

TENNESSEE/METRO NASHVILLE PUBLIC SCHOOLS ACADEMIC STANDARDS/SCIENCE - GRADE 7

GRADE 7: 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 0707.Inq.1 Design and conduct open-ended scientific investigations. GLE 0707.Inq.2 Use appropriate tools and techniques to gather, organize, analyze, and interpret data. GLE 0707.Inq.3 Synthesize information to determine cause and effect relationships between evidence and explanations. GLE 0707.Inq.4 Recognize possible sources of bias and error, alternative explanations, and questions for further exploration. GLE 0707.Inq.5 Communicate scientific understanding using descriptions, explanations, and models.	Checks for Understanding (Formative/Summative Assessment) 0707.Inq.1 Design and conduct an open-ended scientific investigation to answer a question that includes a control and appropriate variables. 0707.Inq.2 Identify tools and techniques needed to gather, organize, analyze, and interpret data collected from a moderately complex scientific investigation. 0707.Inq.3 Use evidence from a dataset to determine cause and effect relationships that explain a phenomenon. 0707.Inq.4 Review an experimental design to determine possible sources of bias or error, state alternative explanations, and identify questions for further investigation. 0707.Inq.5 Design a method to explain the results of an investigation using descriptions, explanations, or models.	State Performance Indicators SPI 0707.Inq.1 Design a simple experimental procedure with an identified control and appropriate variables. SPI 0707.Inq.2 Select tools and procedures needed to conduct a moderately complex experiment. SPI 0707.Inq.3 Interpret and translate data into a table, graph, or diagram. SPI 0707.Inq.4 Draw a conclusion that establishes a cause and effect relationship supported by evidence. SPI 0707.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 0707.T/E.1 Explore how technology responds to social, political, and economic needs. GLE 0707.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 0707.T/E.3 Compare the intended benefits with the unintended consequences of a new technology. GLE 0707.T/E.4 Describe and explain adaptive and assistive bioengineered products.	Checks for Understanding (Formative/Summative Assessment) 0707.T/E.1 Use appropriate tools to test for strength, hardness, and flexibility of materials. 0707.T/E.2 Apply the engineering design process to construct a prototype that meets certain specifications. 0707.T/E.3 Explore how the unintended consequences of new technologies can impact society. 0707.T/E.4 Research bioengineering technologies that advance health and contribute to improvements in our daily lives. 0707.T/E.5 Develop an adaptive design and test its effectiveness.	State Performance Indicators SPI 0707.T/E.1 Identify the tools and procedures needed to test the design features of a prototype. SPI 0707.T/E.2 Evaluate a protocol to determine if the engineering design process was successfully applied. SPI 0707.T/E.3 Distinguish between the intended benefits and the unintended consequences of a new technology. SPI 0707.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 GLE 0707.1.1 Make observations and describe the structure and function of organelles found in plant and animal cells. GLE 0707.1.2 Summarize how the different levels of organization are integrated within living systems. GLE 0707.1.3 Describe the function of different organ systems and how collectively they enable complex multicellular organisms to survive. GLE 0707.1.4 Illustrate how cell division occurs in sequential stages to maintain the chromosome number of a species. GLE 0707.1.5 Observe and explain how materials move through simple diffusion.	Checks for Understanding (Formative/Summative Assessment) 0707.1.1 Examine and describe plant and animal cells using compound microscopes. 0707.1.2 Identify the function of the major plant and animal cellular organelles. 0707.1.3 Make a Venn diagram to compare the structures and functions of an animal cell with a city or school. 0707.1.4 Build a 3-D model of a cell. 0707.1.5 Construct a poster that illustrates the hierarchy among cells, tissues, organs, organ systems, and organisms. 0707.1.6 Describe the function of different organ systems. 0707.1.7 Explain how different organ systems interact to enable complex multicellular organisms to survive. 0707.1.8 Apply the idea of the division of labor to explain why living things are organized into cells, tissues, organs, and organ systems. 0707.1.9 Model the movement of chromosomes during plant cell division. 0707.1.10 Design a demonstration that illustrates how materials move across a semi-permeable membrane by simple diffusion.	State Performance Indicators SPI 0707.1.1 Identify and describe the function of the major plant and animal cell organelles. SPI 0707.1.2 Interpret a chart to explain the integrated relationships that exist among cells, tissues, organs, and organ systems. SPI 0707.1.3 Explain the basic functions of a major organ system. SPI 0707.1.4 Sequence a series of diagrams that depict chromosome movement during plant cell division. SPI 0707.1.5 Explain how materials move through simple diffusion.

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 (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)

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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>
Grade Level Expectations	Checks for Understanding (Formative/Summative Assessment)	State Performance Indicators
<p>GLE 0707.3.1 Distinguish between the basic features of photosynthesis and respiration.</p> <p>GLE 0707.3.2 Investigate the exchange of oxygen and carbon dioxide between living things and the environment.</p>	<p>0707.3.1 Associate the fundamental processes of photosynthesis and respiration with appropriate cell structures.</p> <p>0707.3.2 Examine and identify the chloroplasts in a leaf cell.</p> <p>0707.3.3 Identify the materials used by plants to make food.</p> <p>0707.3.4 Create a chart that compares the reactants and products of photosynthesis and respiration.</p> <p>0707.3.5 Model the pathways of water, oxygen, and carbon dioxide through a plant.</p> <p>0707.3.6 Describe the movement of oxygen and carbon dioxide between living things and the environment.</p> <p>0707.3.7 Describe structures that animals use to obtain oxygen.</p>	<p>SPI 0707.3.1 Compare the chemical compounds that make up the reactants and products of photosynthesis and respiration.</p> <p>SPI 0707.3.2 Interpret a diagram to explain how oxygen and carbon dioxide are exchanged between living things and the environment.</p>

STANDARD 4—HEREDITY

Conceptual Strand 4 <i>Plants and animals reproduce and transmit hereditary information between generations.</i>		Guiding Question 4 <i>What are the principal mechanisms by which living things reproduce and transmit information between parents and offspring?</i>
Grade Level Expectations	Checks for Understanding (Formative/Summative Assessment)	State Performance Indicators
<p>GLE 0707.4.1 Compare and contrast the fundamental features of sexual and asexual reproduction.</p> <p>GLE 0707.4.2 Demonstrate an understanding of sexual reproduction in flowering plants.</p> <p>GLE 0707.4.3 Explain the relationship among genes, chromosomes, and inherited traits.</p> <p>GLE 0707.4.4 Predict the probable appearance of offspring based on the genetic characteristics of the parents.</p>	<p>0707.4.1 Classify organisms according to whether they reproduce sexually or asexually.</p> <p>0707.4.2 Label and explain the function of the reproductive parts of a flower.</p> <p>0707.4.3 Describe various methods of plant pollination.</p> <p>0707.4.4 Investigate the relationship among DNA, genes, and chromosomes.</p> <p>0707.4.5 Explain the differences between dominant and recessive traits.</p> <p>0707.4.6 Use a Punnett square to predict the genotypes of offspring resulting from a monohybrid cross.</p> <p>0707.4.7 Draw a phenotypically accurate picture of an individual whose traits are modeled by the role of a die.</p>	<p>SPI 0707.4.1 Classify methods of reproduction as sexual or asexual.</p> <p>SPI 0707.4.2 Match flower parts with their reproductive functions.</p> <p>SPI 0707.4.3 Describe the relationship among genes, chromosomes, and inherited traits.</p> <p>SPI 0707.4.4 Interpret a Punnett square to predict possible genetic combinations passed from parents to offspring during sexual reproduction.</p>

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>
Grade Level Expectations	Checks for Understanding (Formative/Summative Assessment)	State Performance Indicators
(NOT ADDRESSED AT THIS GRADE LEVEL)	(NOT ADDRESSED AT THIS GRADE LEVEL)	(NOT ADDRESSED AT THIS GRADE LEVEL)

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>
Grade Level Expectations	Checks for Understanding (Formative/Summative Assessment)	State Performance Indicators
(NOT ADDRESSED AT THIS GRADE LEVEL)	(NOT ADDRESSED AT THIS GRADE LEVEL)	(NOT ADDRESSED AT THIS GRADE LEVEL)

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>
Grade Level Expectations	Checks for Understanding (Formative/Summative Assessment)	State Performance Indicators
<p>GLE 0707.7.1 Describe the physical properties of minerals.</p> <p>GLE 0707.7.2 Summarize the basic events that occur during the rock cycle.</p> <p>GLE 0707.7.3 Analyze the characteristics of the earth’s layers and the location of the major plates.</p> <p>GLE 0707.7.4 Explain how earthquakes, mountain building, volcanoes, and sea floor spreading are associated with movements of the earth’s major plates.</p> <p>GLE 0707.7.5 Differentiate between renewable and nonrenewable resources in terms of their use by man.</p> <p>GLE 0707.7.6 Evaluate how human activities affect the earth’s land, oceans, and atmosphere.</p>	<p>0707.7.1 Organize and explain information about the properties of minerals and their uses.</p> <p>0707.7.2 Label a diagram that depicts the major processes of the rock cycle.</p> <p>0707.7.3 Distinguish among sedimentary, igneous, and metamorphic rocks and relate these to a simple diagram of the rock cycle.</p> <p>0707.7.4 Recognize that the earth’s layers have different thickness, states of matter, densities, and chemical makeup.</p> <p>0707.7.5 Analyze the relationship between plate movements and areas of earthquake activity.</p> <p>0707.7.6 Analyze the relationship between plate movements and mountain building.</p> <p>0707.7.7 Analyze the relationship between plate movements, volcanoes, and sea floor spreading.</p> <p>0707.7.8 Determine the impact of man’s use of renewable and nonrenewable resources on future supplies.</p> <p>0707.7.9 Evaluate how human activities affect the condition of the earth’s land, water, and atmosphere.</p>	<p>SPI 0707.7.1 Use a table of physical properties to classify minerals.</p> <p>SPI 0707.7.2 Label a diagram that depicts the three different rock types.</p> <p>SPI 0707.7.3 Identify the major processes that drive the rock cycle.</p> <p>SPI 0707.7.4 Differentiate among the characteristics of the earth’s three layers.</p> <p>SPI 0707.7.5 Recognize that lithospheric plates on the scale of continents and oceans continually move at rates of centimeters per year.</p> <p>SPI 0707.7.6 Describe the relationship between plate movements and earthquakes, mountain building, volcanoes, and sea floor spreading.</p> <p>SPI 0707.7.7 Analyze and evaluate the impact of man’s use of earth’s land, water, and atmospheric resources.</p>

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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 (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)

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 (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 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 GLE 0707.11.1 Identify six types of simple machines. GLE 0707.11.2 Apply the equation for work in experiments with simple machines to determine the amount of force needed to do work. GLE 0707.11.3 Distinguish between speed and velocity. GLE 0707.11.4 Investigate how Newton’s laws of motion explain an object’s movement. GLE 0707.11.5 Compare and contrast the basic parts of a wave. GLE 0707.11.6 Investigate the types and fundamental properties of waves.	Checks for Understanding (Formative/Summative Assessment) 0707.11.1 Compare the six types of simple machines. 0707.11.2 Compete an investigation to determine how machines reduce the amount of force needed to do work. 0707.11.3 Summarize the difference between the speed and velocity based on the distance and amount of time traveled. 0707.11.4 Recognize how a net force impacts an object’s motion. 0707.11.5 Create a graphic organizer to illustrate and describe the basic parts of a wave. 0707.11.6 Compare how transverse and longitudinal waves	State Performance Indicators SPI 0707.11.1 Differentiate between the six simple machines. SPI 0707.11.2 Determine the amount of force needed to do work using different simple machines. SPI 0707.11.3 Apply proper equations to solve basic problems pertaining to distance, time, speed, and velocity. SPI 0707.11.4 Identify and explain how Newton’s laws of motion relate to the movement of objects. SPI 0707.11.5 Compare and contrast the different parts of a wave. SPI 0707.11.6 Differentiate between transverse and longitudinal waves in terms of how they are produced and transmitted.

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 (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)