



**CURRICULUM STANDARDS  
INCLUDING  
GRADE-LEVEL EXPECTATIONS  
FOR SCIENCE**

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**PREKINDERGARTEN–GRADE 8**

## CURRICULUM STANDARDS INCLUDING GRADE-LEVEL EXPECTATIONS FOR SCIENCE

The *Curriculum Standards Including Grade-Level Expectations for Science* is a resource that supports the use of the 2004 *Core Science Curriculum Framework* to develop rigorous science curriculum, instruction and assessments. Grade-level expectations (GLEs) are a new feature that has been added to further delineate the expected performances in the science framework. GLEs specify what students should be able to do as a result of standards-based curriculum and instruction.

To promote high expectations for all students, the instructional outcomes described in the GLE statements reflect a full range of cognitive challenge, from basic recall through more complex applications of knowledge, to higher-order critical thinking skills such as analyzing, evaluating and creating. In addition, expected performances for scientific inquiry described in the science framework have been integrated within the GLEs for each content standard, underscoring the importance of engaging students in scientific inquiry focused on important science content.

The 2004 science framework is the foundation from which the GLEs are developed. Whereas the framework shows all four content standards for a grade level on one page, this document presents each content standard on a separate page with a selection of GLE learner outcomes that serve as targets for instruction and evidence of learning at that grade level. Appearing at the top of each three-column page are the grade level, the broad conceptual theme and the content standard as they are written in the science framework. The left-hand column (“State Frameworks”) shows the grade-level concept indicated by a “◆” in the framework. Since content standards in the science framework can have one, two or three bulleted concepts, this curriculum standards document has assigned an “a”, “b” or “c” to identify each bullet. The center column (“Grade-Level Expectations”) shows the new guidelines for student outcomes. The right-hand column shows expected performances that may be assessed on the science CMT, as written in the science framework.

Connecticut science educators, RESC science specialists and university scientists contributed to the development of the GLEs. The Leadership and Learning Center (formerly the Center for Performance Assessment) reviewed the curriculum standards and GLEs for science. Recommendations were made and are reflected in the current draft. The following is a summary of the center’s comparative analysis of the *Curriculum Standards Including Grade-Level Expectations for Science*:

The Connecticut Curriculum Standards Including Grade-Level Expectations present the science content and inquiry abilities that students need in order to be science literate. The Curriculum Standards are comparable to the National Science Education Standards (National Research Council, 1996) and the Benchmarks for Science Literacy (AAAS, 1993), as well as to the science standards of two states (South Carolina and California) whose standards have been identified by the Thomas B. Fordham Institute’s State of the State Science Standards 2005 as being exemplary.

The curriculum standards and GLEs describe rigorous achievement expectations that can serve as evidence of learning for all students in prekindergarten through Grade 8. This document is meant to assist district curriculum development, to help teachers align instruction to the 2004 Connecticut *Core Science Curriculum Framework*, and to improve student achievement in science.

**PREKINDERGARTEN AND KINDERGARTEN**

**Properties of Matter**

K.1 — Objects have properties that can be observed and used to describe similarities and differences.

State Framework	Grade-Level Expectations	CMT Correlation
<p><b>K.1.a. Some properties can be observed with the senses, and others can be discovered by using simple tools or tests.</b></p>	<ol style="list-style-type: none"> <li>1. Match each of the five senses with its associated body part and the kind of information it perceives.</li> <li>2. Make scientific observations using the five senses, and distinguish between an object’s observable properties and its name or its uses.</li> <li>3. Classify organisms or objects by one and two observable properties and explain the rule used for sorting (e.g., size, color, shape, texture or flexibility).</li> <li>4. Use simple tools and nonstandard units to estimate and measure properties such as heaviness, magnetic attraction and float/sink.</li> <li>5. Compare the observable properties of different materials from which objects are made (e.g., wood, plastic, metal, cloth and paper).</li> <li>6. Count, order and sort objects by their observable properties.</li> </ol>	<p><b>A1.</b> Use the senses and simple measuring tools, such as rulers and equal-arm balances, to observe common objects and sort them into groups based on size, weight, shape or color.</p> <p><b>A2.</b> Sort objects made of materials such as wood, paper and metal into groups based on properties such as flexibility, attraction to magnets, and whether they float or sink in water.</p> <p><b>A3.</b> Count objects in a group and use mathematical terms to describe quantitative relationships such as: same as, more than, less than, equal, etc.</p>

**PREKINDERGARTEN AND KINDERGARTEN**

**Heredity and Evolution**

K.2 — Many different kinds of living things inhabit the Earth.

State Framework	Grade Level Expectations	CMT Correlation
<p><b>K.2.a. Living things have certain characteristics that distinguish them from nonliving things, including growth, movement, reproduction and response to stimuli.</b></p>	<ol style="list-style-type: none"> <li>1. Use the senses to make observations of characteristics and behaviors of living and nonliving things.</li> <li>2. Infer from observations that living things need air, food, water, shelter and space to stay alive.</li> <li>3. Compare and contrast living things, which grow and can make a new living thing like itself, with nonliving things, which do not grow or reproduce.</li> <li>4. Give examples of living things and nonliving things.</li> <li>5. Make observations and distinguish between the characteristics of plants and animals.</li> <li>6. Match parents with their offspring (both plants and animals) to show that offspring are similar, but not identical, to their parents and to one another.</li> </ol>	<p><b>A4.</b> Describe the similarities and differences in the appearance and behaviors of plants, birds, fish, insects and mammals (including humans).</p> <p><b>A5.</b> Describe the similarities and differences in the appearance and behaviors of adults and their offspring.</p> <p><b>A6.</b> Describe characteristics that distinguish living from nonliving things.</p>

**PREKINDERGARTEN AND KINDERGARTEN**

**Energy in the Earth's Systems**

K.3 — Weather conditions vary daily and seasonally.

<b>State Framework</b>	<b>Grade-Level Expectations:</b>	<b>CMT Correlation</b>
<b>K.3.a. Daily and seasonal weather conditions affect what we do, what we wear and how we feel.</b>	<ol style="list-style-type: none"><li>1. Use the senses and simple measuring tools to estimate and record weather data and represent it in bar graphs.</li><li>2. Analyze weather data collected over time (during the day, from day to day, and from season to season) to identify patterns and make predictions.</li><li>3. Observe, compare and contrast cloud shapes, sizes and colors, and relate the appearance of clouds to fair weather or precipitation.</li><li>4. Summarize ways that weather influences humans, other animals and plants.</li><li>5. Make judgments about appropriate clothing and activities based on weather conditions.</li></ol>	<p><b>A7.</b> Describe and record daily weather conditions.</p> <p><b>A8.</b> Relate seasonal weather patterns to appropriate choices of clothing and activities.</p>

**PREKINDERGARTEN AND KINDERGARTEN**

**Science and Technology in Society**

K.4 — Some objects are natural, while others have been designed and made by people to improve the quality of life.

*This content standard is an application of the concepts in content standard K.1 and should be integrated into the same unit.*

<b>State Framework</b>	<b>Grade-Level Expectations:</b>	<b>CMT Correlation</b>
<b>K.4.a. Humans select both natural and man-made materials to build shelters based on local climate conditions, properties of the materials, and their availability in the environment.</b>	<ol style="list-style-type: none"><li>1. Conduct simple tests to determine properties that make different materials useful for making roofs, windows, walls and floors (e.g., waterproof, transparent, strong).</li><li>2. Seek information in books, magazines and pictures that describes materials used to build shelters by people in different regions of the world.</li><li>3. Compare and contrast the materials used by humans and animals to build shelters.</li></ol>	<b>A9.</b> Describe the types of materials used by people to build houses and the properties that make the materials useful.

**GRADE 1**

**Forces and Motion**

1.1 — The sun appears to move across the sky in the same way every day, but its path changes gradually over the seasons.

<b>State Framework</b>	<b>Grade-Level Expectations:</b>	<b>CMT Correlation</b>
<p><b>1.1.a An object’s position can be described by locating it relative to another object or the background.</b></p> <p><b>1.1.b An object’s motion can be described by tracing and measuring its position over time.</b></p>	<ol style="list-style-type: none"><li>1. Compare and contrast the relative positions of objects in words (in front of, behind, next to, inside of, above or below) and numbers (by measuring its distance from another object).</li><li>2. Apply direct and indirect pushes and pulls to cause objects to move (change position) in different ways (e.g., straight line, forward and backward, zigzag, in a circle).</li><li>3. Classify objects by the way they move (e.g., spinning, rolling, bouncing).</li><li>4. Conduct simple experiments and evaluate different ways to change the speed and direction of an object’s motion.</li><li>5. Observe, record and predict the sun’s position at different times of day (morning, noon, afternoon or night).</li><li>6. Conduct simple investigations of shadows and analyze how shadows change as the position of the sun (or an artificial light source) changes.</li></ol>	<p><b>A10.</b> Describe how the motion of objects can be changed by pushing and pulling.</p> <p><b>A11.</b> Describe the apparent movement of the sun across the sky and the changes in the length and direction of shadows during the day.</p>

**GRADE 1**

**Structure and Function**

1.2 — Living things have different structures and behaviors that allow them to meet their basic needs.

<b>State Framework</b>	<b>Grade-Level Expectations:</b>	<b>CMT Correlation</b>
<p><b>1.2.a. Animals need air, water and food to survive</b></p> <p><b>1.2.b. Plants need air, water and sunlight to survive.</b></p>	<ol style="list-style-type: none"><li>1. Explain what animals and plants need to stay alive.</li><li>2. Compare and contrast different structures and behaviors used by mammals, birds, amphibians, reptiles, fish and insects to move around, breathe and obtain food and water (e.g., legs/wings/fins, gills/lungs, claws/hands, etc.)</li><li>3. Explain the functions of roots, stems and leaves for enabling plants to obtain air, water, nutrients and sunlight.</li><li>4. Sort and classify plants by observable characteristics (e.g., leaf shape/size, stem or trunk covering, type of flower/fruit).</li><li>5. Perform simple experiments to explore how plant leaves and roots respond to water and sunlight.</li><li>6. Compare and contrast information about animals and plants found in fiction and nonfiction sources.</li></ol>	<p><b>A12.</b> Describe the different ways that animals, including humans, obtain water and food.</p> <p><b>A13.</b> Describe the different structures plants have for obtaining water and sunlight.</p> <p><b>A14.</b> Describe the structures that animals, including humans, use to move around.</p>



**GRADE 1**

**Structure and Function**

1.3 — Organisms change in form and behavior as part of their life cycles.

<b>State Framework</b>	<b>Grade-Level Expectations:</b>	<b>CMT Correlation</b>
<b>1.3.a. Some organisms undergo metamorphosis during their life cycles; other organisms grow and change, but their basic form stays essentially the same.</b>	<ol style="list-style-type: none"><li>1. Explain that living things experience a life cycle that includes birth, growth, reproduction and death.</li><li>2. Distinguish between animals that are born alive (e.g., humans, dogs, cows) and those that hatch from eggs (e.g., chickens, sea turtles, crocodiles).</li><li>3. Compare and contrast the changes in structure and behavior that occur during the life cycles of animals that undergo metamorphosis with those that do not.</li><li>4. Observe, record and compare the sequenced metamorphosis stages of different animals, and make predictions based on observed patterns.</li></ol>	<p><b>A15.</b> Describe the changes in organisms, such as frogs and butterflies, as they undergo metamorphosis.</p> <p><b>A16.</b> Describe the life cycles of organisms that grow but do not metamorphose.</p>

**GRADE 1**

**Science and Technology in Society**

1.4 The properties of materials and organisms can be described more accurately through the use of standard measuring units.

*This content standard should be integrated within all PK–5 standards.*

<b>State Framework</b>	<b>Grade-Level Expectations:</b>	<b>CMT Correlation</b>
<b>1.4.a. Various tools can be used to measure, describe and compare different objects and organisms.</b>	<ol style="list-style-type: none"><li>1. Use nonstandard and standard measurements to describe and compare the weight, length, and size of objects and organisms.</li><li>2. Show approximate size of a centimeter, meter, inch, foot and yard using referents such as a finger, a hand or a book.</li><li>3. Use metric and customary rulers to measure length, height or distance in centimeters, meters, inches, feet and yards.</li><li>4. Use balances and scales to compare and measure the heaviness of objects and organisms in kilograms, grams, pounds and ounces.</li><li>5. Use graduated cylinders, beakers and measuring cups to measure the volume of liquids in milliliters, liters, cups and ounces.</li><li>6. Use thermometers to measure air and water temperature in degrees Celsius and degrees Fahrenheit.</li><li>7. Make bar graphs to identify patterns in recorded measurements of growth or temperature over time.</li></ol>	<b>A17.</b> Estimate, measure and compare the sizes and weights of different objects and organisms using standard and nonstandard measuring tools.

**GRADE 2**

**Properties of Matter**

2.1 — Materials can be classified as solid, liquid or gas based on their observable properties.

<b>State Framework</b>	<b>Grade-Level Expectations:</b>	<b>CMT Correlation</b>
<b>2.1.a Solids tend to maintain their own shapes, while liquids tend to assume the shapes of their containers, and gases fill their containers fully.</b>	<ol style="list-style-type: none"><li>1. Compare and contrast the properties that distinguish solids, liquids and gases.</li><li>2. Classify objects and materials according to their state of matter.</li><li>3. Measure and compare the sizes of different solids.</li><li>4. Measure and compare the volume of a liquid poured into different containers.</li><li>5. Design a simple test to compare the flow rates of different liquids and granular solids.</li></ol>	<b>A18.</b> Describe differences in the physical properties of solids and liquids.

**GRADE 2**

**Structure and Function**

2.2 — Plants change their forms as part of their life cycles.

<b>State Framework</b>	<b>Grade-Level Expectations:</b>	<b>CMT Correlation</b>
<b>2.2.a. The life cycles of flowering plants include seed germination, growth, flowering, pollination and seed dispersal.</b>	<ol style="list-style-type: none"><li>1. Use senses and simple tools to collect data about the roots, stems, leaves, flowers and seeds of various plants (including trees, vegetables and grass.)</li><li>2. Explain how roots, stems, leaves, flowers and seeds function to complete the plant’s life cycle.</li><li>3. Predict the sequenced stages of a flowering plant’s life cycle.</li><li>4. Compare and contrast how seeds of different plants are adapted for dispersal by water, wind or animals.</li><li>5. Use magnifiers to observe the parts of a flower and describe the interactions between pollinators and the flower that result in plant reproduction.</li><li>6. Pose testable questions and design simple experiments to explore factors that affect seed germination and plant growth.</li></ol>	<p><b>A19.</b> Describe the life cycles of flowering plants as they grow from seeds, proceed through maturation and produce new seeds.</p> <p><b>A20.</b> Explore and describe the effects of light and water on seed germination and plant growth.</p>

**GRADE 2**

**The Changing Earth**

2.3 — Earth materials have varied physical properties that make them useful in different ways.

<b>State Framework</b>	<b>Grade-Level Expectations:</b>	<b>CMT Correlation</b>
<b>2.3.a. Soils support the growth of many kinds of plants, including those in our food supply.</b>	<ol style="list-style-type: none"><li>1. Observe and analyze the different components of soil, including rock fragments, water, air, minerals and organic material.</li><li>2. Use senses and simple equipment (e.g., sieves and settlement tests) to separate soil components and identify sand, silt and clay particles.</li><li>3. Classify soils by properties such as color, particle size (texture), or amount of organic material (humus).</li><li>4. Explain and evaluate the importance of soil to plants, animals and people.</li><li>5. Plan and conduct fair tests to investigate how different soil types affect plant growth and write conclusions supported by evidence.</li></ol>	<p><b>A21.</b> Sort different soils by properties, such as particle size, color and composition.</p> <p><b>A22.</b> Relate the properties of different soils to their capacity to retain water and support the growth of certain plants.</p>

**GRADE 2**

**Science and Technology in Society**

2.4 Human beings, like all other living things, have special nutritional needs for survival.

*This content standard is an application of the concepts in content standard 2.3 and should be integrated into the same unit.*

State Framework	Grade-Level Expectations	CMT Correlation
<p><b>2.4.a. The essential components of balanced nutrition can be obtained from plant and animal sources.</b></p> <p><b>2.4.b. People eat different foods in order to satisfy nutritional needs for carbohydrates, proteins and fats.</b></p>	<ol style="list-style-type: none"> <li>1. Explain that food is a source of carbohydrates, protein and fats — basic nutrients that animals (including humans) convert to energy they use to stay alive.</li> <li>2. Classify foods into groups based on their source (e.g., plant or animal) and relate common foods to the plant or animal from which they come.</li> <li>3. Explain how soil type, sunlight and rainfall influence crop growth in an area, and give examples of ways people can improve soil quality and crop growth (e.g., irrigation, fertilizer, pesticides).</li> <li>4. Compare and contrast how different cultures meet needs for basic nutrients by consuming various foods.</li> <li>5. Analyze food labels to evaluate and compare the nutritional value of different foods.</li> </ol>	<p><b>A23.</b> Identify the sources of common foods and classify them by their basic food groups.</p> <p><b>A24.</b> Describe how people in different cultures use different food sources to meet their nutritional needs.</p>

**GRADE 3**

**Properties of Matter**

3.1 Materials have properties that can be identified and described through the use of simple tests.

<b>State Framework</b>	<b>Grade-Level Expectations</b>	<b>CMT Correlation</b>
<b>3.1.a. Heating and cooling cause changes in some of the properties of materials.</b>	<ol style="list-style-type: none"><li>1. Compare and contrast the properties of solids, liquids and gases.</li><li>2. Carry out simple tests to determine if materials dissolve, sink or float in water, conduct heat or attract to magnets.</li><li>3. Classify materials based on their observable properties, including state of matter.</li><li>4. Design and conduct fair tests to investigate the absorbency of different papers, write conclusions based on evidence, and explain why similar investigations might produce different results.</li><li>5. Evaluate the effectiveness of different materials for keeping a substance warm or cold (i.e., conducting heat).</li><li>6. Explain the role of heat in changing matter from one state to another.</li><li>7. Predict the effect of adding or removing heat on the condensation, evaporation, melting or freezing of water.</li></ol>	<p><b>B1.</b> Sort and classify materials based on properties such as dissolving in water, sinking and floating, conducting heat, and attracting to magnets.</p> <p><b>B2.</b> Describe the effect of heating on the melting, evaporation, condensation and freezing of water.</p>

**GRADE 3**

**Heredity and Evolution**

3.2 — Organisms can survive and reproduce only in environments that meet their basic needs.

<b>State Framework</b>	<b>Grade-Level Expectations</b>	<b>CMT Correlation</b>
<b>3.2.a. Plants and animals have structures and behaviors that help them survive in different environments.</b>	<ol style="list-style-type: none"><li>1. Observe and analyze the external features and behaviors of diverse organisms that enable them to get food, water, find mates, and be protected from predators and weather.</li><li>2. Compare and contrast structural and behavioral adaptations that enable organisms to survive in different land and water environments.</li><li>3. Explain how hibernation and migration allow animals to survive seasonal changes.</li><li>4. Identify adaptations that allow plants to reach sunlight and water.</li><li>5. Give examples of ways in which animals use camouflage and explain how this adaptation helps them to survive.</li><li>6. Evaluate the ability of a plant or animal to survive in a given environment based on the organism’s structural and behavioral adaptations.</li></ol>	<p><b>B3.</b> Describe how different plants and animals are adapted to obtain air, water, food and protection in specific land habitats.</p> <p><b>B4.</b> Describe how different plants and animals are adapted to obtain air, water, food and protection in water habitats.</p>



**GRADE 3**

**The Changing Earth**

3.3 — Earth materials have different physical and chemical properties.

<b>State Framework</b>	<b>Grade-Level Expectations</b>	<b>CMT Correlation</b>
<b>3.3.a. Rocks and minerals have properties that may be identified through observation and testing; these properties determine how earth materials are used.</b>	<ol style="list-style-type: none"><li>1. Differentiate between rocks and minerals.</li><li>2. Observe and measure various rocks, then classify them based on observable properties (e.g., shape, size, color, weight, visible markings).</li><li>3. Test the properties of different minerals (e.g. color, odor, streak, luster, hardness, magnetism), organize data in a table, and use the data and other resources to identify unknown mineral specimens.</li><li>4. Observe, compare and analyze rock properties (e.g., crystal size or layers) to infer the conditions under which they were formed.</li><li>5. Locate scientific information about rock formation and compare and contrast the conditions under which igneous, metamorphic and sedimentary rocks are formed.</li><li>6. Evaluate the usefulness of different rock types for specific applications (e.g., construction, countertops, statues).</li></ol>	<p><b>B5.</b> Describe the physical properties of rocks and relate them to their potential uses.</p> <p><b>B6.</b> Relate the properties of rocks to the possible environmental conditions during their formation.</p>

**GRADE 3**

**Science and Technology in Society**

3.4 — Earth materials provide resources for all living things, but these resources are limited and should be conserved.

*This content standard is an application of the concepts in content standard 3.3 and should be integrated into the same unit.*

<b>State Framework</b>	<b>Grade-Level Expectations</b>	<b>CMT Correlation</b>
<b>3.4.a Decisions made by individuals can affect the global supply of many resources.</b>	<ol style="list-style-type: none"><li>1. Identify earth materials that are classified as natural resources and describe their uses.</li><li>2. Seek information in print and electronic media regarding how humans use technology to obtain energy and make materials from natural resources.</li><li>3. Compare and contrast renewable and nonrenewable resources.</li><li>4. Identify renewable and nonrenewable energy sources that can be used for heating buildings, fueling cars and making electricity.</li><li>5. Evaluate the impact of human actions (e.g., driving, trash disposal) on the quality of the air, water and land.</li><li>6. Use mathematics to estimate, measure and graph the quantity of a natural resource (e.g., water, paper) used by an individual (or group) in a certain time period.</li><li>7. Distinguish among reducing, reusing, recycling and replacing as conservation techniques.</li><li>8. Describe a conservation practice in the local community.</li></ol>	<b>B7.</b> Describe how earth materials can be conserved by reducing the quantities used, and by reusing and recycling materials rather than discarding them.

**GRADE 4**

**Forces and Motion**

4.1 — The position and motion of objects can be changed by pushing or pulling.

<b>State Framework</b>	<b>Grade-Level Expectations:</b>	<b>CMT Correlation</b>
<p><b>4.1.a. The size of the change in an object’s motion is related to the strength of the push or pull.</b></p> <p><b>4.1. b. The more massive an object is, the less effect a given force will have on its motion.</b></p>	<ol style="list-style-type: none"><li>1. Explain that a force is a push or pull that can cause an object to start moving, stop, or change speed or direction.</li><li>2. Use measurement tools and standard units to compare and contrast the motion of common objects in terms of change in position, speed and direction.</li><li>3. Investigate factors that affect the motion of objects (e.g., mass, friction, air resistance).</li><li>4. Design and conduct experiments to determine how the motion of an object is affected by varying the mass of the object and the strength of the force applied.</li><li>5. Create data tables and graphs and use them to analyze the relationship between the mass of an object and the force needed to change its motion.</li><li>6. Predict that the more massive an object is, the less effect a given force has on its motion.</li></ol>	<p><b>B8.</b> Describe the effects of the strengths of pushes and pulls on the motion of objects.</p> <p><b>B9.</b> Describe the effect of the mass of an object on its motion.</p>

**GRADE 4**

**Matter and Energy in Ecosystems**

4.2 — All organisms depend on the living and nonliving features of the environment for survival.

State Framework	Grade-Level Expectations:	CMT Correlation
<p><b>4.2.a. When the environment changes, some organisms survive and reproduce, and others die or move to new locations.</b></p>	<ol style="list-style-type: none"> <li>1. Give examples of ways that living and nonliving things are interdependent within an ecosystem and infer that abiotic factors (water, soil, sunlight) influence the biotic factors (plants, animals) within the ecosystem.</li> <li>2. Summarize how the sun’s energy enters and is transferred from producers to consumers in a food chain.</li> <li>3. Compare and contrast producers, consumers, herbivores, carnivores, omnivores and decomposers in terms of how they obtain energy.</li> <li>4. Draw food webs to show the varied energy-passing relationships among plants and animals in an ecosystem.</li> <li>5. Compare and contrast naturally occurring changes in ecosystems with those caused by human activity.</li> <li>6. Evaluate whether changes in an ecosystem are beneficial or harmful to an organism and predict the impact on various organisms when ecosystems change.</li> </ol>	<p><b>B10.</b> Describe how animals, directly or indirectly, depend on plants to provide the food and energy they need to grow and survive.</p> <p><b>B11.</b> Describe how natural phenomena and some human activities may cause changes to habitats and their inhabitants.</p>

**GRADE 4**

**Energy in the Earth's System**

4.3 — Water has a major role in shaping the Earth's surface.

<b>State Framework</b>	<b>Grade-Level Expectations:</b>	<b>CMT Correlation</b>
<b>4.3.a. Water circulates through the Earth's crust, oceans and atmosphere.</b>	<ol style="list-style-type: none"><li>1. Compare and contrast the major processes of the water cycle, (e.g., evaporation, condensation, precipitation, runoff) and describe the effects of the sun's energy and changes in temperature.</li><li>2. Construct models showing how topography influences how precipitation accumulates in streams and rivers that eventually return to an ocean.</li><li>3. Design and conduct simple investigations to determine how moving water (flowing downhill or in ocean waves) causes changes to the land, the coastline or the course of a stream or river.</li><li>4. Employ simple equipment and measuring tools to quantitatively test factors that affect erosion (e.g., type of earth material in an area, volume of moving water, slope of land, vegetation coverage).</li><li>5. Analyze observations and data to determine the relationship between the amount and speed of moving water and the size of earth materials moved (e.g., silt, pebbles, boulders).</li></ol>	<p><b>B12.</b> Describe how the sun's energy impacts the water cycle.</p> <p><b>B13.</b> Describe the role of water in erosion and river formation.</p>

**GRADE 4**

**Science and Technology in Society**

4.4 — Electrical and magnetic energy can be transferred and transformed.

State Framework	Grade-Level Expectations	CMT Correlation
<p><b>4.4.a. Electricity in circuits can be transformed into light, heat, sound and magnetic effects.</b></p> <p><b>4.4.b. Magnets can make objects move without direct contact between the object and the magnet.</b></p>	<ol style="list-style-type: none"> <li>1. Construct complete (closed) and incomplete (open) series circuits, draw labeled diagrams of each, and compare and contrast their properties.</li> <li>2. Predict whether diagrammed circuit configurations will light a bulb.</li> <li>3. Develop a method for testing conductivity and analyze data to generalize about what type of materials are good electrical conductors and which are good insulators.</li> <li>4. Create circuits in which electrical energy is transformed into heat, light, sound and/or motion energy.</li> <li>5. Observe magnetic effects associated with electricity and investigate factors that affect the strength of an electromagnet.</li> <li>6. Describe properties of materials that are attracted by magnets.</li> <li>7. Design procedures to separate mixtures of solids by using a magnet.</li> <li>8. Design and conduct fair tests to compare the attractive force of various magnets and identify improvements to the experimental designs.</li> <li>9. Investigate how magnets react with other magnets and analyze findings to develop rules about the interaction of north and south poles of magnets.</li> <li>10. Give examples of uses of magnets (e.g., motors, generators, household devices), and design a new application that uses a magnet.</li> </ol>	<p><b>B14.</b> Describe how batteries and wires can transfer energy to light a bulb.</p> <p><b>B15.</b> Explain how simple electrical circuits can be used to determine which materials conduct electricity.</p> <p><b>B16.</b> Describe the properties of magnets, and how they can be used to identify and separate mixtures of solid materials.</p>

**GRADE 5**

**Energy Transfer and Transformations**

5.1 — Sound and light are forms of energy.

State Framework	Grade-Level Expectations	CMT Correlation
<b>5.1.a. Sound is a form of energy that is produced by the vibration of objects and is transmitted by the vibration of air and objects.</b>	<ol style="list-style-type: none"><li>1. Generalize that vibrating objects produce sound if the vibrations are transferred from the object through another material (e.g., air, solid, liquid).</li><li>2. Compare and contrast the characteristic properties of sounds (e.g., loudness, pitch, and quality/timbre) and demonstrate how these properties can be varied.</li><li>3. Use simple equipment to demonstrate the relationship between vibration speed (frequency) and pitch.</li><li>4. Design and conduct investigations to determine factors that affect pitch.</li><li>5. Compare and contrast the transmission of sound through solids, liquids and gases and generalize that sound moves better through some materials than others.</li><li>6. Analyze properties of materials that cause sound to be reflected or absorbed, then apply findings to design a device that reflects or absorbs sound.</li><li>7. Construct musical instruments that produce sounds with various pitches, volume and timbres.</li></ol>	<p><b>B17.</b> Describe the factors that affect the pitch and loudness of sound produced by vibrating objects.</p> <p><b>B18.</b> Describe how sound is transmitted, reflected and/or absorbed by different materials.</p>

**GRADE 5**

**Energy Transfer and Transformations**

5.1 — Sound and light are forms of energy.

<b>State Framework</b>	<b>Grade-Level Expectations</b>	<b>CMT Correlation</b>
<b>5.1.b. Light is a form of energy that travels in a straight line and can be reflected by a mirror, refracted by a lens, or absorbed by objects.</b>	<ol style="list-style-type: none"><li>1. Demonstrate that light travels in straight lines away from a source in all directions.</li><li>2. Investigate how light is refracted as it passes through a lens or at an angle from one transparent material to another.</li><li>3. Demonstrate that white light is composed of many colors.</li><li>4. Explain that all visible objects are reflecting some light to the human eye.</li><li>5. Compare and contrast how light is reflected by a smooth, shiny object (e.g., mirror or pool of water) and how light is reflected by other objects.</li><li>6. Measure angles to predict the path of light reflected by a mirror.</li><li>7. Judge whether a material is opaque, transparent or translucent based on how light passes through it.</li><li>8. Design light absorption experiments that vary the size, length, direction and clarity of a shadow by changing the position of the light-blocking object or the light source.</li></ol>	<b>B19.</b> Describe how light is absorbed and/or reflected by different surfaces.



**GRADE 5**

**Structure and Function**

5.2 Perceiving and responding to information about the environment is critical to the survival of organisms.

<b>State Framework</b>	<b>Grade-Level Expectations:</b>	<b>CMT Correlation</b>
<b>5.2.a The sense organs perceive stimuli from the environment and send signals to the brain through the nervous system.</b>	<ol style="list-style-type: none"><li>1. Explain the role of sensory organs in influencing behaviors in response to environmental stimuli (e.g., light/dark, heat/cold, flavors, pain, etc.)</li><li>2. Pose testable questions and design experiments to determine factors that affect human reaction time.</li><li>3. Design and conduct simple investigations to explore the capabilities of the human senses.</li><li>4. Create a display that illustrates the role of the brain and spinal cord in responding to information received from the sense organs.</li><li>5. Identify the major structures of the human eye, ear, nose, skin and tongue, and explain their functions.</li><li>6. Draw diagrams showing the straight path of light rays from a source to a reflecting object to the eye, allowing objects to be seen.</li><li>7. Explain how properties of different materials and structures in the human eye affect humans' perception of color.</li></ol>	<p><b>B20.</b> Describe how light absorption and reflection allow one to see the shapes and colors of objects.</p> <p><b>B21.</b> Describe the structure and function of the human senses and the signals they perceive.</p>

**GRADE 5**

**Earth in the Solar System**

5.3 — Most objects in the solar system are in a regular and predictable motion.

<b>State Framework</b>	<b>Grade-Level Expectations</b>	<b>CMT Correlation</b>
<b>5.3.a. The positions of the earth and moon relative to the sun explain the cycles of day and night, and the monthly moon phases.</b>	<ol style="list-style-type: none"><li>1. Explain how light from the sun and Earth’s 24-hour axial rotation causes day and night on Earth.</li><li>2. Construct models demonstrating Earth’s rotation on its axis, the moon’s revolution around the Earth, and the Earth and moon revolving around the sun.</li><li>3. Differentiate between the sun as a source of light and the moon as a reflection of that light.</li><li>4. Observe and record the moon’s appearance over time and analyze findings to determine the monthly sequence of changes in its appearance (phases).</li><li>5. Relate the moon phases to changes in the moon’s position relative to the Earth and sun during its 29-day revolution around the Earth.</li></ol>	<p><b>B22.</b> Explain the cause of day and night based on the rotation of Earth on its axis.</p> <p><b>B23.</b> Describe the monthly changes in the appearance of the moon, based on the moon’s orbit around the Earth.</p>

**GRADE 5**

**Science and Technology in Society**

5.4 — Humans have the capacity to build and use tools to advance the quality of their lives.

*This content standard is an application of the concepts in content standard 5.1 and should be integrated into the same unit.*

State Framework	Grade-Level Expectations:	CMT Correlation															
<p><b>5.4.a. Advances in technology allow individuals to acquire new information about the world.</b></p>	<ol style="list-style-type: none"> <li>1. Generalize that optical tools, such as binoculars, telescopes, eyeglasses or periscopes, change the path of light by reflecting or refracting it.</li> <li>2. Construct simple periscopes and telescopes and analyze how the placement of their lenses and mirrors affects the quality of the image formed.</li> <li>3. Given a selection of optical instruments, evaluate the best one for a given task.</li> <li>4. Design and conduct simple investigations to determine how the shape of a lens or mirror (concave, convex, flat) affects the direction in which light rays travel.</li> <li>5. Explain how eyeglasses or contact lenses improve vision by changing the path of light to the retina.</li> <li>6. Analyze the similarities and differences between structures of the human eye and those of a simple camera.</li> </ol> <table border="1" data-bbox="520 1024 1640 1312"> <thead> <tr> <th>HUMAN EYE</th> <th>CAMERA</th> <th>FUNCTION</th> </tr> </thead> <tbody> <tr> <td>Eyelid</td> <td>Lens cap</td> <td>Protect interior parts</td> </tr> <tr> <td>Pupil</td> <td>Lens opening (aperture)</td> <td>Control amount of light entering</td> </tr> <tr> <td>Cornea, lens</td> <td>Lens</td> <td>Focus light rays on a point</td> </tr> <tr> <td>Retina</td> <td>Film (or digital medium)</td> <td>Respond to light resulting in an image</td> </tr> </tbody> </table>	HUMAN EYE	CAMERA	FUNCTION	Eyelid	Lens cap	Protect interior parts	Pupil	Lens opening (aperture)	Control amount of light entering	Cornea, lens	Lens	Focus light rays on a point	Retina	Film (or digital medium)	Respond to light resulting in an image	<p><b>B24.</b> Compare and contrast the structures of the human eye with those of the camera.</p> <p><b>B25.</b> Describe the uses of different instruments, such as eye glasses, magnifiers, periscopes and telescopes, to enhance our vision.</p>
HUMAN EYE	CAMERA	FUNCTION															
Eyelid	Lens cap	Protect interior parts															
Pupil	Lens opening (aperture)	Control amount of light entering															
Cornea, lens	Lens	Focus light rays on a point															
Retina	Film (or digital medium)	Respond to light resulting in an image															

**GRADE 6**

**Properties of Matter**

6.1 — Materials can be classified as pure substances or mixtures, depending on their chemical and physical properties.

State Framework	Grade-Level Expectations	CMT Correlation
<p><b>6.1.a Mixtures are made of combinations of elements and/or compounds, and they can be separated by using a variety of physical means.</b></p> <p><b>6.1.b Pure substances can be either elements or compounds, and they cannot be broken down by physical means.</b></p>	<ol style="list-style-type: none"> <li>1. Calculate the densities of various substances (matter) using the measurements of mass and volume.</li> <li>2. Describe the structure of the atom and its component parts.</li> <li>3. Support the statement, “All elements of matter have distinct physical and chemical properties and a unique atomic structure that may be used to identify them.”</li> <li>4. Illustrate the differences in physical and chemical properties of a molecule and the individual atoms bonded to form that molecule.</li> <li>5. Differentiate between a mixture and an element or compound and identify examples.</li> <li>6. Conduct and report on an investigation that uses physical means such particle size, density, solubility and magnetism to separate substances in a mixture.</li> <li>7. Develop an explanation of the patterns by which the periodic table is organized, including the structure of atoms and the resulting properties of the elements.</li> <li>8. Use a periodic table to identify elements in a compound; to locate metals, semimetals and nonmetals; and predict the general characteristics of an element.</li> </ol>	<p><b>C1.</b> Describe the properties of common elements, such as oxygen, hydrogen, carbon, iron and aluminum.</p> <p><b>C2.</b> Describe how the properties of simple compounds, such as water and table salt, are different from the properties of the elements of which they are made.</p> <p><b>C3.</b> Explain how mixtures can be separated by using the properties of the substances from which they are made, such as particle size, density, solubility and boiling point.</p>

**GRADE 6**

**Matter and Energy in Ecosystems**

6.2 — An ecosystem is composed of all the populations that are living in a certain space and the physical factors with which they interact.

State Framework	Grade-Level Expectations	CMT Correlation
<p><b>6.2.a Populations in ecosystems are affected by biotic factors, such as other populations, and abiotic factors, such as soil and water supply.</b></p> <p><b>6.2.b Populations in ecosystems can be categorized as producers, consumers and decomposers of organic matter.</b></p>	<ol style="list-style-type: none"> <li>1. Analyze and interpret how biotic and abiotic factors interact within a given ecosystem.</li> <li>2. Defend the statement, “The sun is the main source of energy on Earth.”</li> <li>3. Express in general terms how plants and other photosynthetic organisms use the sun’s energy.</li> <li>4. Investigate and report on the effects of abiotic factors on a plant’s ability to photosynthesize.</li> <li>5. Compare and contrast how energy and matter flow in an ecosystem emphasizing the interactions among producers, consumers and decomposers.</li> <li>6. Create a map of a Connecticut food web and determine the contributions of producers, consumers and decomposers in that food web.</li> <li>7. Compare the diets of herbivores, omnivores and carnivores and give local examples for each type of animal.</li> <li>8. Identify local examples of predator-prey relationships and justify the impact of each type of population on the other.</li> <li>9. Create and interpret graphs that illustrate the fluctuation of populations over time.</li> <li>10. Distinguish a food chain from a food web and identify local examples of each.</li> <li>11. Explain the impact of environmental conditions such as climate, elevation, topography or water quality on food chains.</li> <li>12. Research and report on how living organisms affect their environment in both beneficial and harmful ways.</li> <li>13. Predict what will happen to a population based upon current trends (fires, disease, overhunting, development) and defend the prediction.</li> </ol>	<p><b>C4.</b> Describe how abiotic factors, such as temperature, water and sunlight, affect the ability of plants to create their own food through photosynthesis.</p> <p><b>C5.</b> Explain how populations are affected by predator-prey relationships.</p> <p><b>C6.</b> Describe common food webs in different Connecticut ecosystems.</p>

**GRADE 6**

**Energy in the Earth’s Systems**

6.3 — Variation in the amount of the sun’s energy hitting the Earth’s surface affects daily and seasonal weather patterns.

State Framework	Grade-Level Expectations	CMT Correlation
<p><b>6.3.a Local and regional weather are affected by the amount of solar energy the area receives and proximity to a large body of water.</b></p>	<ol style="list-style-type: none"> <li>1. Compare the composition and structure of the Earth’s atmospheric layers.</li> <li>2. Demonstrate how changes in temperature, pressure and moisture affect weather patterns (e.g., air masses and air pressure.)</li> <li>3. Describe in writing how solar energy drives Earth’s weather systems.</li> <li>4. Investigate and report on how the introduction of heat affects the motion of particles and the distance between them.</li> <li>5. Illustrate the transfer of energy as matter changes phase.</li> <li>6. Design, conduct and report in writing an investigation that reveals different substances absorb and release heat at different rates.</li> <li>7. Research and give examples of heat transfer and local weather differences in Connecticut.</li> <li>8. Research and plan demonstrations that show how air molecules constantly press on and around objects on Earth creating air pressure.</li> <li>9. Compare the density of cold air to warm air and predict the impact of each on weather patterns.</li> <li>10. Investigate and explain the movement of local winds, including “sea breezes” and “land breezes,” based upon the uneven heating of the Earth’s surface and a change in air pressure.</li> <li>11. Examine and explain that global winds are caused by uneven heating of the Earth’s surface and the rotation of the Earth.</li> <li>12. Design a weather forecast based upon collected weather data.</li> </ol>	<p><b>C7.</b> Describe the effect of heating on the movement of molecules in solids, liquids and gases.</p> <p><b>C8.</b> Explain how local weather conditions are related to the temperature, pressure and water content of the atmosphere and the proximity to a large body of water.</p> <p><b>C9.</b> Explain how the uneven heating of the Earth’s surface causes winds and affects the seasons.</p>

**GRADE 6**

**Science, Technology and Society**

6.4 — Water moving across and through earth materials carries with it the products of human activities.

*This content standard is an application of the concepts in content standard 6.2 and should be integrated into the same unit.*

State Framework	Grade-Level Expectations	CMT Correlation
<p><b>6.4.a Most precipitation that falls on Connecticut eventually reaches Long Island Sound.</b></p>	<ol style="list-style-type: none"> <li>1. Discuss and chart the reasons why water is essential for life and is a distinguishing feature of Earth among the planets in our solar system.</li> <li>2. Research the differences in quantities between fresh water (solid and liquid) and salt water covering the Earth’s surface and report on the impact to humans.</li> <li>3. Observe, analyze and record the unique physical and chemical properties of water.</li> <li>4. Investigate and explain in writing how substances, both harmful and beneficial, dissolve in and are carried by surface and ground water.</li> <li>5. Use appropriate maps to locate and identify the major watersheds that drain into Long Island Sound and analyze how the topography influences the way water moves in the Long Island Sound watershed.</li> <li>6. Research and evaluate in writing the effects of common point and non-point water pollutants in Connecticut.</li> <li>7. Develop criteria for the use of a water source based upon the chemical and physical characteristics of a water source (drinking, recreational, industrial, agricultural).</li> <li>8. Compare and contrast the general structures, processes and limitations of a septic system to a secondary wastewater treatment plant.</li> <li>9. Debate the effectiveness of laws, regulations and remedial actions in the protection and restoration of water resources.</li> </ol>	<p><b>C10.</b> Explain the role of septic and sewage systems on the quality of surface and ground water.</p> <p><b>C11.</b> Explain how human activity may impact water resources in Connecticut, such as ponds, rivers and the Long Island Sound ecosystem.</p>

**GRADE 7**

**Energy Transfer and Transformations**

7.1 — Energy provides the ability to do work and can exist in many forms.

State Framework	Grade-Level Expectations	CMT Correlation
<p><b>7.1.a Work is the process of making objects move through the application of force.</b></p> <p><b>7.1.b Energy can be stored in many forms and can be transformed into the energy of motion.</b></p>	<ol style="list-style-type: none"> <li>1. Conduct simple experiments that show and explain how forces work in pairs (push/pull) to change the motion of an object.</li> <li>2. Compare and contrast forces that work over distances (gravity, magnetism) with forces that act on objects in direct contact (normal, friction).</li> <li>3. Calculate work done on objects as force and distance vary.</li> <li>4. Explain in writing how the six simple machines make work easier but do not alter the amount of work done on an object.</li> <li>5. Create and report on an investigation that compares input work and output work (mechanical advantage) of simple machines.</li> <li>6. Demonstrate how everyday objects function as simple machines.</li> <li>7. Defend the statement, “Work output of a machine is always less than work input because of energy lost due to friction.”</li> <li>8. Design and create a working compound machine from several simple machines.</li> <li>9. Use a diagram or model of a moving object (roller coaster, pendulum, etc.) to describe the conversion of potential energy into kinetic energy and vice versa.</li> <li>10. Discuss different forms of energy and describe how they can be converted from one form to another for use by humans (e.g., thermal, electrical, light, chemical, mechanical).</li> <li>11. Trace energy conversions that occur in the human body once food enters and explain the conversions in writing.</li> <li>12. Calculate potential and kinetic energy and relate those quantities to total energy in a system.</li> </ol>	<p><b>C12.</b> Explain the relationship among, force, distance and work, and use the relationship (<math>W = F \times D</math>) to calculate work done in lifting heavy objects.</p> <p><b>C13.</b> Explain how simple machines, such as inclined planes, pulleys and levers, are used to create mechanical advantage.</p> <p><b>C14.</b> Describe how different types of stored (potential) energy can be used to make objects move.</p>



**GRADE 7**

**Structure and Function**

7.2 — Many organisms, including humans, have specialized organ systems that interact with each other to maintain dynamic internal balance.

<b>State Framework</b>	<b>Grade-Level Expectations</b>	<b>CMT Correlation</b>
<p><b>7.2.a All organisms are composed of one or more cells; each cell carries on life-sustaining functions.</b></p> <p><b>7.2.b Multicellular organisms need specialized structures and systems to perform basic life functions.</b></p>	<ol style="list-style-type: none"> <li>1. Compare and contrast living organisms that are single celled with multicellular organisms.</li> <li>2. Illustrate and describe in writing the structure and the function of the following cell structures: cell membrane, cytoplasm, mitochondria and nucleus in an animal cell.</li> <li>3. Explain how the structure and function of multicellular organisms (animals) is dependent on the interaction of cells, tissues, organs and organ systems.</li> <li>4. Illustrate the structural differences and function of various cell types found in multicellular organisms (muscle, nerve, blood).</li> <li>5. Determine and report on how a similar group of cells are organized in tissues that have specific functions.</li> <li>6. Analyze and illustrate how tissues form organs with specific functions that contribute to the larger system.</li> <li>7. Investigate and explain in writing the basic structure and function of the human skeletal system.</li> <li>8. Differentiate between the structures and range of motion associated with ball, socket and hinge joints.</li> <li>9. Relate human joints to simple machines.</li> <li>10. Compare and contrast the structure and function of skeletal muscle with cardiac and smooth muscle.</li> <li>11. Demonstrate how the muscles, tendons, ligaments and bones interact to support the human body and allow movement.</li> </ol>	<p><b>C15.</b> Describe the basic structures of an animal cell, including the nucleus, cytoplasm, mitochondria and cell membrane, and how they function to support life.</p> <p><b>C16.</b> Describe the structures of the human digestive, respiratory and circulatory systems and explain how they function to bring oxygen and nutrients to the cells and expel waste materials.</p> <p><b>C17.</b> Explain how the human musculoskeletal system supports the body and allows movement.</p>

	<ol style="list-style-type: none"><li>12. Label the major parts of the human respiratory system and explain in writing the function of each part (nasal cavity, trachea, bronchi, lungs and diaphragm).</li><li>13. Label the major parts of the human circulatory system and explain in writing the function of each part (heart, veins, arteries and capillaries).</li><li>14. Demonstrate how the heart functions to circulate and re-oxygenate blood in the human body.</li><li>15. Compare the structures and functions of the basic components of blood (plasma, platelets, red and white cells).</li><li>16. Analyze the interaction between the circulatory and respiratory systems as the demand for oxygen changes.</li><li>17. Label the major parts of the human digestive system and explain in writing the function of each part in the chemical and physical breakdown of food (mouth, esophagus, stomach, small intestine, large intestine and rectum).</li><li>18. Research and defend the statement, “Body systems are interdependent and act together to maintain the body’s dynamic internal balance” (homeostasis).</li></ol>	
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**GRADE 7**

**Energy in the Earth's Systems**

7.3 — Landforms are the result of the interaction of constructive and destructive forces over time.

State Framework	Grade-Level Expectations	CMT Correlation
<p><b>7.3.a Volcanic activity and the folding and faulting of rock layers during the shifting of the Earth's crust affect the formation of mountains, ridges and valleys.</b></p> <p><b>7.3.b Glaciation, weathering and erosion change the Earth's surface by moving earth materials from place to place.</b></p>	<ol style="list-style-type: none"> <li>1. Illustrate and describe in writing the composition of the three major layers of the Earth's interior.</li> <li>2. Explain how Earth's internal energy is transferred to move tectonic plates.</li> <li>3. Demonstrate the processes of folding and faulting of the Earth's crust.</li> <li>4. Use an appropriate map to locate and name the major plate boundaries.</li> <li>5. Correlate common geological features/events (deep sea trenches, mountains, earthquakes, volcanoes) with the location of the plate boundaries.</li> <li>6. Examine and compare geological features that result from constructive forces shaping the surface of the Earth over time (e.g., mountains, ridges, volcanoes) with geological features that result from destructive forces shaping the surface of the Earth over time.</li> <li>7. Analyze and interpret data about the location, frequency and intensity of earthquakes.</li> <li>8. Compare and contrast the major agents of erosion: running water, moving ice, wave action, wind and mass movement due to gravity.</li> <li>9. Investigate and determine how glaciers form and affect the Earth's surface as they change over time.</li> <li>10. Discover and report how moving water is the major natural process by which the Earth's surface changes.</li> <li>11. Distinguish between weathering and erosion.</li> <li>12. Explain in writing the role of wind in the erosion and deposition of sediments to shape the Earth's surface.</li> <li>13. Observe and report on the geological events that are responsible for having shaped Connecticut's landscape.</li> </ol>	<p><b>C18.</b> Describe how folded and faulted rock layers provide evidence of gradual up and down motion of the Earth's crust.</p> <p><b>C19.</b> Explain how glaciation, weathering and erosion create and shape valleys and floodplains.</p> <p><b>C20.</b> Explain how the boundaries of tectonic plates can be inferred from the location of earthquakes and volcanoes.</p>

**GRADE 7**

**Science, Technology and Society**

7.4 — Technology allows us to improve food production and preservation, thus improving our ability to meet the nutritional needs of growing populations.

*This content standard is an application of the concepts in content standard 7.2 and should be integrated into the same unit.*

<b>State Framework</b>	<b>Grade-Level Expectations</b>	<b>CMT Correlation</b>
<b>7.4.a Various microbes compete with humans for the same sources of food.</b>	<ol style="list-style-type: none"><li>1. Investigate and describe in writing different types of microbes and the environmental conditions necessary for their survival.</li><li>2. Sketch how under optimum conditions bacteria reproduce rapidly.</li><li>3. Illustrate and describe the structural differences between bacterial and animal cells.</li><li>4. Analyze and record the various ways bacteria function in food webs.</li><li>5. Discover and discuss how humans use bacteria to produce food and identify examples.</li><li>6. Compare and contrast the role of bacteria in food production and food spoilage.</li><li>7. Evaluate and report how each method of food preservation including dehydration, pickling, irradiation and refrigeration works to stop or inhibit bacterial growth and give examples of each.</li><li>8. Compare and contrast the effectiveness and safety of past and current methods of food preservation.</li></ol>	<b>C21.</b> Describe how freezing, dehydration, pickling and irradiation prevent food spoilage caused by microbes.

**GRADE 8**

**Forces and Motion**

8.1 — An object’s inertia causes it to continue to moving the way it is moving unless it is acted upon by a force.

State Framework	Grade-Level Expectations	CMT Correlation
<p><b>8.1.a The motion of an object can be described by its position, direction of motion and speed.</b></p> <p><b>8.1.b An unbalanced force acting on an object changes its speed and/or direction of motion.</b></p> <p><b>8.1.c Objects moving in circles must experience force acting toward the center.</b></p>	<ol style="list-style-type: none"> <li>1. Demonstrate how forces (pushes/pulls) act upon an object to change its position over time in relation to a fixed point of reference.</li> <li>2. Calculate the average speed of an object and distinguish between instantaneous speed and average speed of an object.</li> <li>3. Create and interpret distance-time graphs for objects moving at constant and nonconstant speeds.</li> <li>4. Predict the motion of an object given the magnitude and direction of forces acting upon it (net force).</li> <li>5. Justify in writing why an object will not change its motion when forces acting upon it are balanced.</li> <li>6. Investigate and demonstrate how unbalanced forces cause acceleration (change in speed and/or direction of an object’s motion).</li> <li>7. Distinguish between scalar and vector quantities as they relate to motion of an object (speed vs. velocity).</li> <li>8. Assess in writing the relationship between an object’s mass and its inertia when at rest and in motion.</li> <li>9. Express mathematically how the mass of an object and the force acting on it affect its acceleration.</li> <li>10. Design and conduct an experiment to determine the relationship between gravitational acceleration and fluid friction (air resistance) on a falling object.</li> <li>11. Illustrate how the circular motion (centripetal motion) of an object is caused by a center seeking force resulting in the object’s constant acceleration.</li> </ol>	<p><b>C22.</b> Calculate the average speed of a moving object and illustrate the motion of objects in graphs of distance over time.</p> <p><b>C23.</b> Describe the qualitative relationships among force, mass and changes in motion.</p> <p><b>C24.</b> Describe the forces acting on an object moving in a circular path.</p>

**GRADE 8**

**Heredity and Evolution**

8.2 — Reproduction is a characteristic of living systems and it is essential for the continuation of every species.

State Framework	Grade-Level Expectations	CMT Correlation
<p><b>8.2.a Heredity is the passage of genetic information from one generation to another.</b></p> <p><b>8.2.b Some of the characteristics of an organism are inherited and some result from interactions with the environment.</b></p>	<ol style="list-style-type: none"> <li>1. Relate the continued existence of any species to its successful reproduction and explain in writing the factors that contribute to successful reproduction.</li> <li>2. Describe the structure, location and function of chromosomes, genes and DNA and how they relate to each other in the living cell.</li> <li>3. Illustrate and chart the purpose, cell type (somatic and germ) and resulting chromosome count during cell division in mitosis and meiosis.</li> <li>4. Identify the major structures in human male and female reproductive systems and explain where meiosis and gamete formation take place.</li> <li>5. Investigate and report on the role of hormone production as it initiates and regulates the creation of male and female germ cells from birth through adolescence and into adulthood.</li> <li>6. Compare and contrast the events and processes that occur when a human egg is fertilized or not fertilized.</li> <li>7. Demonstrate the relationship of corresponding genes on pairs of chromosomes to traits inherited by offspring.</li> <li>8. Describe in writing the role of the germ cells in the formation of the human zygote and its resulting 23 pairs of chromosomes, the 23rd of which determines gender and the other 22 of which determine the characteristics of that offspring.</li> </ol>	<p><b>C25.</b> Explain the differences in cell division in somatic and germ cells.</p> <p><b>C26.</b> Describe the structure and function of the male and female human reproductive systems, including the process of egg and sperm development.</p> <p><b>C27.</b> Describe how genetic information is organized in genes on chromosomes, and explain sex determination in humans.</p>

**GRADE 8**

**The Earth in the solar system**

8.3 — The solar system is composed of planets and other objects that orbit the sun.

State Framework	Grade-Level Expectations	CMT Correlation
<p><b>8.3.a Gravity is the force that governs the motions of objects in the solar system.</b></p> <p><b>8.3.b The motion of the Earth and moon relative to the sun causes daily, monthly and yearly cycles on the Earth.</b></p>	<ol style="list-style-type: none"> <li>1. Relate the strength of gravitational force between two objects to their mass and the distance between the centers of the two objects and provide examples.</li> <li>2. Describe in writing how gravitational attraction and the inertia of objects in the solar system keep them on a predictable elliptical pathway.</li> <li>3. Distinguish between rotation of Earth on its axis and its elliptical revolution around the sun.</li> <li>4. Demonstrate the impact of Earth’s rotation on its axis on daylight and tidal cycles.</li> <li>5. Investigate and report in writing the impact of Earth’s revolution around the Sun on changes in daylight, tides and seasons.</li> <li>6. Compare the revolution times of all the planets and relate it to their distance from the sun.</li> <li>7. Conduct and report on an investigation that shows how the Earth’s tilt on its axis and position around the sun relates to the angle of incidence of light and the subsequent intensity of light striking the Earth’s surface.</li> <li>8. Use a model to demonstrate the phases of the moon relative to the position of the sun, Earth and moon.</li> <li>9. Develop a model or illustration to show the relative positions of the Earth, sun and moon during a lunar and solar eclipse and explain how those positions influence the view from Earth.</li> <li>10. Interpret daily and monthly tidal data and analyze the patterns in terms of the gravitational attraction between the Earth, sun and moon.</li> <li>11. Investigate the technologies in use and research projects underway in space science today and assess the implications for everyday life on Earth.</li> </ol>	<p><b>C28.</b> Explain the effect of gravity on the orbital movements of planets in the solar system.</p> <p><b>C29.</b> Explain how the relative motion and relative position of the sun, Earth and moon affect the seasons, phases of the moon and eclipses.</p>

**GRADE 8**

**Science, Technology and Society**

8.4 — In the design of structures there is a need to consider factors such as function, materials, safety, cost and appearance.

*This content standard is an application of the concepts in content standard 8.1 and should be integrated into the same unit.*

<b>State Framework</b>	<b>Grade-Level Expectations</b>	<b>CMT Correlation</b>
<b>8.4.a Bridges can be designed in different ways to withstand certain loads and potentially destructive forces.</b>	<ol style="list-style-type: none"><li>1. Identify the forces acting on a truss, beam and suspension bridge, including compression, tension and gravity, given pictures or diagrams.</li><li>2. Explain in writing the advantages and disadvantages of truss, beam and suspension bridge design and identify each bridge visually.</li><li>3. Conduct an experiment to discover and report on a bridge’s ability to support a load based upon the interplay of tension and compression forces that result in a net force of zero.</li><li>4. Use technology to simulate how engineers plan, test and revise designs of bridges given parameters including cost, time, safety and aesthetics.</li></ol>	<b>C30.</b> Explain how beam, truss and suspension bridges are designed to withstand the forces that act on them.