

## Tennessee Science Standards

### Grade 4 : Inquiry

#### Conceptual Strand

*Understandings about scientific inquiry and the ability to conduct inquiry are essential for living in the 21<sup>st</sup> century.*

#### Guiding Question

*What tools, skills, knowledge, and dispositions are needed to conduct scientific inquiry?*

Grade Level Expectations	Checks for Understanding	State Performance Indicators
<p><b>GLE 0407.Inq.1</b> Explore different scientific phenomena by asking questions, making logical predictions, planning investigations, and recording data.</p> <p><b>GLE 0407.Inq.2</b> Select and use appropriate tools and simple equipment to conduct an investigation.</p> <p><b>GLE 0407.Inq.3</b> Organize data into appropriate tables, graphs, drawings, or diagrams.</p> <p><b>GLE 0407.Inq.4</b> Identify and interpret simple patterns of evidence to communicate the findings of multiple investigations.</p> <p><b>GLE 0407.Inq.5</b> Recognize that people may interpret the same results in different ways.</p>	<p>✓<b>0407.Inq.1</b> Identify specific investigations that could be used to answer a particular question and identify reasons for this choice.</p> <p>✓<b>0407.Inq.2</b> Identify tools needed to investigate specific questions.</p> <p>✓<b>0407.Inq.3</b> Maintain a science notebook that includes observations, data, diagrams, and explanations.</p> <p>✓<b>0407.Inq.4</b> Analyze and communicate findings from multiple investigations of similar phenomena to reach a conclusion.</p>	<p><b>SPI 0407.Inq.1</b> Select an investigation that could be used to answer a specific question.</p>

GLE 0407.Inq.6 Compare the results of an investigation with what scientists already accept about this question.		
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## Grade 4 : Technology & Engineering

### Conceptual Strand

*Society benefits when engineers apply scientific discoveries to design materials and processes that develop into enabling technologies.*

### Guiding Question

*How do science concepts, engineering skills, and applications of technology improve the quality of life?*

Grade Level Expectations	Checks for Understanding	State Performance Indicators
<p><b>GLE 0407.T/E.1</b> Describe how tools, technology, and inventions help to answer questions and solve problems.</p> <p><b>GLE 0407.T/E.2</b> Recognize that new tools, technology, and inventions are always being developed.</p> <p><b>GLE 0407.T/E.3</b> Identify appropriate materials, tools, and machines that can extend or enhance the ability to solve a specified problem.</p> <p><b>GLE 0407.T/E.4</b> Recognize the connection between scientific advances, new knowledge, and the availability of new tools and</p>	<p>✓<b>0407.T/E.1</b> Explain how different inventions and technologies impact people and other living organisms.</p> <p>✓<b>0407.T/E.2</b> Design a tool or a process that addresses an identified problem caused by human activity.</p> <p>✓<b>0407.T/E.3</b> Determine criteria to evaluate the effectiveness of a solution to a specified problem.</p> <p>✓<b>0407.T/E.4</b> Evaluate an invention that solves a problem and determine ways to improve the design.</p>	<p><b>SPI 0407.T/E.1</b> Select a tool, technology, or invention that was used to solve a human problem.</p> <p><b>SPI 0407.T/E.2</b> Recognize the connection between a scientific advance and the development of a new tool or technology.</p>

technologies.		
<b>GLE 0407.T/E.5</b> Apply a creative design strategy to solve a particular problem generated by societal needs and wants.		

## Grade 4 - Life Science

### Grade 4 : Standard 1 - Cells

#### Conceptual Strand 1

*All living things are made of cells that perform functions necessary for life.*

#### Guiding Question 1

*How are plant and animals cells organized to carry on the processes of life?*

Grade Level Expectations	Checks for Understanding	State Performance Indicators
<b>GLE 0407.1.1</b> Recognize that cells are the building blocks of all living things.	<p>✓<b>0407.1.1</b> Use illustrations or direct observations to compare and contrast the basic structures of plant and animal cells.</p> <p>✓<b>0407.1.2</b> Create a basic model of the cell that illustrates different cell structures and describes their functions.</p>	<b>SPI 0407.1.1</b> Compare basic structures of plant and animal cells.

## Grade 4 : Standard 2 - Interdependence

### Conceptual Strand 2

*All life is interdependent and interacts with the environment.*

### Guiding Question 2

*How do living things interact with one another and with the non-living elements of their environment?*

<b>Grade Level Expectations</b>	<b>Checks for Understanding</b>	<b>State Performance Indicators</b>
<b>GLE 0407.2.1</b> Analyze the effects of changes in the environment on the stability of an ecosystem.	✓ <b>0407.2.1</b> Analyze how an increase or decrease in competition or predation affects an ecosystem.  ✓ <b>0407.2.2</b> Design a simple experiment to illustrate the effects of competition, predation, and interdependency among living things.	<b>SPI 0407.2.1</b> Recognize the impact of predation and competition on an ecosystem.

## Grade 4 : Standard 3 - Flow of Matter and Energy

### Conceptual Strand 3

*Matter and energy flow through the biosphere.*

### Guiding Question 3

*What scientific information explains how matter and energy flow through the biosphere?*

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<b>Grade Level Expectations</b>	<b>Checks for Understanding</b>	<b>State Performance Indicators</b>
<p><b>GLE 0407.3.1</b> Demonstrate that plants require light energy to grow and survive.</p> <p><b>GLE 0407.3.2</b> Investigate different ways that organisms meet their energy needs.</p>	<p>✓<b>0407.3.1</b> Create a food web that illustrates the energy relationships between plants and animals and the key issues or assumptions found in the model.</p> <p>✓<b>0407.3.2</b> Classify organisms as carnivores, herbivores, or omnivores.</p> <p>✓<b>0407.3.3</b> Identify how a variety of organisms meet their energy needs.</p>	<p><b>SPI 0407.3.1</b> Determine how different organisms function within an environment in terms of their location on an energy pyramid.</p>

## Grade 4 : Standard 4 - Heredity

### Conceptual Strand 4

*Plants and animals reproduce and transmit hereditary information between generations.*

### Guiding Question 4

*What are the principal mechanisms by which living things reproduce and transmit information between parents and offspring?*

<b>Grade Level Expectations</b>	<b>Checks for Understanding</b>	<b>State Performance Indicators</b>
<p><b>GLE 0407.4.1</b> Recognize the relationship between reproduction and the continuation of a species.</p> <p><b>GLE 0407.4.2</b> Differentiate between complete</p>	<p>✓<b>0407.4.1</b> Design a simple demonstration that illustrates the relationship between reproduction and survival of a species.</p> <p>✓<b>0407.4.2</b> Study the life cycles of a variety of</p>	<p><b>SPI 0407.4.1</b> Draw conclusions about the relationship between reproduction and the survival of a species.</p> <p><b>SPI 0407.4.2</b> Distinguish between complete</p>

and incomplete metamorphosis.	organisms and determine whether these processes illustrate complete or incomplete metamorphosis.	and incomplete metamorphosis.
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<h2 style="text-align: center;">Grade 4 : Standard 5 - Biodiversity and Change</h2>		
<p><b>Conceptual Strand 5</b>  <i>A rich variety of complex organisms have developed in response to a continually changing environment.</i></p>		
<p><b>Guiding Question 5</b>  <i>How does natural selection explain how organisms have changed over time?</i></p>		
Grade Level Expectations	Checks for Understanding	State Performance Indicators
<p><b>GLE 0407.5.1</b> Analyze physical and behavioral adaptations that enable organisms to survive in their environment.</p> <p><b>GLE 0407.5.2</b> Describe how environmental changes caused the extinction of various plant and animal species.</p>	<p>✓<b>0407.5.1</b> Classify animals according to their physical adaptations for obtaining food, oxygen, and surviving within a particular environment.</p> <p>✓<b>0407.5.2</b> Describe how animal behaviors such as migration, defense, means of locomotion, and hibernation enable them to survive in an environment.</p> <p>✓<b>0407.5.3</b> Investigate tropisms that plants exhibit in response to changes in their environment.</p>	<p><b>SPI 0407.5.1</b> Determine how a physical or behavioral adaptation can enhance the chances of survival.</p> <p><b>SPI 0407.5.2</b> Infer the possible reasons why a species became endangered or extinct.</p>

	<p>✓<b>0407.5.4</b> Gather fossil information to draw conclusions about organisms that exist today.</p> <p>✓<b>0407.5.5</b> Analyze the common causes of extinction and explain how human actions sometimes result in the extinction of a species.</p>	
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## Grade 4 - Earth and Space Science

### Grade 4 : Standard 6 - The Universe

#### Conceptual Strand 6

*The cosmos is vast and explored well enough to know its basic structure and operational principles.*

#### Guiding Question 6

*What big ideas guide human understanding about the origin and structure of the universe, Earth's place in the cosmos, and observable motions and patterns in the sky?*

Grade Level Expectations	Checks for Understanding	State Performance Indicators
<p><b>GLE 0407.6.1</b> Analyze patterns, relative movements, and relationships among the sun, moon, and earth.</p>	<p>✓<b>0407.6.1</b> Chart the movements of the sun, moon, and earth to develop an explanation for the phases of the moon and solar and lunar eclipses.</p>	<p><b>SPI 0407.6.1</b> Organize the phases of the moon in the correct sequence.</p> <p><b>SPI 0407.6.2</b> Infer that the moon's phases are caused by the revolution of the moon and</p>

	✓0407.6.2 Sequence the major phases of the moon during a lunar cycle.	earth around the sun.
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## Grade 4 : Standard 7 – The Earth

### Conceptual Strand 7

*Major geologic events that occur over eons or brief moments in time continually shape and reshape the surface of the Earth, resulting in continuous global change.*

### Guiding Question 7

*How is the earth affected by long-term and short term geological cycles and the influence of man?*

Grade Level Expectations	Checks for Understanding	State Performance Indicators
<p><b>GLE 0407.7.1</b> Investigate how the Earth’s geological features change as a result of erosion (weathering and transportation) and deposition.</p> <p><b>GLE 0407.7.2</b> Evaluate how some earth materials can be used to solve human problems and enhance the quality of life.</p>	<p>✓0407.7.1 Prepare a demonstration to illustrate how wind and water affect the earth’s surface features.</p> <p>✓0407.7.2 Design an investigation to demonstrate how erosion and deposition change the earth’s surface.</p> <p>✓0407.7.3 List factors that determine the appropriate use of an earth material.</p> <p>✓0407.7.4 Use data from a variety of informational texts to analyze and evaluate man’s impact on non-renewable resources.</p>	<p><b>SPI 0407.7.1</b> Design a simple model to illustrate how the wind and movement of water alter the earth’s surface.</p> <p><b>SPI 0407.7.2</b> Analyze how different earth materials are utilized to solve human problems or improve the quality of life.</p>

## Grade 4 : Standard 8 - The Atmosphere

### Conceptual Strand 8

*The earth is surrounded by an active atmosphere and an energy system that controls the distribution life, local weather, climate, and global temperature.*

### Guiding Question 8

*How do the physical characteristics and the chemical makeup of the atmosphere influence surface processes and life on Earth?*

Grade Level Expectations	Checks for Understanding	State Performance Indicators
<p><b>GLE 0407.8.1</b> Recognize the major components of the water cycle.</p> <p><b>GLE 0407.8.2</b> Differentiate between weather and climate.</p>	<p>✓<b>0407.8.1</b> Prepare a model that illustrates the basic features of the water cycle.</p> <p>✓<b>0407.8.2</b> Use long term weather data to distinguish between weather and climate.</p> <p>✓<b>0407.8.3</b> Use an illustration to predict and draw conclusions about how weather and climate affect the water cycle.</p>	<p><b>SPI 0407.8.1</b> Identify the basic features of the water cycle and describe their importance to life on earth.</p> <p><b>SPI 0407.8.2</b> Distinguish between weather and climate.</p>

## Grade 4 - Physical Science

### Grade 4 : Standard 9 - Matter

<p><b>Conceptual Strand 9</b>  <i>The composition and structure of matter is known, and it behaves according to principles that are generally understood.</i></p>		
<p><b>Guiding Question 9</b>  <i>How does the structure of matter influence its physical and chemical behavior?</i></p>		
<p><b>Grade Level Expectations</b></p>	<p><b>Checks for Understanding</b></p>	<p><b>State Performance Indicators</b></p>
<p><b>GLE 0407.9.1</b> Collect data to illustrate that the physical properties of matter can be described with tools that measure weight, mass, length, and volume.</p> <p><b>GLE 0407.9.2</b> Explore different types of physical changes in matter.</p>	<p>✓<b>0407.9.1</b> Use appropriate tools to measure and compare the physical properties of various solids and liquids.</p> <p>✓<b>0407.9.2</b> Compare the causes and effects of various physical changes in matter.</p>	<p><b>SPI 0407.9.1</b> Choose an appropriate tool for measuring a specific physical property of matter.</p> <p><b>SPI 0407.9.2</b> Determine the mass, volume, and temperature of a substance or object using proper units of measurement.</p> <p><b>SPI 0407.9.3</b> Interpret the causes and effects of a physical change in matter.</p>

<p><b>Grade 4 : Standard 10 - Energy</b></p>		
<p><b>Conceptual Strand 10</b>  <i>Various forms of energy are constantly being transformed into other types without any net loss of energy from the system.</i></p>		
<p><b>Guiding Question 10</b>  <i>What basic energy related ideas are essential for understanding the dependency of the natural and man-made worlds on energy?</i></p>		

<b>Grade Level Expectations</b>	<b>Checks for Understanding</b>	<b>State Performance Indicators</b>
<p><b>GLE 0407.10.1</b> Distinguish among heat, radiant, and chemical forms of energy.</p> <p><b>GLE 0407.10.2</b> Investigate how light travels and is influenced by different types of materials and surfaces.</p>	<p>✓<b>0407.10.1</b> Design an investigation to demonstrate how different forms of energy release heat or light.</p> <p>✓<b>0407.10.2</b> Design an experiment to investigate how different surfaces determine if light is reflected, refracted, or absorbed</p> <p>✓<b>0407.10.3</b> Gather and organize information about a variety of materials to categorize them as translucent, transparent, or opaque.</p>	<p><b>SPI 0407.10.1</b> Identify different forms of energy, such as heat, light, and chemical.</p> <p><b>SPI 0407.10.2</b> Determine which surfaces reflect, refract, or absorb light.</p> <p><b>SPI 0407.10.3</b> Determine whether a material is transparent, translucent, or opaque.</p>

## **Grade 4 : Standard 11 - Motion**

### **Conceptual Strand 11**

*Objects move in ways that can be observed, described, predicted, and measured.*

### **Guiding Question 11**

*What causes objects to move differently under different circumstances?*

<b>Grade Level Expectations</b>	<b>Checks for Understanding</b>	<b>State Performance Indicators</b>
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<p><b>GLE 0407.11.1</b> Recognize that the position of an object can be described relative to other objects or a background.</p> <p><b>GLE 0407.11.2</b> Design a simple investigation to demonstrate how friction affects the movement of an object.</p> <p><b>GLE 0407.11.3</b> Investigate the relationship between the speed of an object and the distance traveled during a certain time period.</p>	<p>✓<b>0407.11.1</b> Identify the position of objects relative to fixed reference points.</p> <p>✓<b>0407.11.2</b> Design an investigation to identify factors that affect the speed and distance traveled by an object in motion.</p> <p>✓<b>0407.11.3</b> Complete a coordinate graph to describe the relative positions of objects.</p> <p>✓<b>0407.11.4</b> Plan and execute an investigation that demonstrates how friction affects the movement of an object.</p> <p>✓<b>0407.11.5</b> Design and implement an investigation to determine that the speed of an object is equal to the distance traveled over time.</p>	<p><b>SPI 0407.11.1</b> Describe the position of an object relative to fixed reference points.</p> <p><b>SPI 0407.11.2</b> Identify factors that influence the motion of an object.</p> <p><b>SPI 0407.11.3</b> Determine the relationship between speed and distance traveled over time.</p>
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## Grade 4 : Standard 12 - Forces in Nature

### Conceptual Strand 12

*Everything in the universe exerts a gravitational force on everything else; there is an interplay between magnetic fields and electrical currents.*

### Guiding Question 12

*What are the scientific principles that explain gravity and electromagnetism?*

Grade Level Expectations	Checks for Understanding	State Performance Indicators
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<p><b>GLE 0407.12.1</b> Explore the interactions between magnets.</p> <p><b>GLE 0407.12.2</b> Observe that electrically charged objects exert a pull on other materials.</p> <p><b>GLE 0407.12.3</b> Explain how electricity in a simple circuit requires a complete loop through which current can pass.</p>	<p>✓<b>0407.12.1</b> Explore the interactions between an electrically charged object and other materials.</p> <p>✓<b>0407.12.2</b> Design an experiment to investigate how a simple electromagnet affects common objects.</p> <p>✓<b>0407.12.3</b> Describe how electricity passes through a simple circuit that includes a battery, wire, switch, and bulb.</p>	<p><b>SPI 0407.12.1</b> Identify how magnets attract or repel one another.</p> <p><b>SPI 0407.12.2</b> Determine how an electrically charged material interacts with other objects.</p> <p><b>SPI 0407.12.3</b> Determine the path of an electrical current in a simple circuit.</p>
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