

TENNESSEE/METRO NASHVILLE PUBLIC SCHOOLS ACADEMIC STANDARDS/SCIENCE - GRADE 6

GRADE 6: EMBEDDED INQUIRY

Conceptual Strand - Inquiry <i>Understandings about scientific inquiry and the ability to conduct inquiry are essential for living in the 21st century.</i>		Guiding Question - Inquiry <i>What tools, skills, knowledge, and dispositions are needed to conduct scientific inquiry?</i>
Grade Level Expectations GLE 0607.Inq.1 Design and conduct open-ended scientific investigations. GLE 0607.Inq.2 Use appropriate tools and techniques to gather, organize, analyze, and interpret data. GLE 0607.Inq.3 Synthesize information to determine cause and effect relationships between evidence and explanations. GLE 0607.Inq.4 Recognize possible sources of bias and error, alternative explanations, and questions for further exploration. GLE 0607.Inq.5 Communicate scientific understanding using descriptions, explanations, and models..	Checks for Understanding (Formative/Summative Assessment) 0607.Inq.1 Design and conduct an open-ended scientific investigation to answer a question that includes a control and appropriate variables. 0607.Inq.2 Identify tools and techniques needed to gather, organize, analyze, and interpret data collected from a moderately complex scientific investigation. 0607.Inq.3 Use evidence from a dataset to determine cause and effect relationships that explain a phenomenon. 0607.Inq.4 Review an experimental design to determine possible sources of bias or error, state alternative explanations, and identify questions for further investigation. 0607.Inq.5 Design a method to explain the results of an investigation using descriptions, explanations, or models.	State Performance Indicators SPI 0607.Inq.1 Design a simple experimental procedure with an identified control and appropriate variables. SPI 0607.Inq.2 Select tools and procedures needed to conduct a moderately complex experiment. SPI 0607.Inq.3 Interpret and translate data into a table, graph, or diagram. SPI 0607.Inq.4 Draw a conclusion that establishes a cause and effect relationship supported by evidence. SPI 0607.Inq.5 Identify a faulty interpretation of data that is due to bias or experimental error.

EMBEDDED TECHNOLOGY & ENGINEERING

Conceptual Strand <i>Society benefits when engineers apply scientific discoveries to design materials and processes that develop into enabling technologies.</i>		Guiding <i>How do science concepts, engineering skills, and applications of technology improve the quality of life?</i>
Grade Level Expectations GLE 0607.T/E.1 Explore how technology responds to social, political, and economic needs. GLE 0607.T/E.2 Know that the engineering design process involves an ongoing series of events that incorporate design constraints, model building, testing, evaluating, modifying, and retesting. GLE 0607.T/E.3 Compare the intended benefits with the unintended consequences of a new technology. GLE 0607.T/E.4 Describe and explain adaptive and assistive bioengineered products.	Checks for Understanding (Formative/Summative Assessment) 0607.T/E.1 Use appropriate tools to test for strength, hardness, and flexibility of materials. 0607.T/E.2 Apply the engineering design process to construct a prototype that meets certain specifications. 0607.T/E.3 Explore how the unintended consequences of new technologies can impact society. 0607.T/E.4 Research bioengineering technologies that advance health and contribute to improvements in our daily lives. 0607.T/E.5 Develop an adaptive design and test its effectiveness.	SPI 0607.T/E.1 Identify the tools and procedures needed to test the design features of a prototype. SPI 0607.T/E.2 Evaluate a protocol to determine if the engineering design process was successfully applied. SPI 0607.T/E.3 Distinguish between the intended benefits and the unintended consequences of a new technology. SPI 0607.T/E.4 Differentiate between adaptive and assistive bioengineered products (e.g., food, biofuels, medicines, integrated pest management).

LIFE SCIENCE

STANDARD 1 – CELL

Conceptual Strand 1 <i>All living things are made of cells that perform functions necessary for life.</i>		Guiding Question 1 <i>How are plant and animals cells organized to carry on the processes of life?</i>
Grade Level Expectations (NOT ADDRESSED AT THIS GRADE LEVEL)	Checks for Understanding (Formative/Summative Assessment) (NOT ADDRESSED AT THIS GRADE LEVEL)	State Performance Indicators (NOT ADDRESSED AT THIS GRADE LEVEL)

STANDARD 2— INTERDEPENDENCE

Conceptual Strand 2 <i>All life is interdependent and interacts with the environment.</i>		Guiding Question 2 <i>How do living things interact with one another and with the non-living elements of their environment?</i>
Grade Level Expectations GLE 0607.2.1 Examine the roles of consumers, producers, and decomposers in a biological community. GLE 0607.2.2 Describe how matter and energy are transferred through an ecosystem. GLE 0607.2.3 Draw conclusions from data about interactions between the biotic and abiotic elements of a particular environment. GLE 0607.2.4 Analyze the environments and the interdependence among organisms found in the world’s major biomes.	Checks for Understanding (Formative/Summative Assessment) 0607.2.1 Compare and contrast the different methods used by organisms to obtain nutrition in a biological community. 0607.2.2 Create a graphic organizer that illustrates how biotic and abiotic elements of an environment interact. 0607.2.3 Use a food web or energy pyramid to demonstrate the interdependence of organisms within a specific biome. 0607.2.4 Create poster presentations to illustrate differences among the world’s major biomes.	State Performance Indicators SPI 0607.2.1 Classify organisms as producers, consumers, scavengers, or decomposers according to their role in a food chain or food web. SPI 0607.2.2 Interpret how materials and energy are transferred through an ecosystem. SPI 0607.2.3 Identify the biotic and abiotic elements of the major biomes. SPI 0607.2.4 Identify the environmental conditions and interdependencies among organisms found in the major biomes.

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STANDARD 3—FLOW OF MATTER AND ENERGY

Conceptual Strand 3 <i>Matter and energy flow through the biosphere.</i>	Guiding Question 3 <i>What scientific information explains how matter and energy flow through the biosphere?</i>
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STANDARD 4—HEREDITY

Conceptual Strand 4 Plants and animals reproduce and transmit hereditary information between generations.	Guiding Question 4 <i>What are the principal mechanisms by which living things reproduce and transmit information between parents and offspring?</i>
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STANDARD 5—BIODIVERSITY AND CHANGE

Conceptual Strand 5 <i>A rich variety of complex organisms have developed in response to a continually changing environment.</i>	Guiding Question 5 <i>How does natural selection explain how organisms have changed over time?</i>
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EARTH AND SPACE SCIENCE

STANDARD 6 – THE UNIVERSE

Conceptual Strand 6 <i>The cosmos is vast and explored well enough to know its basic structure and operational principles.</i>	Guiding Question 6 <i>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?</i>
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Grade Level Expectations	Checks for Understanding (Formative/Summative Assessment)	State Performance Indicators
<p>GLE 0607.6.1 Analyze information about the major components of the universe.</p> <p>GLE 0607.6.2 Describe the relative distance of objects in the solar system from earth.</p> <p>GLE 0607.6.3 Explain how the positional relationships among the earth, moon, and sun control the length of the day, lunar cycle, and year.</p> <p>GLE 0607.6.4 Describe the different stages in the lunar cycle.</p> <p>GLE 0607.6.5 Produce a model to demonstrate how the moon produces tides.</p> <p>GLE 0607.6.6 Illustrate the relationship between the seasons and the earth-sun system.</p> <p>GLE 0607.6.7 Describe the causes of lunar and solar eclipses.</p>	<p>0607.6.1 Use data to draw conclusions about the major components of the universe.</p> <p>0607.6.2 Construct a model of the solar system showing accurate positional relationships and relative distances.</p> <p>0607.6.3 Investigate how the earth, sun, and moon are responsible for a day, lunar cycle, and year.</p> <p>0607.6.4 Explain why the positions of the earth, moon, and sun were used to develop calendars and clocks.</p> <p>0607.6.5 Illustrate the positions of the earth, moon, and sun during specific tidal conditions.</p> <p>0607.6.6 Diagram the relationship of the earth and sun that accounts for the seasons.</p> <p>0607.6.7 Model the positions of the earth, moon, and sun during solar and lunar eclipses.</p>	<p>SPI 0607.6.1 Use data to draw conclusions about the major components of the universe.</p> <p>SPI 0607.6.2 Explain how the relative distance of objects from the earth affects how they appear.</p> <p>SPI 0607.6.3 Distinguish among a day, lunar cycle, and year based on the movements of the earth, sun, and moon.</p> <p>SPI 0607.6.4 Explain the different phases of the moon using a model of the earth, moon, and sun.</p> <p>SPI 0607.6.5 Predict the types of tides that occur when the earth and moon occupy various positions.</p> <p>SPI 0607.6.6 Use a diagram that shows the positions of the earth and sun to explain the four seasons.</p> <p>SPI 0607.6.7 Explain the difference between a solar and a lunar eclipse.</p>

STANDARD 7—THE EARTH

Conceptual Strand 7 <i>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.</i>	Guiding Question 7 <i>How is the earth affected by long-term and short term geological cycles and the influence of man?</i>
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STANDARD 8—ATMOSPHERE

Conceptual Strand 8 <i>The earth is surrounded by an active atmosphere and an energy system that controls the distribution life, local weather, climate, and global temperature.</i>		Guiding Question 8 <i>How do the physical characteristics and the chemical makeup of the atmosphere influence surface processes and life on Earth?</i>
Grade Level Expectations	Checks for Understanding (Formative/Summative Assessment)	State Performance Indicators
<p>GLE 0607.8.1 Design and conduct an investigation to determine how the sun drives atmospheric convection.</p> <p>GLE 0607.8.2 Describe how the sun’s energy produces the wind.</p> <p>GLE 0607.8.2 Investigate the relationship between currents and oceanic temperature differences.</p> <p>GLE 0607.8.4 Analyze meteorological data to predict weather conditions.</p>	<p>0607.8.1 Recognize how convection currents in the atmosphere produce wind.</p> <p>0607.8.2 Design an experiment to investigate differences in the amount of the sun’s energy absorbed by a variety of surface materials.</p> <p>0607.8.3 Design an experiment to demonstrate how ocean currents are associated with the sun’s energy.</p> <p>0607.8.4 Analyze ocean temperature data to demonstrate how these conditions affect the weather in nearby land masses.</p> <p>0607.8.5 Interpret data found on ocean current maps.</p> <p>0607.8.6 Use data collected from instruments such as a barometer, thermometer, psychrometer, and anemometer to describe local weather conditions.</p>	<p>SPI 0607.8.1 Analyze data to identify events associated with heat convection in the atmosphere.</p> <p>SPI 0607.8.2 Recognize the connection between the sun’s energy and the wind.</p> <p>SPI 0607.8.3 Describe how temperature differences in the ocean account for currents.</p> <p>SPI 0607.8.4 Interpret meteorological data to make predictions about the weather.</p>

PHYSICAL SCIENCE

STANDARD 9 – MATTER

Conceptual Strand 9 <i>The composition and structure of matter is known, and it behaves according to principles that are generally understood..</i>		Guiding Question 9 <i>How does the structure of matter influence its physical and chemical behavior?</i>
Grade Level Expectations (NOT ADDRESSED AT THIS GRADE LEVEL)	Checks for Understanding (Formative/Summative Assessment) (NOT ADDRESSED AT THIS GRADE LEVEL)	State Performance Indicators (NOT ADDRESSED AT THIS GRADE LEVEL)

STANDARD 10—ENERGY

Conceptual Strand 10 <i>Various forms of energy are constantly being transformed into other types without any net loss of energy from the system.</i>		Guiding Question 10 <i>What basic energy related ideas are essential for understanding the dependency of the natural and man-made worlds on energy?</i>
Grade Level Expectations	Checks for Understanding (Formative/Summative Assessment)	State Performance Indicators
<p>GLE 0607.10.1 Compare and contrast the three forms of potential energy.</p> <p>GLE 0607.10.2 Analyze various types of energy transformations.</p> <p>GLE 0607.10.3 Explain the principles underlying the Law of Conservation of Energy.</p>	<p>0607.10.1 Compare potential and kinetic energy.</p> <p>0607.10.2 Create a poster that illustrates different forms of potential energy.</p> <p>0607.10.3 Design a model that demonstrates a specific energy transformation.</p> <p>0607.10.4 Explain why a variety of energy transformations illustrate the Law of Conservation of Energy.</p>	<p>SPI 0607.10.1 Distinguish among gravitational potential energy, elastic potential energy, and chemical potential energy.</p> <p>SPI 0607.10.2 Interpret the relationship between potential and kinetic energy.</p> <p>SPI 0607.10.3 Recognize that energy can be transformed from one type to another.</p> <p>SPI 0607.10.4 Explain the Law of Conservation of Energy using data from a variety of energy transformations.</p>

STANDARD 11—MOTION

Conceptual Strand 11 <i>Objects move in ways that can be observed, described, predicted, and measured.</i>		Guiding Question 11 <i>What causes objects to move differently under different circumstances?</i>
Grade Level Expectations (NOT ADDRESSED AT THIS GRADE LEVEL)	Checks for Understanding (Formative/Summative Assessment) (NOT ADDRESSED AT THIS GRADE LEVEL)	State Performance Indicators (NOT ADDRESSED AT THIS GRADE LEVEL)

STANDARD 12—FORCES IN NATURE

Conceptual Strand 12 <i>Everything in the universe exerts a gravitational force on everything else; there is an interplay between magnetic fields and electrical currents.</i>		Guiding Question 12 <i>What are the scientific principles that explain gravity and electromagnetism?</i>
Grade Level Expectations	Checks for Understanding (Formative/Summative Assessment)	State Performance Indicators
<p>GLE 0607.12.1 Describe how simple circuits are associated with the transfer of electrical energy.</p> <p>GLE 0607.12.2 Explain how simple electrical circuits can be used to determine which materials conduct electricity.</p>	<p>0607.12.1 Prepare a poster that illustrates how electricity passes through a simple circuit to produce heat, light, or sound.</p> <p>0607.12.2 Determine a material’s electrical conductivity by testing it with a simple battery/bulb circuit.</p> <p>0607.12.3 Compare and contrast the characteristics of objects and materials that conduct electricity with those that are electrical insulators.</p>	<p>SPI 0607.12.1 Identify how simple circuits are associated with the transfer of electrical energy when heat, light, sound, and chemical changes are produced.</p> <p>SPI 0607.12.2 Identify materials that can conduct electricity.</p>