

	GE Statement with Ceiling DOK	Science Concepts	Examples/Practice Items
CELL TRANSPORT			
Cell Transport	<p>S79-12:30 (DOK 3) Students demonstrate their understanding of Structure and Function-Survival Requirements by...</p> <ul style="list-style-type: none"> Predicting, explaining and drawing conclusions about the direction of movement of substances across a membrane. 	<p>Science Concepts: a. There are four basic types of organic compounds found in a cell (proteins, carbohydrates, lipids and nucleic acids).</p>	
Cell Organelles	<p>AND</p> <ul style="list-style-type: none"> Developing a model that illustrates the interdependence of cellular organelles (mitochondria, ribosomes, lysosomes, endoplasmic reticulum, cytoplasm) in biochemical pathways within the cell (e.g. mitochondria and chloroplasts: cellular respiration and photosynthesis; nucleus and ribosomes: DNA transcription and protein synthesis). 	<p>b. Enzymes, proteins that regulate biochemical reactions, are critical to the survival of cells.</p>	<p>(DOK 2)</p> <ul style="list-style-type: none"> Compare and contrast the structures and functions of the mitochondrion and chloroplast organelles.
PNCL	<p>AND</p> <ul style="list-style-type: none"> Explaining how the basic (general) shape and structure of each of the four types of organic molecules relates to its role in maintaining cell survival (i.e., Simple carbohydrates [monosaccharides] can be an energy source as a single molecule and a storage/structural molecule when multiple units are chemically combined—[starch, cellulose, chitin].). 	<p>c. The molecular structure of a cell membrane allows for selective transfer of substances into and out of the cell (i.e., diffusion, osmosis, facilitated diffusion, active transport).</p>	<p>(DOK 3)</p> <ul style="list-style-type: none"> Develop scientific model that illustrates the interdependence of structure and functioning six cellular organelles using an analogy to everyday objects or systems.
Protein folding (shape)	<p>AND</p> <ul style="list-style-type: none"> Explaining how a specific sequence of amino acids determines the shape of a protein (i.e., hemoglobin molecule—normal vs. Sickle cell). 	<p>d. The shape of proteins in a cell determines the structure and function of that cell, hence survival of the organism (i.e., cytoskeleton, biochemical functions, catalysts).</p>	<p>(DOK 1)</p> <ul style="list-style-type: none"> Identify and describe the four basic types of organic molecules found in living organisms. <p>(DOK 3)</p> <ul style="list-style-type: none"> Use evidence to justify how the sequence of amino acids affects the structure and functioning of the hemoglobin molecule.

Science GE DOK Alignment Chart

LIFE SCIENCE

Grades 9-12

GE 33-34

DOK & NECAP Release Item Codes	GE Statement with Ceiling DOK	Science Concepts	Examples/Practice Items
Enduring Knowledge: All living organisms and their component cells have identifiable characteristics that allow for survival.			
<p>DOK 2 LS1(5-8) INQ + SAE-1</p> <p>DOK 3 LS1(5-8) FAF-4</p> <p>DOK 2</p>	<p>S9-12:33 (DOK 3) Students demonstrate their understanding of how Energy Flow Within Cells Supports an Organism’s Survival by...</p> <ul style="list-style-type: none"> Comparing and contrasting the structure of mitochondria and chloroplasts as cell organelles, the interrelatedness of their functions, and their importance to the survival of all cells. <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> Describing and justifying a possible flow of energy from the environment through an organism to the cellular level, and through the cell from assimilation through storage in ATP. <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> Investigating and describing enzyme action under a variety of chemical and physical conditions. 	<p>Science Concepts:</p> <p>a. In living systems, energy flows through matter and is stored and released through chemical reactions. Basic survival energy transformations between cells and their environment include aerobic and anaerobic respiration and photosynthesis reactions. Energy is necessary for work to be accomplished and life to be sustained (e.g., At the cellular level, this work can be growth, repair, reproduction, and synthesis).</p> <p>b. Energy is stored in living systems in ATP molecules. Energy is transformed through living systems from the environment through specific cell organelles and specific chemical processes.</p> <p>c. Energy transformations in living systems are enzyme dependent.</p>	
Enduring Knowledge: Energy enters an ecosystem in the form of sunlight and flows through the system to each cell. Matter interacts, changes and recycles in an ecosystem. Populations of organisms survive by maintaining interdependent relationships with one another and by utilizing biotic and abiotic resources from the environment.			
<p>DOK 3 LS1(5-8) FAF-4</p>	<p>9-12:34 (DOK 3) Students demonstrate their understanding of Energy Flow in an Ecosystem by...</p> <ul style="list-style-type: none"> Diagramming or developing a model that compares the energy at different trophic levels in a given ecosystem 	<p>Science Concept:</p> <p>a. Energy from the sun enters all ecosystems through photosynthesis, is passed through trophic levels (producers, consumers, decomposers) with energy released as heat at every level until all the original energy is eventually released as heat (i.e., Energy Pyramid and 10% Rule).</p>	<p>(DOK 2) Use a model or diagram to demonstrate the energy flow through trophic levels in a Northern Hardwood forest ecosystem.</p> <p>(DOK 3) Devise/develop an original model to illustrate the energy flow through trophic levels in a Northern Hardwood forest ecosystem.</p>

DOK & NECAP Release Item Codes	GE Statement with Ceiling DOK	Science Concepts	Examples/Practice Items
Enduring Knowledge: Energy enters an ecosystem in the form of sunlight and flows through the system to each cell. Matter interacts, changes and recycles in an ecosystem. Populations of organisms survive by maintaining interdependent relationships with one another and by utilizing biotic and abiotic resources from the environment.			
<p>DOK 2 LS1(5-8) FAF-4</p>	<p>S9-12:35 (DOK 2) Students demonstrate their understanding of Food Webs in an Ecosystem by... • Tracing the cycling of matter (e.g. carbon compounds, nitrogen compounds) within the organisms of a food web from its source through its transformation in cellular, biochemical processes (e.g., cells, organs, organisms, communities).</p>	<p>Science Concept: a. Within ecosystems, the processes of photosynthesis and cellular respiration recycle matter (i.e., carbon compounds) found within organisms and the abiotic environment.</p>	
<p>DOK 3 LS2(9-12)INQ + SAE-3</p>	<p>S9-12:36 (DOK 3) Students demonstrate their understanding of Equilibrium in an Ecosystem by... • Designing an investigation to compare a natural system with one altered by human activities (e.g., acid rain, eutrophication through agricultural runoff, fertilizer, pollution, solid waste, clear cutting, toxic emissions or conservation and habitat reclamation).</p>	<p>Science Concept: a. Human beings are part of the earth’s many ecosystems. Human activities can deliberately or inadvertently alter the equilibrium in an ecosystem.</p>	<p>(DOK 4) • Design and conduct an investigation to determine the effect of stocking hatchery trout on the genetic variability of a wild trout population. Use your data and other information—such as economic, recreation, and conservation data—to justify a recommendation to the Fish and Wildlife Dept. on their stocking policy.</p>
<p>DOK 3</p>	<p>S9-12:37 (DOK 3) Students demonstrate their understanding of Recycling in an Ecosystem by... • Developing and explaining a model that shows the recycling of inorganic compounds within a natural ecosystem (e.g., Compare worm compost with commercial fertilizer.).</p>	<p>Science Concept: a. Matter (inorganic compounds) used by living things on the molecular level is cycled from old life to new life through major chemical cycles of the earth (e.g., N, H₂O, C-O, P).</p>	

DOK & NECAP Release Item Codes	GE Statement with Ceiling DOK	Science Concepts	Examples/Practice Items
Enduring Knowledge: All living things exhibit patterns of similarity in their structures, behaviors and biochemistry			
<p>DOK 2 LS3(5-8) SAE -6 LS3(5-8)MAS + FAF-8</p>	<p>S9-12:38 (DOK 2) Students demonstrate their understanding of Classification of Organisms by... • Developing a graphic representation that illustrates and compares the degree of molecular similarity among several species (e.g., DNA or amino acid sequences).</p>	<p>Science Concepts: a. Formal classification systems of organisms (Domain, Kingdom, Phylum...) are based upon molecular similarities and differences among organisms. b. A species is the most fundamental unit of classification. Similarity of species (degree of kinship) can be substantiated by the molecular composition (e.g., DNA /amino acid sequences, biochemical similarity within species).</p>	
<p>DOK 3 LS2(5-8) SAE -6 LS2(5-8) SAE -7 LS3(5-8)MAS + FAF-8</p>	<p>S9-12:39 (DOK 3) Students demonstrate their understanding of Evolution/Natural Selection by... • Using evidence to apply the theory of Natural Selection to a scenario depicting change within a given population over time/through many generations (e.g., bacterial resistance to antibiotics, neck length of the giraffe, animal camouflage).</p>	<p>Science Concepts: a. The diversity of present-day organisms resulted from changes over time in many ancestral organisms. b. Evolution (change over time) is based on variety within species. A greater variation within a species increases the possibility of species survival under changing conditions. Life on earth is thought to have begun four billion years ago, as simple, one-celled organisms about some of which still exist today. c. Natural Selection provides a mechanism for evolution and leads to organisms well-suited in a particular, existing environment. d. New species result from evolution due to: • overpopulation • genetic variability of offspring • a finite supply of resources, producing stress and competition • the selection (survival and subsequent reproduction) of offspring best suited to a particular environment e. Molecular structure provides additional evidence for evolution.</p>	

DOK & NECAP Release Item Codes	GE Statement with Ceiling DOK	Science Concepts	Examples/Practice Items
<p>Enduring Knowledge: All living organisms and their component cells have identifiable characteristics that allow for survival.</p>			
<p>DOK 3 LS1(9-11) INQ + SAE + FAF-1</p> <p>DOK 3 LS1(9-11) INQ + SAE + FAF-1</p> <p>DOK 2</p> <p>DOK 3 LS1(9-11) FAF + POC-2</p>	<p>S79-12:30 (DOK 3) Students demonstrate their understanding of Structure and Function-Survival Requirements by...</p> <ul style="list-style-type: none"> Predicting, explaining and drawing conclusions about the direction of movement of substances across a membrane. <p>AND</p> <ul style="list-style-type: none"> Developing a model that illustrates the interdependence of cellular organelles (mitochondria, ribosomes, lysosomes, endoplasmic reticulum, cytoplasm) in biochemical pathways within the cell (e.g. mitochondria and chloroplasts: cellular respiration and photosynthesis; nucleus and ribosomes: DNA transcription and protein synthesis). <p>AND</p> <ul style="list-style-type: none"> Explaining how the basic (general) shape and structure of each of the four types of organic molecules relates to its role in maintaining cell survival (i.e., Simple carbohydrates [monosaccharides] can be an energy source as a single molecule and a storage/structural molecule when multiple units are chemically combined—[starch, cellulose, chitin].). <p>AND</p> <ul style="list-style-type: none"> Explaining how a specific sequence of amino acids determines the shape of a protein (i.e., hemoglobin molecule—normal vs. Sickle cell). 	<p>Science Concepts:</p> <p>a. There are four basic types of organic compounds found in a cell (proteins, carbohydrates, lipids and nucleic acids).</p> <p>b. Enzymes, proteins that regulate biochemical reactions, are critical to the survival of cells.</p> <p>c. The molecular structure of a cell membrane allows for selective transfer of substances into and out of the cell (i.e., diffusion, osmosis, facilitated diffusion, active transport).</p> <p>d. The shape of proteins in a cell determines the structure and function of that cell, hence survival of the organism (i.e., cytoskeleton, biochemical functions, catalysts).</p>	<p>(DOK 2)</p> <ul style="list-style-type: none"> Compare and contrast the structures and functions of the mitochondrion and chloroplast organelles. <p>(DOK 3)</p> <ul style="list-style-type: none"> Develop scientific model that illustrates the interdependence of structure and functioning six cellular organelles using an analogy to everyday objects or systems. <p>(DOK 1)</p> <ul style="list-style-type: none"> Identify and describe the four basic types of organic molecules found in living organisms. <p>(DOK 3)</p> <ul style="list-style-type: none"> Use evidence to justify how the sequence of amino acids affects the structure and functioning of the hemoglobin molecule.

DOK & NECAP Release Item Codes	GE Statement with Ceiling DOK	Science Concepts	Examples/Practice Items
Enduring Knowledge: All living organisms and their component cells have identifiable characteristics that allow for survival.			
<p>DOK 3 LS1(5-8) SAE + FAF-2</p> <p>DOK 2 LS1(5-8) SAE + FAF-2</p>	<p>S7-8:31 (DOK 3) Students demonstrate their understanding of Reproduction by ...</p> <ul style="list-style-type: none"> • Creating a model which illustrates how the DNA of all cells/tissues in an organism is produced from a single fertilized egg cell (mitosis). <p>AND</p> <ul style="list-style-type: none"> • Explaining how the nucleotide sequence in DNA (gene) directs the synthesis of specific proteins needed by a cell (e.g., protein synthesis) and cell division. 	<p>Science Concepts:</p> <ol style="list-style-type: none"> Every body cell in an organism contains the identical genome (DNA) which is maintained from one cell generation to the next by mitosis and DNA replication. Transmission of genetic information to offspring occurs through egg and sperm cells that contain only one representative from each chromosome pair. The genetic information in a cell’s DNA is used to direct the synthesis of the thousands of proteins that each cell requires, however only portions of the genome are active in any one cell. Genetic variation in organisms arises from gamete formation and sexual reproduction. 	<p>(DOK 1)</p> <ul style="list-style-type: none"> • Describe the steps in the process of DNA replication. <p>(DOK 2)</p> <ul style="list-style-type: none"> • Determine the sequence of amino acids in of a protein produced from the following DNA code.
Enduring Knowledge: All living organisms and their component cells have identifiable characteristics that allow for survival.			
<p>DOK 2</p> <p>DOK 2</p>	<p>S9-12:32 (DOK 2) Students demonstrate their understanding of Differentiation by...</p> <ul style="list-style-type: none"> • Predicting the change in an embryo caused by disruption of the ectoderm or mesoderm or endoderm during embryonic development (e.g., Fetal Alcohol Syndrome, drugs, injury). <p>AND</p> <ul style="list-style-type: none"> • Comparing the role of various sub-cellular units in unicellular organisms to comparable structures in multicellular organisms (i.e., oral groove, gullet, food vacuole in <i>Paramecium</i> compared to digestive systems in multicellular organisms). 	<p>Science Concepts:</p> <ol style="list-style-type: none"> Cell differentiation is regulated through the expression of different genes within the embryo cells. During embryonic development of complex multicellular organisms, chemicals within the cells activate and deactivate portions of the genetic code as influenced by the cell’s environment and past history. Unicellular organisms lack differentiation, but sub-cellular units carry out all life functions. 	

Science GE DOK Alignment Chart

LIFE SCIENCE

Grades 9-12

GE 33-34

DOK & NECAP Release Item Codes	GE Statement with Ceiling DOK	Science Concepts	Examples/Practice Items
Enduring Knowledge: All living organisms and their component cells have identifiable characteristics that allow for survival.			
<p>DOK 2 LS1(5-8) INQ + SAE-1</p> <p>DOK 3 LS1(5-8) FAF-4</p> <p>DOK 2</p>	<p>S9-12:33 (DOK 3) Students demonstrate their understanding of how Energy Flow Within Cells Supports an Organism’s Survival by...</p> <ul style="list-style-type: none"> Comparing and contrasting the structure of mitochondria and chloroplasts as cell organelles, the interrelatedness of their functions, and their importance to the survival of all cells. <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> Describing and justifying a possible flow of energy from the environment through an organism to the cellular level, and through the cell from assimilation through storage in ATP. <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> Investigating and describing enzyme action under a variety of chemical and physical conditions. 	<p>Science Concepts:</p> <p>a. In living systems, energy flows through matter and is stored and released through chemical reactions. Basic survival energy transformations between cells and their environment include aerobic and anaerobic respiration and photosynthesis reactions. Energy is necessary for work to be accomplished and life to be sustained (e.g., At the cellular level, this work can be growth, repair, reproduction, and synthesis).</p> <p>b. Energy is stored in living systems in ATP molecules. Energy is transformed through living systems from the environment through specific cell organelles and specific chemical processes.</p> <p>c. Energy transformations in living systems are enzyme dependent.</p>	
Enduring Knowledge: Energy enters an ecosystem in the form of sunlight and flows through the system to each cell. Matter interacts, changes and recycles in an ecosystem. Populations of organisms survive by maintaining interdependent relationships with one another and by utilizing biotic and abiotic resources from the environment.			
<p>DOK 3 LS1(5-8) FAF-4</p>	<p>9-12:34 (DOK 3) Students demonstrate their understanding of Energy Flow in an Ecosystem by...</p> <ul style="list-style-type: none"> Diagramming or developing a model that compares the energy at different trophic levels in a given ecosystem 	<p>Science Concept:</p> <p>a. Energy from the sun enters all ecosystems through photosynthesis, is passed through trophic levels (producers, consumers, decomposers) with energy released as heat at every level until all the original energy is eventually released as heat (i.e., Energy Pyramid and 10% Rule).</p>	<p>(DOK 2) Use a model or diagram to demonstrate the energy flow through trophic levels in a Northern Hardwood forest ecosystem.</p> <p>(DOK 3) Devise/develop an original model to illustrate the energy flow through trophic levels in a Northern Hardwood forest ecosystem.</p>

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Enduring Knowledge: Energy enters an ecosystem in the form of sunlight and flows through the system to each cell. Matter interacts, changes and recycles in an ecosystem. Populations of organisms survive by maintaining interdependent relationships with one another and by utilizing biotic and abiotic resources from the environment.			
<p>DOK 2 LS1(5-8) FAF-4</p>	<p>S9-12:35 (DOK 2) Students demonstrate their understanding of Food Webs in an Ecosystem by... • Tracing the cycling of matter (e.g. carbon compounds, nitrogen compounds) within the organisms of a food web from its source through its transformation in cellular, biochemical processes (e.g., cells, organs, organisms, communities).</p>	<p>Science Concept: a. Within ecosystems, the processes of photosynthesis and cellular respiration recycle matter (i.e., carbon compounds) found within organisms and the abiotic environment.</p>	
<p>DOK 3 LS2(9-12)INQ + SAE-3</p>	<p>S9-12:36 (DOK 3) Students demonstrate their understanding of Equilibrium in an Ecosystem by... • Designing an investigation to compare a natural system with one altered by human activities (e.g., acid rain, eutrophication through agricultural runoff, fertilizer, pollution, solid waste, clear cutting, toxic emissions or conservation and habitat reclamation).</p>	<p>Science Concept: a. Human beings are part of the earth’s many ecosystems. Human activities can deliberately or inadvertently alter the equilibrium in an ecosystem.</p>	<p>(DOK 4) • Design and conduct an investigation to determine the effect of stocking hatchery trout on the genetic variability of a wild trout population. Use your data and other information—such as economic, recreation, and conservation data—to justify a recommendation to the Fish and Wildlife Dept. on their stocking policy.</p>
<p>DOK 3</p>	<p>S9-12:37 (DOK 3) Students demonstrate their understanding of Recycling in an Ecosystem by... • Developing and explaining a model that shows the recycling of inorganic compounds within a natural ecosystem (e.g., Compare worm compost with commercial fertilizer.).</p>	<p>Science Concept: a. Matter (inorganic compounds) used by living things on the molecular level is cycled from old life to new life through major chemical cycles of the earth (e.g., N, H₂O, C-O, P).</p>	

DOK & NECAP Release Item Codes	GE Statement with Ceiling DOK	Science Concepts	Examples/Practice Items
Enduring Knowledge: All living things exhibit patterns of similarity in their structures, behaviors and biochemistry			
<p>DOK 2 LS3(5-8) SAE -6 LS3(5-8)MAS + FAF-8</p>	<p>S9-12:38 (DOK 2) Students demonstrate their understanding of Classification of Organisms by... • Developing a graphic representation that illustrates and compares the degree of molecular similarity among several species (e.g., DNA or amino acid sequences).</p>	<p>Science Concepts: a. Formal classification systems of organisms (Domain, Kingdom, Phylum...) are based upon molecular similarities and differences among organisms. b. A species is the most fundamental unit of classification. Similarity of species (degree of kinship) can be substantiated by the molecular composition (e.g., DNA /amino acid sequences, biochemical similarity within species).</p>	
<p>DOK 3 LS2(5-8) SAE -6 LS2(5-8) SAE -7 LS3(5-8)MAS + FAF-8</p>	<p>S9-12:39 (DOK 3) Students demonstrate their understanding of Evolution/Natural Selection by... • Using evidence to apply the theory of Natural Selection to a scenario depicting change within a given population over time/through many generations (e.g., bacterial resistance to antibiotics, neck length of the giraffe, animal camouflage).</p>	<p>Science Concepts: a. The diversity of present-day organisms resulted from changes over time in many ancestral organisms. b. Evolution (change over time) is based on variety within species. A greater variation within a species increases the possibility of species survival under changing conditions. Life on earth is thought to have begun four billion years ago, as simple, one-celled organisms about some of which still exist today. c. Natural Selection provides a mechanism for evolution and leads to organisms well-suited in a particular, existing environment. d. New species result from evolution due to: • overpopulation • genetic variability of offspring • a finite supply of resources, producing stress and competition • the selection (survival and subsequent reproduction) of offspring best suited to a particular environment e. Molecular structure provides additional evidence for evolution.</p>	

NECAP Science GE and DOK Alignment Chart

INQUIRY

Grades 9-12

GE 1-2

DOK & NECAP Release Item Codes	GE Statement with Ceiling DOK Level	Examples/Practice Items
<p>Enduring Knowledge (Scientific Questioning): Students raise scientifically oriented questions that can be answered through observations, experimentation and/or research. At early stages, students learn how to develop investigable questions that guide their work. At later stages, students connect their questions to scientific ideas, concepts, and quantitative relationships that inform investigations.</p>		
<p>All Inquiry GEs are assessed at the state level (NECAP Science).</p> <p>DOK 3</p> <p>DOK 2</p>	<p>S9-12:1 (DOK 3) Students demonstrate their understanding of SCIENTIFIC QUESTIONING by...</p> <ul style="list-style-type: none"> • Framing testable questions showing evidence of observations and prior knowledge to illustrate cause and effect. <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> • Developing a testable question appropriate to the scientific domain being investigated. 	
<p>Enduring Knowledge: (Predicting and Hypothesizing): Scientists' explanations about what happens in the world come partly from what they observe and partly from what they think. Preliminary explanations are constructed with conceptual knowledge and propose a new level of understanding. At early stages, students think about what may happen during an investigation and justify their thinking. At later stages, students identify cause and effect relationships within an hypothesis and base predictions on factual evidence more than opinions.</p>		
<p>All Inquiry GEs are assessed at the state level (NECAP Science).</p> <p>DOK 3</p> <p>DOK 2</p> <p>DOK 2</p>	<p>S9-12: 2 (DOK 3) Students demonstrate their understanding of PREDICTING AND HYPOTHESIZING by...</p> <ul style="list-style-type: none"> • Developing a testable/guiding hypothesis and predictions based upon evidence of scientific principles. <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> • Predicting results (evidence) that support the hypothesis. <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> • Clearly distinguishing cause and effect within a testable/guiding hypothesis. 	

DOK & NECAP Release Item Codes	GE Statement with Ceiling DOK Level	Examples/Practice Items
<p>Enduring Knowledge (Designing Experiments): Students design investigations that control variables, generate adequate data/observations to provide reasonable explanations, and can be reproduced by other scientists. At early stages, experimental design reflects what the experimenter will do to answer a question and ensure that a test is fair. At later stages, students design investigations that will produce the appropriate kinds of evidence to support or refute an hypothesis. Multiple trials or the collection of multiple data points are incorporated into the design and variables are controlled to ensure that the investigation is valid and reproducible.</p>		
<p>All Inquiry GEs are assessed at the state level (NECAP Science).</p> <p>DOK 3</p>	<p>S9-12:3 (DOK 3) Students demonstrate their understanding of EXPERIMENTAL DESIGN by...</p> <ul style="list-style-type: none"> • Writing a plan related to the question and prediction that includes: <ol style="list-style-type: none"> a. Procedures that incorporate appropriate protection (e.g., no food in lab area). b. Appropriate tools, units of measurement and degree of accuracy. c. Components that reflect current scientific knowledge and available technology . d. Use of scientific terminology that supports the identified procedures 	
<p>Enduring Knowledge (Conducting Experiments): Students follow an experimental design and use scientific tools (including measurement tools) appropriately and accurately. At early stages, students are encouraged to pay close attention to their experimental plan and record data throughout an investigation. At later stages, students engage in extended investigations and use more sophisticated science tools including computers.</p>		
<p>All Inquiry GEs are assessed at the state level (NECAP Science).</p> <p>DOK 2</p> <p>DOK 3</p>	<p>S9-12:4 (DOK 3) Students demonstrate their ability to CONDUCT EXPERIMENTS by...</p> <ul style="list-style-type: none"> • Collecting significant data by completing multiple trials; • Evaluating and revising procedures as investigation progresses. 	

DOK & NECAP Release Item Codes	GE Statement with Ceiling DOK Level	Examples/Practice Items
Enduring Knowledge (Representing Data and Analysis): Students represent data using text, charts, tables, graphs.		
<p>All Inquiry GEs are assessed at the state level (NECAP Science).</p> <p>DOK 2</p> <p>DOK 2</p> <p>DOK 2</p> <p>DOK 2</p>	<p>S9-12:5 (DOK 2) Students demonstrate their ability to REPRESENT DATA by...</p> <ul style="list-style-type: none"> Representing data quantitatively to the appropriate level of precision through the use of mathematical calculations. <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> Developing the skill of drawing a “best fit” curve from data. <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> Recording accurate data, free of bias. <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> Explaining importance of avoiding plagiarism/fabrication of other recorded research data. 	
<p>DOK 2</p> <p>DOK 3</p> <p>DOK 3</p>	<p>S 9-12: 6 (DOK 3) Students demonstrate their ability to ANALYZE DATA by...</p> <ul style="list-style-type: none"> Accounting for identified experimental errors. <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> Analyzing significance of experimental data. <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> Critically examining and explaining the relationship of evidence to the findings of others (e.g., classmates or scientists in the field). 	

DOK & NECAP Release Item Codes	GE Statement with Ceiling DOK Level	Examples/Practice Items
Representing Data and Analysis (continued)		
<p>All Inquiry GEs are assessed at the state level (NECAP Science).</p> <p>DOK 3</p> <p>DOK 3</p> <p>DOK 3</p> <p>DOK 2</p> <p>DOK 3</p> <p>DOK 3</p> <p>DOK 3</p>	<p>S9-12:7 (DOK 3) Students demonstrate their ability to EXPLAIN DATA by...</p> <ul style="list-style-type: none"> Proposing, synthesizing, and evaluating alternative explanations for experimental results. <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> Citing experimental evidence within an explanation. <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> Including logically consistent position to explain observed phenomena. <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> Comparing an experimental conclusion to other proposed explanations by peer review (e.g., students, scientists or local interest groups). <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> Conducting objective scientific analysis and evaluating potential bias in the interpretation of evidence. <p style="text-align: center;">AND</p> <ul style="list-style-type: none"> Identifying and evaluating uncontrolled variables inherent in experimental model. <p>EXTENSION:</p> <ul style="list-style-type: none"> Considering multiple variables when interpreting mathematical analysis. 	

NECAP Science GE and DOK Alignment Chart

INQUIRY

Grades 9-12

GE 8

DOK & NECAP Release Item Codes	GE Statement with Ceiling DOK Level	Examples/Practice Items	
<p>Enduring Knowledge (Applying Results): Students synthesize the results of an investigation by generating new questions related to the results of the investigation, stating a general rule regarding the understandings learned from the investigation, or applying the understandings learned to similar situations. At early stages, students make connections between classroom investigations and similar situations or experiences. At later stages, students recognize that different explanations can sometimes arise from the same evidence. Students demonstrate an ability to resist overgeneralization based on insufficient evidence and suggest the types of evidence that need to be gathered in order to better understand the focus of the investigation</p>			
<p>All Inquiry GEs are assessed at the state level (NECAP Science).</p> <p>DOK 2</p> <p>DOK 3-4</p> <p>DOK 3</p>	<p>S9-12:8 (DOK 3) Students demonstrate their ability to APPLY RESULTS by...</p> <ul style="list-style-type: none"> Using technology to communicate results effectively and appropriately to others (e.g., power point, web site, posters, etc.). <p>AND</p> <ul style="list-style-type: none"> Predicting/recommending how scientific conclusions can be applied to civic, economic or social issues. <p>AND</p> <ul style="list-style-type: none"> Proposing and evaluating new questions, predictions, procedures and technology for further investigations. 		