protists and moneran can be harmful and / or helpful to plants and animals. 	<p>Performance Indicator: L.4.3a Students describe sources of variation in organisms and their structures and relate the variations to survival. <i>EQ: How are organisms organized from basic elements?</i></p> <ol style="list-style-type: none"> Describes how structures of organisms relate to their function. Cites examples of how structures of organisms and movement are related. Uses physical attributes of organisms to develop a classification system. <p><i>EQ: How do living organisms interact with/ impact the environment?</i></p> <ol style="list-style-type: none"> Describes structures within ecosystems and relates this to how organisms interact within their own population and the environment.
<p>Key Idea: L.4.3 Individual organisms and species change over time. Performance Indicator: L.4.3b Students describe factors responsible for competition within species and the significance of that competition.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: L.4.3b Students describe factors responsible for competition within species and the significance of that competition <i>EQ: How ecosystems change over time?</i></p> <ol style="list-style-type: none"> Explains food chains/ food webs present within the ocean ecosystem. Identifies ocean organisms to include survival behaviors (eg., camouflage, mimicry, etc). 	<p>Performance Indicator: L.4.3b Students describe factors responsible for competition within species and the significance of that competition <i>EQ: What are simple organisms and how do they change?</i></p> <ol style="list-style-type: none"> Identifies factors that enable competition within a species. Describes significance of competition within a species. 	<p>Performance Indicator: L.4.3b Students describe factors responsible for competition within species and the significance of that competition <i>EQ: How do living organisms interact with/ impact the environment?</i></p> <ol style="list-style-type: none"> Explains how adaptations to limiting factors in the environment allow species to survive.

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SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 4: Science Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. (MST-4)

THE LIVING ENVIRONMENT

<p>Key Idea: L.4.4 The continuity of life is sustained through reproduction and development. Performance Indicator: L.4.4a Students observe and describe the variations in reproductive patterns of organisms, including asexual and sexual reproduction.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>No indicators at this grade level for <u>THIS</u> performance indicator.</p>	<p>Performance Indicator: L.4.4a <i>Students observe and describe the variations in reproductive patterns of organisms, including asexual and sexual reproduction.</i> EQ: How are physical traits inherited? 1. Identifies the process of human reproduction (see L.4.2a).</p>	<p>Performance Indicator: L.4.4a <i>Students observe and describe the variations in reproductive patterns of organisms, including asexual and sexual reproduction.</i> EQ: How do living organisms interact with/ impact the environment? 1. Identifies other processes for reproduction in plants and animals (to include asexual and sexual reproduction (see L.4.2a)). 2. Identifies reproductive parts of plant species (to include gymnosperms –peduncle, receptacle, sepals, petals, stamens, pistils- and angiosperms).</p>
<p>Key Idea: L.4.4 The continuity of life is sustained through reproduction and development. Performance Indicator: L.4.4b Students explain the role of sperm and egg cells in sexual reproduction.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>No indicators at this grade level for <u>THIS</u> performance indicator.</p>	<p>Performance Indicator: L.4.4b <i>Students explain the role of sperm and egg cells in sexual reproduction.</i> EQ: How are physical traits inherited? 1. Describes the processes of fertilization (to include sperm and egg).</p>	<p>Performance Indicator: L.4.4b <i>Students explain the role of sperm and egg cells in sexual reproduction.</i> EQ: How do living organisms interact? 1. Identifies the structures and functions of the endocrine, male and female reproduction systems. 2. Explains the process of human reproduction, conception and pregnancy.</p>

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SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 4: Science Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. (MST-4)

THE LIVING ENVIRONMENT

<p>Key Idea: L.4.4 The continuity of life is sustained through reproduction and development. Performance Indicator: L.4.4c Students observe and describe developmental patterns in selected plants and animals (e.g., insects, frogs, humans, seed-bearing plants).</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: L.4.4c Students observe and describe developmental patterns in selected plants and animals (e.g., insects, frogs, humans, seed-bearing plants). <i>EQ: How are vertebrates and invertebrates similar/ different?</i></p> <ol style="list-style-type: none"> Identifies examples of growth and change within vertebrates and invertebrates. <p><i>EQ: How ecosystems change over time?</i></p> <ol style="list-style-type: none"> Identifies plant and animal life contained within the ocean ecosystem (see also L.4.6a). Uses Hyperstudio, Power Point, or similar software to present the components of an ocean ecosystem (see also L.4.6a). 	<p>Performance Indicator: L.4.4c Students observe and describe developmental patterns in selected plants and animals (e.g., insects, frogs, humans, seed-bearing plants). <i>EQ: How do organisms change?</i></p> <ol style="list-style-type: none"> Observes developmental patterns in selected animals (e.g., frogs, gerbils/ hamsters/ rats, snakes, etc). 	<p>Performance Indicator: L.4.4c Students observe and describe developmental patterns in selected plants and animals (e.g., insects, frogs, humans, seed-bearing plants). <i>EQ: How do living organisms interact?</i></p> <ol style="list-style-type: none"> Observes developmental patterns in selected animals. Observes developmental patterns in selected plants (e.g., bean, corn, etc.) Identify structures and functions of plant and animal cells.
<p>Key Idea: L.4.4 The continuity of life is sustained through reproduction and development. Performance Indicator: L.4.4d Students observe and describe cell division at the microscopic level and its macroscopic effects.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>No indicators at this grade level for THIS performance indicator.</p>	<p>Performance Indicator: L.4.4d Students observe and describe cell division at the microscopic level and its macroscopic effects. <i>EQ: How are physical traits inherited?</i></p> <ol style="list-style-type: none"> Describes how genetic traits are passed from parent to offspring (<i>to include cell division and dominant/ recessive traits</i>). (See also L.4.2b). 	<p>Performance Indicator: L.4.4d Students observe and describe cell division at the microscopic level and its macroscopic effects. <i>EQ: How are organisms organized from basic elements?</i></p> <ol style="list-style-type: none"> Describes the processes of mitosis, meiosis, genetic re-combinations and end products.

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SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 4: Science Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. (MST-4)

THE LIVING ENVIRONMENT

Key Idea: L.4.5 Organisms maintain a dynamic equilibrium that sustains life. Performance Indicator: L.4.5a Students compare the way a variety of living specimens carry out basic life functions and maintain dynamic equilibrium.		
Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: L.4.5a Students compare the way a variety of living specimens carry out basic life functions and maintain dynamic equilibrium.</p> <p><i>EQ: How are vertebrates and invertebrates similar/ different?</i></p> <ol style="list-style-type: none"> Compares and contrasts body systems of vertebrates and invertebrates. 	<p>Performance Indicator: L.4.5a Students compare the way a variety of living specimens carry out basic life functions and maintain dynamic equilibrium.</p> <p><i>EQ: How do organisms change?</i></p> <ol style="list-style-type: none"> Observes life functions in selected animals (e.g., frogs, gerbils/ hamsters/ rats, snakes, etc). Compares and contrasts life functions among a variety of specimens. Explains that all organisms require energy to survive (e.g., cells use oxygen to release energy stored in food). 	<p>Performance Indicator: L.4.5a Students compare the way a variety of living specimens carry out basic life functions and maintain dynamic equilibrium.</p> <p><i>EQ: How do living organisms interact with/ impact the environment?</i></p> <ol style="list-style-type: none"> Demonstrates an understanding that natural cycles of living things are important to the environment. Describes the interaction among species and each organisms' place in the equilibrium of an ecosystem (e.g., producers- consumers, herbivores- carnivores- decomposers).

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SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 4: Science Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. **(MST-4)**

NYS Standard 1: Personal Health and Fitness Students will have the necessary knowledge and skills to establish and maintain physical fitness, participate in physical activity, and maintain personal health. **(H-1)**

THE LIVING ENVIRONMENT

Key Idea: L.4.5 Organisms maintain a dynamic equilibrium that sustains life.

Performance Indicator: L.4.5b Students describe the importance of major nutrients, vitamins, and minerals in maintaining health and promoting growth and explain the need for a constant input of energy for living organisms.

ALSO Key Idea: Health Education H.1.1 Students will understand human growth and development and recognize the relationship between behaviors and healthy development. They will understand ways to promote health and prevent disease and will demonstrate and practice positive health behaviors.

Performance Indicators:

- Students know how basic body systems work and interrelate in normal patterns of growth and development.
- Students possess basic knowledge and skills which support positive health choices and behaviors.
- Students understand how behaviors such as food selection, exercise, and rest affect growth and development.
- Students know about some diseases and disorders and how they are prevented and treated.

Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: L.4.5b Students describe the importance of major nutrients, vitamins, and minerals in maintaining health and promoting growth and explain the need for a constant input of energy for living organisms.</p> <p><i>EQ: How do body systems function?</i></p> <ol style="list-style-type: none"> 1. Defines food as a building material for all organisms. 2. Defines pathogens. 3. Explains how pathogens are transmitted and how to prevent transmission. 	<p>Performance Indicator: L.4.5b Students describe the importance of major nutrients, vitamins, and minerals in maintaining health and promoting growth and explain the need for a constant input of energy for living organisms.</p> <p><i>EQ: How do body systems interact?</i></p> <ol style="list-style-type: none"> 1. Analyzes nutrients in a variety of foods. 2. Explains how the nutrients in foods change during cooking and processing. 3. Identifies that energy in food is measured in calories. 	<p>Performance Indicator: L.4.5b Students describe the importance of major nutrients, vitamins, and minerals in maintaining health and promoting growth and explain the need for a constant input of energy for living organisms.</p> <p><i>EQ: How are organisms organized from basic elements?</i></p> <p><i>EQ: How are nutrients basic elements?</i></p> <ol style="list-style-type: none"> 1. Explains how the Food Guide pyramid is related to nutrients and a balanced diet. 2. Analyze the nutrient content claims of various foods. 3. Explains metabolism and the need for nutrients, vitamins and minerals for energy.

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SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 4: Science Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. **(MST-4)**

NYS Standard 5: Technology Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs. **(MST-5)**

THE LIVING ENVIRONMENT

Key Idea: L.4.6 Plants and animals depend on each other and their physical environment.

Performance Indicator: L.4.6a Students describe the flow of energy and matter through food chains and food webs.

ALSO Key Idea: T.5.1 Engineering design is an iterative process involving *modeling* and *optimization* used to develop technological solutions to problems within given constraints.

Performance Indicator: Students locate and utilize a range of printed, electronic, and human information resources to obtain ideas.

Performance Indicator: Students develop plans, including drawings with measurements and details of construction, and construct a model of the solution, exhibiting a degree of craftsmanship.

Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: L.4.6a Students describe the flow of energy and matter through food chains and food webs.</p> <p><i>EQ: How and why do changes occur within biomes?</i></p> <ol style="list-style-type: none"> Describes interdependence among living things (plants and animals) within each biome. <p><i>EQ: How ecosystems change over time?</i></p> <ol style="list-style-type: none"> Describes interdependence among living things within the ocean ecosystem. Identifies plant and animal life contained within the ocean ecosystem (see also L.4.4c). Uses Hyperstudio, Power Point, or similar software to present the components of an ocean ecosystem (see also L.4.4c). 	<p>Performance Indicator: L.4.6a Students describe the flow of energy and matter through food chains and food webs.</p> <p><i>EQ: How do organisms/ plants change?</i></p> <ol style="list-style-type: none"> Describes how plants make, store, and use food for energy. Identifies and explains passage of energy to/ from each link of the food chain. 	<p>Performance Indicator: L.4.6a Students describe the flow of energy and matter through food chains and food webs.</p> <p><i>EQ: How do living organisms interact with/ impact the environment?</i></p> <ol style="list-style-type: none"> Describes transfer of energy from its original source throughout the food chain. Identifies matter as transferred from one organism to another and between organisms and their physical environment (<i>to include water, nitrogen, carbon dioxide, and oxygen</i>). Constructs model of a food web or food chain using a variety of materials and sources.

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SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 4: Science Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. (MST-4)

THE LIVING ENVIRONMENT

<p>Key Idea: L.4.6 Plants and animals depend on each other and their physical environment. Performance Indicator: L.4.6b Students provide evidence that green plants make food and explain the significance of this process to other organisms.</p>		
Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: L.4.6b Students provide evidence that green plants make food and explain the significance of this process to other organisms. <i>EQ: How ecosystems change over time?</i></p> <ol style="list-style-type: none"> Identifies the role of the sun in salinity levels and ocean water composition. <p><i>EQ: How and why do changes occur within biomes?</i></p> <ol style="list-style-type: none"> Identifies the role of the sun within each major biome. 	<p>Performance Indicator: L.4.6b Students provide evidence that green plants make food and explain the significance of this process to other organisms. <i>EQ: How do plants change?</i></p> <ol style="list-style-type: none"> Differentiates between the process of photosynthesis and the process of respiration. Explains photosynthesis specifically (<i>to include the conversion of the Sun's energy to sugar and the roles of carbon dioxide and oxygen</i>). 	<p>No indicators at this grade level for <u>THIS</u> performance indicator.</p>

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SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 4: Science Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. **(MST-4)**

NYS Standard 5: Technology Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs. **(MST-5)**

THE LIVING ENVIRONMENT

Key Idea: L.4.7 Human decisions and activities have had a profound impact on the physical and living environment.

Performance Indicator: L.4.7a Students describe how living things, including humans, depend upon the living and nonliving environment for their survival.

ALSO Key Idea: T.5.6 Technology can have positive and negative impacts on individuals, society, and the environment and humans have the capability and responsibility to constrain or promote technological development.

Performance Indicator: Students describe how outputs of a technological system can be desired, undesired, expected, or unexpected.

Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: L.4.7a Students describe how living things, including humans, depend upon the living and nonliving environment for their survival.</p> <p><i>EQ: How ecosystems change over time?</i></p> <ol style="list-style-type: none"> 1. Describes methods used to remove the ocean's natural resources. <p><i>EQ: How and why do changes occur within biomes?</i></p> <ol style="list-style-type: none"> 2. Explains human changes upon biomes and the effects of those changes. 	<p>Performance Indicator: L.4.7a Students describe how living things, including humans, depend upon the living and nonliving environment for their survival.</p> <p><i>EQ: How do organisms/ plants change?</i></p> <ol style="list-style-type: none"> 1. Identifies renewable (water, plants and animals) and nonrenewable (coal, gas and oil) natural resources and their impact on society. 	<p>Performance Indicator: L.4.7a Students describe how living things, including humans, depend upon the living and nonliving environment for their survival.</p> <p><i>EQ: How is land impacted?</i></p> <ol style="list-style-type: none"> 1. Identifies the interconnectedness of an ecosystem to include living and nonliving elements. 2. Defines population (<i>to include role of resources, predation, and climate in increase or decrease of a species- including humans</i>). 3. Researches and describes the impact of technology (<i>positive or negative</i>) on the environment.

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SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 4: Science Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. **(MST-4)**

NYS Standard 5: Technology Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs. **(MST-5)**

THE LIVING ENVIRONMENT

Key Idea: L.4.7 Human decisions and activities have had a profound impact on the physical and living environment.

Performance Indicator: L.4.7b Students describe the effects of environmental changes on humans and other populations.

ALSO Key Idea: T.5.6 Technology can have positive and negative impacts on individuals, society, and the environment and humans have the capability and responsibility to constrain or promote technological development.

Performance Indicator: Students describe how outputs of a technological system can be desired, undesired, expected, or unexpected.

Grade 5	Grade 6	Grade 7 / 8
<p>Performance Indicator: L.4.7b Students describe the effects of environmental changes on humans and other populations.</p> <p><i>EQ: How and why do changes occur within biomes?</i></p> <ol style="list-style-type: none"> Explains environmental changes upon biomes and the effects of those changes. Describes the ocean ecosystem and balance of species. 	<p>Performance Indicator: L.4.7b Students describe the effects of environmental changes on humans and other populations.</p> <p><i>EQ: How do organisms/ plants change?</i></p> <ol style="list-style-type: none"> Identifies sources of air, water, and land pollution and their resulting impact on the natural world. Describes ways in which individuals can help conserve resources. 	<p>Performance Indicator: L.4.7b Students describe the effects of environmental changes on humans and other populations.</p> <p><i>EQ: How does geography affect how and where people live? (see SS.3.1)</i> <i>EQ: How is land impacted?</i></p> <ol style="list-style-type: none"> Identifies fossil fuels as nonrenewable energy resources and explains how their use can negatively impact the environment. Describes environmental changes that have impacted human populations. Describes environmental changes that have impacted animal populations.

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SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 6: Interconnectedness: Common Themes Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning. **(MST-6)**

INTERCONNECTEDNESS: COMMON THEMES

Key Idea: I.6.1 Systems Thinking Through systems thinking, people can recognize the commonalities that exist among all systems and how parts of a system interrelate and combine to perform specific functions.		
Grade 5	Grade 6	Grade 7/8
<i>Performance Indicators:</i> 1. Students describe the differences between dynamic systems and organizational systems. 2. Students describe the differences and similarities between engineering systems, natural systems, and social systems. 3. Students describe how the output from one part of a system (which can include material, energy, or information) can become the input to other parts.		<i>Performance Indicators:</i> 1. Students describe the differences between dynamic systems and organizational systems. 2. Students describe the differences and similarities between engineering systems, natural systems, and social systems. 3. Students describe the differences between open-and closed-loop systems. (NOTE: 7/8 only) 4. Students describe how the output from one part of a system (which can include material, energy, or information) can become the input to other parts.
Key Idea: I.6.2 Models Models are simplified representations of objects, structures, or systems used in analysis, explanation, interpretation, or design.		
Grade 5	Grade 6	Grade 7/8
<i>Performance Indicators:</i> 1. Students select an appropriate model to begin the search for answers or solutions to a question or problem. 2. Students use models to study processes that cannot be studied directly (e.g., when the real process is too slow, too fast, or too dangerous for direct observation). 3. Students demonstrate the effectiveness of different models to represent the same thing and the same model to represent different things.		
Key Idea: I.6.3 Magnitude and Scale The grouping of magnitudes of size, time, frequency, and pressures or other units of measurements into a series of relative order provides a useful way to deal with the immense range and the changes in scale that affect the behavior and design of systems.		
Grade 5	Grade 6	Grade 7/8
<i>Performance Indicators:</i> 1. Students cite examples of how different aspects of natural and designed systems change at different rates with changes in scale. 2. Students use powers of ten notation to represent very small and very large numbers		

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SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 6: Interconnectedness: Common Themes Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning. **(MST-6)**

INTERCONNECTEDNESS: COMMON THEMES

Key Idea: I.6.4 Equilibrium and Stability Equilibrium is a state of stability due either to a lack of changes (static equilibrium) or a balance between opposing forces (dynamic equilibrium).		
Grade 5	Grade 6	Grade 7/8
<i>Performance Indicators:</i> 1. Students describe how feedback mechanisms are used in both designed and natural systems to keep changes within desired limits. 2. Students describe changes within equilibrium cycles in terms of frequency or cycle length and determine the highest and lowest values and when they occur.		
Key Idea: I.6.5 Patterns of Change Identifying patterns of change is necessary for making predictions about future behavior and conditions.		
Grade 5	Grade 6	Grade 7/8
<i>Performance Indicators:</i> 1. Students use simple linear equations to represent how a parameter changes with time. 2. Students observe patterns of change in trends or cycles and make predictions on what might happen in the future.		
Key Idea: I.6.6 Optimization In order to arrive at the best solution that meets criteria within constraints, it is often necessary to make trade-offs.		
Grade 5	Grade 6	Grade 7/8
<i>Performance Indicators:</i> 1. Students determine the criteria and constraints and make tradeoffs to determine the best decision. 2. Students use graphs of information for a decision making problem to determine the optimum solution		

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SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 7: Interdisciplinary Problem Solving Students will apply the knowledge and thinking skills of mathematics, science and technology to address real-life problems and make informed decisions. (MST-7)

INTERDISCIPLINARY PROBLEM SOLVING

<p>Key Idea: IPS.7.1 Connections The knowledge and skills of mathematics, science, and technology are used together to make informed decisions and solve problems, especially those relating to issues of science/technology/society, consumer decision making, design, and inquiry into phenomena.</p>		
Grade 5	Grade 6	Grade 7/8
<p><i>Performance Indicators:</i></p> <ol style="list-style-type: none"> 1. Students analyze science/technology/society problems and issues that affect their home, school, or community, and carry out a remedial course of action. 2. Students make informed consumer decisions by seeking answers to appropriate questions about products, services, and systems; determining the cost/benefit and risk/benefit tradeoffs; and applying this knowledge to a potential purchase. 3. Students design solutions to real-world problems of general social interest related to home, school, or community using scientific experimentation to inform the solution and applying mathematical concepts and reasoning to assist in developing a solution. 4. Students describe and explain phenomena by designing and conducting investigations involving systematic observations, accurate measurements, and the identification and control of variables; by inquiring into relevant mathematical ideas; and by using mathematical and technological tools and procedures to assist in the investigation. 		

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SCIENCE: 5-8 Intermediate Curriculum

NYS Standard 7: Interdisciplinary Problem Solving Students will apply the knowledge and thinking skills of mathematics, science and technology to address real-life problems and make informed decisions. (MST-7)

INTERDISCIPLINARY PROBLEM SOLVING

<p>Key Idea: IPS.7.2 Strategies Solving interdisciplinary problems involves a variety of skills and strategies, including effective work habits, gathering and processing information; generating and analyzing ideas; realizing ideas; making connections among the common themes of mathematics, science, and technology; and presenting results.</p>		
Grade 5	Grade 6	Grade 7/8
<p><i>Performance Indicators:</i></p> <p>Students participate in an extended, culminating mathematics, science, and technology project. The project would require students to:</p> <ul style="list-style-type: none"> • work effectively • gather and process information • generate and analyze ideas • observe common themes • realize ideas • present results 		
<p>Key Idea: IPS.7.3 Skills and Strategies for Interdisciplinary Problem Solving</p>		
Grade 5	Grade 6	Grade 7/8
<p><i>Performance Indicators:</i></p> <p>Working Effectively: Contributing to the work of a brainstorming group, laboratory partnership, cooperative learning group, or project team; planning procedures; identify and managing responsibilities of team members; and staying on task, whether working alone or as part of a group.</p> <p>Gathering and Processing Information: Accessing information from printed media, electronic data bases, and community resources and using the information to develop a definition of the problem and to research possible solutions.</p> <p>Generating and Analyzing Ideas: Developing ideas for proposed solutions, investigating ideas, collecting data, and showing relationships and patterns in the data.</p> <p>Common Themes: Observing examples of common unifying themes, applying them to the problem, and using them to better understand the dimensions of the problem.</p> <p>Realizing Ideas: Constructing components or models, arriving at a solution, and evaluating the result.</p> <p>Presenting Results: Using a variety of media to present the solution and to communicate the results.</p>		

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