Science GE DOK Alignment Chart **INQUIRY Grades 7-8 GE 1-2**

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| **DOK & NECAP Release Item Codes** | **GE Statement with Ceiling DOK** | **Examples/Practice Items** |
| **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.** | | |
| All Inquiry GEs are assessed at the state level (NECAP Science).  **DOK 2**  **DOK 2** | **S7-8:1 (DOK 2)**  **Students demonstrate their understanding of SCIENTIFIC QUESTIONING by…**  Developing questions that reflect priorknowledge.  **AND**  Refining and focusing broad ill-defined questions. |  |
| **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 opinion.** | | |
| All Inquiry GEs are assessed at the state level (NECAP Science).  **DOK 2**  **DOK 2** | **S 7-8: 2 (DOK 2)**  **Students demonstrate their understanding of PREDICTING AND HYPOTHESIZING by…**  Predicting results (evidence) that support the  hypothesis.  .**AND**  Proposing a hypothesis based upon a scientific concept orprinciple, observation, or experience that identifies therelationship among variables. |  |

Science GE DOK Alignment Chart **INQUIRY Grades 7-8 GE 3**

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| **DOK & NECAP Release Item Codes** | **GE Statement with Ceiling DOK** | | **Examples/Practice Items** |
| **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.** | | | |
| All Inquiry GEs are assessed at the state level (NECAP Science).  **DOK 3** | **S7-8:3 (DOK 3)**  **Students demonstrate their understanding of EXPERIMENTAL DESIGN by…**  Writing a plan related to the question and  prediction that includes:  a. A diagram labeled using scientific terminology that supports procedures and illustrates the setup .  b. A procedure that lists significant steps that identify manipulated (independent) and responding (dependent) variables.  c. A **control** for comparing data when appropriate.  d. Identification of tools and procedures for collecting data and reducing error. |  | |

Science GE DOK Alignment Chart **INQUIRY Grades 7-8 GE 4-5**

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| **DOK & NECAP Release Item Codes** | **GE Statement with Ceiling DOK** | **Examples/Practice Items** |
| **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.** | | |
| All Inquiry GEs are assessed at the state level (NECAP Science).    **DOK 2**  **DOK 2**  **DOK 2** | **S7-8:4 (DOK 2)**  **Students demonstrate their ability to CONDUCT EXPERIMENTS by…**  Accurately quantifying observations using **appropriate measurement tools**.  **AND**  Using technology to collect, quantify, organize, and store observations (e.g., use of probe).  **AND**  Drawing scientifically:  a. Recording **multiple perspectives** to scale (e.g., magnification, cross section, top view, side view, etc.). |  |
| **Enduring Knowledge (Representing Data and Analysis): Students represent data using text, charts, tables, graphs.** | | |
| All Inquiry GEs are assessed at the state level (NECAP Science).  **DOK 2**  **DOK 2**  **DOK 2**  **DOK 2** | **S57-8:5 (DOK 2)**  **Students demonstrate their ability to REPRESENT DATA by…**  Representing **independent variable** on the  “X” axis and **dependent variable** on the “Y” axis.  **AND**  Determining a scale for a diagram that is  appropriate to the task.  **AND**  Using technology to enhance a representation.  **AND**  Using color, texture, symbols and other graphic strategies to clarify trends/patterns within a representation. |  |

Science GE DOK Alignment Chart **INQUIRY Grades 7-8 GE 6-7**

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| **DOK & NECAP Release Item Codes** | **GE Statement with Ceiling DOK** | **Examples/Practice Items** |
| **Representing Data and Analysis (continued)** | | |
| All Inquiry GEs are assessed at the state level (NECAP Science).  **DOK 2**  **DOK 3** | **S 7-8: 6 (DOK 3)**  **Students demonstrate their ability to ANALYZE DATA by…**  Identifying, considering and addressing  **experimental errors** (e.g., errors in experimental design, errors in data collection procedures).  **AND**  Identifying limitations and/or sources of error  within the experimental design. |  |
| All Inquiry GEs are assessed at the state level (NECAP Science).  **DOK 3**    **DOK 3**  **DOK 3**  **DOK 2**  **DOK 2** | **S7-8:7 (DOK 3)**  **Students demonstrate their ability to EXPLAIN DATA by…**  Using scientific concepts, models, and terminology to report results, discuss relationships, and propose new explanations.  **AND**  Generating **alternative explanations**.  **AND**  Documenting and explaining changes in  experimental design.  **AND**  Sharing conclusion/summary with  appropriate audience beyond the research group.  **AND**  Using **mathematical analysis** as an integral  component of the conclusion. |  |

Science GE DOK Alignment Chart  **INQUIRY Grades 7-8 GE 8**

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| **DOK & NECAP Release Item Codes** | **GE Statement with Ceiling DOK** | **Examples/Practice Items** |
| **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** | | |
| All Inquiry GEs are assessed at the state level (NECAP Science).  **DOK 2**    **DOK 3**    **DOK 3**    **DOK 3** | **S7-8:8 (DOK 3)**  **Students demonstrate their ability to APPLY RESULTS by…**  Identifying additional data that would strengthen an investigation.  **AND**  Explaining limitations for generalizing findings.  **AND**  Explaining **relevance of findings** (e.g., So what?) to the local environment (community, school, classroom).  **AND**  Devising **recommendations for further investigation** and making **decisions based on evidence** for experimental results. |  |

Science GE DOK Alignment Chart **LIFE SCIENCE Grades 7-8 GE 30**

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| **DOK & NECAP Release Item Codes** | **GE Statement with Ceiling DOK** | | **Science Concepts** | | **Examples/Practice Items** | |
| **LIFE SCIENCE** | | | | | | |
| **Enduring Knowledge: All living organisms and their component cells have identifiable characteristics that allow for survival.** | | | | | | |
| **DOK 2**  **LS1(5-8) SAE +**  **FAF-2**    **DOK 2**  **LS1(5-8) FAF-4**  **DOK 2**  **LS1(5-8) SAE +**  **FAF-2**  **LS4(5-8) INQ +**  **POC -11** | |  **S7-8:30 (DOK 2)**  **Students demonstrate their understanding of Structure and Function-Survival Requirements by…**  Conducting experiments that investigate how different **concentrations** of materials (inside and outside a cell) will cause water to flow into or out of cells.  **AND**  Examining cells under a microscope and identifying cell wall and chloroplasts, and by comparing the function of a common cell structure, such as membrane in all cells, with the function of a unique structure, such as chloroplasts in plant cells. **AND**  Examining cells under a microscope, identifying the nucleus and explaining the relationship between **genes** (located in the nucleus) and traits. | | Science Concepts:  a. Cells contain structures that carry out survival functions.  b. The nucleus of a cell contains the genes. Every cell contains a complete set of genes for that organism.  c. Genes provide the instructions that direct the functions of the cell.  d. Plant cells have a cell wall in addition to a cell membrane. The cell wall provides structural support for the cell. The cell membrane regulates the movement of materials into and out of a cell.  e. Most plant cells contain chloroplasts where green pigment traps the energy from sunlight and transforms it from light energy into chemical energy.  f. Some materials can pass into and out of cells as concentrations move toward equilibrium (**diffusion**). | |  |

Science GE DOK Alignment Chart **LIFE SCIENCE Grades 7-8 GE 31-33**

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| **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.** | | | |
| **DOK 1**  **LS4(5-8) INQ +**  **POC -11**  **DOK 2**  **LS4(5-8) POC-12** |  **S7-8:31 (DOK 2)**  **Students demonstrate their understanding of Reproduction by …**  Explaining that cells come only from other living cells and that genes duplicate in the process of **cell division** producing an identical copy of the original cell.  **AND**  Describing the relationship between human growth and **cell division**. | Science Concepts:  a. Cells only come from other cells.  b. Cells repeatedly divide to make more cells for growth and repair.  c. During cell reproduction, genes duplicate so that each new cell will have an identical set of genes.  d. When cells divide, they are reproducing asexually.  e. As a result of asexual reproduction, new cells (organisms) are identical to the parent cell.  f. Some complete organisms can reproduce asexually (e.g., budding). | **(DOK 2)**   * Compare and contrast sexual and asexual reproduction. |
| **S7-8:32 Not assessed at this grade level** | | | |
| **DOK 1-2**  **LS2(5-8) SAE -6** | **S7-8:33 (DOK 2)**  **Students demonstrate their understanding of how Energy Flow Within Cells Supports an Organism’s Survival by…**  Explaining that energy from the sun is transferred and utilized in plant and animal cells through chemical changes and then transferred into other forms such as heat (e.g., using a word equation rather than a chemical equation). | Science Concepts:  a. Plant cells take in carbon dioxide and water and use the energy from sunlight to chemically change them to food (sugar) and oxygen.  b. All cells chemically change sugar (food) and oxygen into energy required to survive.  c. Energy is used by all cells to carry out functions for survival and some energy is transferred to the environment as heat. |  |

Science GE DOK Alignment Chart **LIFE SCIENCE Grades 7-8 GE 34-36**

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| **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.** | | | |
| **DOK 2**  **LS2(5-8) SAE -6**  **LS2(5-8) SAE -7** |  **S7-8:34 (DOK 2)**  **Students demonstrate their understanding of Energy Flow in an Ecosystem by…**  Describing how light is transformed into chemical energy by producers and how this chemical energy is used by all organisms to sustain life (e.g., using a word equation rather than a chemical equation). | Science Concept:  a. Plants transform energy from the sun into stored chemical energy by changing carbon dioxide and water into sugar (food). Plants use or store the sugar they produce to satisfy their energy needs.  b. All organisms release the energy stored in sugar (food) through a chemical change that requires oxygen and produces carbon dioxide and water in addition to energy. Some consumers eat plants directly (**herbivores**). Some consumers eat other animals **(carnivores**) and use the energy from the plant’s sugar food that was stored in the animal’s cells. Some consumers eat both plant and animal material **(omnivore**). |  |
| **S7-8:35 Not assessed at this grade level** | | | |
| **DOK 3**  **LS1(5-8) INQ +**  **SAE-1**  **LS2(5-8) INQ +**  **SAE -5**  **LS2(5-8) SAE -6**  **LS2(5-8) SAE -7** | **S7-8:36 (DOK 3 )**  **Students demonstrate their understanding of Equilibrium in an Ecosystem by…**  Identifying an **abiotic** or **biotic** change in a local ecosystem, predicting the short and long-term effects of this change and drawing conclusions about the stability of the system (e.g., local river study). | Science Concept:  a. Given adequate biotic and abiotic resources, an ecosystem will maintain equilibrium and continue indefinitely.  b. Factors that affect biotic or abiotic resources such as disease, predation, climate, and pollution can change the dynamics of an ecosystem and the interdependent relationships among populations of organisms until a new equilibrium is reached (e.g., Members of a species that occur together at a given time are referred to as a population). |  |

Science GE DOK Alignment Chart **LIFE SCIENCE Grades 7-8 GE 37-38**

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| **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.** | | | |
| **DOK 2**  **LS2(5-8) SAE -7** | **S7-8:37 (DOK 2)**  **Students demonstrate their understanding of Recycling in an Ecosystem by…**  Explaining how products of decomposition are utilized by the ecosystem to sustain life while conserving mass (e.g., worm farm, compost). | Science Concept:  a. When decomposers break down the matter contained in plants and animals, the molecules of matter can be recycled through the ecosystem and used by plants to produce food or as building material for all organisms.  b. As matter is transferred from one organism to another in an ecosystem, the total amount (mass) remains the same. |  |
| **HUMAN BODY** | | | |
| **Enduring Knowledge: All living things exhibit patterns of similarity in their structures, behaviors and biochemistry** | | | |
| **DOK 2**  **LS3(5-8)INQ +**  **FAF + POC-8**    **DOK 1**  **LS3(5-8)INQ +**  **FAF + POC-8** | **S7-8:38 (DOK 2)**  **Students demonstrate their understanding of Classification of Organisms by…**  Comparing and sorting organisms with similar characteristics into groups based on internal and external structures recognized by scientists.  **AND**  Recognizing that individuals that can reproduce with one another and produce fertile offspring are classified as a **species**. | Science Concepts:  a. Scientists organize the vast diversity of organisms by describing similarities and differences among living things. Details of internal and external structures of organisms are more important for scientific classification than behavior and general appearance.  b. Individuals that can reproduce with one another and produce fertile offspring are classified as a species. |  |

Science GE DOK Alignment Chart **LIFE SCIENCE Grades 7-8 GE 39**

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| **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** | | | |
| **DOK 1**  **LS3-9**  **LS4(5-8) INQ +**  **POC -11**    **DOK 2**  **LS1(5-8)POC-3** | **S7-8:39 (DOK 2)**  **Students demonstrate their understanding of Evolution/Natural Selection by…**  Identifying that traits occur randomly.  **AND**  Explaining that advantageous traits of organisms are passed on through reproduction.  **AND**  Comparing **sexual** with **asexual reproduction.** | Science Concepts:  a. Differences in physical characteristics (traits) occur randomly (by chance) in a population or species.  b. As environments change, organisms that possess advantageous traits (those that enable them to survive) pass those traits to offspring through reproduction. | **(DOK 2)**   * Compare and contrast sexual and asexual reproduction. |

Science GE DOK Alignment Chart **EARTH/SPACE SCIENCE Grades 7-8 GE 44-48**

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| **DOK & NECAP Release Item Codes** | **GE Statement with Ceiling DOK** | **Science Concepts** | **Examples/Practice Items** |
| **Enduring Knowledge: The universe, earth and all earth systems have undergone change in the past, continue to change in the present and are predicted to continue changing in the future.** | | | |
| **S7-8:44 Not assessed at this grade level** | | | |
| **DOK 1**  **ESS2(5-8)**  **NOS-7** | **S7-8:45 (DOK 1)**  **Students demonstrate their understanding of Processes and Change over Time within Systems of the Universe by…**  Identifying and labeling the location of the sun in our solar system and its relationship to the galaxy. | Science Concepts:  a. The sun is many thousands of times closer to the earth than any other star. The sun is located near the edge of a  disc-shaped galaxy of stars. |  |
| **S7-8:46 Not assessed at this grade level** | | | |
| **S7-8:47 Not assessed at this grade level** | | | |

Science GE DOK Alignment Chart **EARTH/SPACE SCIENCE Grades 7-8 GE 48**

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| **DOK & NECAP Release Item Codes** | **GE Statement with Ceiling DOK** | **Science Concepts** | **Examples/Practice Items** |
| **Enduring Knowledge: The universe, earth and all earth systems have undergone change in the past, continue to change in the present and predicted to continue changing in the future.** | | | |
| **DOK 2**  **ESS1(5-8)**  **SAE-2**  **DOK 1**    **DOK 3**  **ESS1(5-8)SAE +**  **POC-4**  **DOK 3**  **ESS2(5-8)SAE+**  **POC-8** | **S7-8:48 (DOK 3)**  **Students demonstrate their understanding of Processes and Change over Time within Earth Systems by…**  Diagramming, labeling and explaining the process of the water cycle (precipitation, evaporation, condensation, runoff, ground water, transpiration).  **AND**  Identifying the major gases of earth’s atmosphere.  **AND**  Explaining how differential heating can affect the earth’s weather patterns.  **AND**  Creating a model showing the tilt of the earth on its axis and explaining how the sun’s energy hitting the earth surface creates the seasons. | Science Concepts:  a. The cycling of water in and out of the atmosphere plays an important role in determining climatic patterns. Water evaporates from the surface of the earth, rises and cools,  condenses into rain or snow, and falls again to the surface. Global patterns of atmospheric movement influence local  weather. Oceans have a major effect on climate because water in the oceans holds a large amount of heat.  b. The entire planet is surrounded by a relatively thin blanket of air composed of nitrogen, oxygen, and small amounts of other gases, including water vapor.  c. Heat from the sun is the primary source of energy for changes on the earth’s surface. The differences in heating of the earth’s surface produce the planet’s weather patterns.  d. Seasons result from variations in the amount of sun’s energy hitting the earth’s surface. This happens because of the tilt of the earth’s axis and the orbit of the earth around the sun. |  |

Science GE DOK Alignment Chart **EARTH/SPACE SCIENCE Grades 7-8 GE 49**

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| **DOK & NECAP Release Item Codes** | **GE Statement with Ceiling DOK** | **Science Concepts** | **Examples/Practice Items** |
| **Enduring Knowledge: The universe, earth and all earth systems have undergone change in the past, continue to change in the present and predicted to continue changing in the future. (continued)** | | | |
| **DOK 2**  **LS2(5-8)INQ +**  **SAE-5**    **DOK 3**  **DOK 3-4** | **S7-8:49 (DOK 4)**  **Students demonstrate their understanding of Processes and Change within Natural Resources by…**  Investigating natural resources in the community and monitoring/managing them for responsible use.  **AND**  Identifying a human activity in a local environment and determining the impact of that activity on a specific (local) natural resource.  **AND**  Researching the impact of different human activities on the earth’s land, waterways and atmosphere, and describing possible effects on the living organisms in those environments. | Science Concepts:  a. Human activities have impacts on natural resources, such as increasing wildlife habitats, reducing/managing  the amount of forest cover, increasing the amount and variety of chemicals released into the atmosphere and farming intensively. Some of these changes have decreased the capacity of the environment to support life forms. Others have enhanced the environment to support greater availability of resources.  b. Fresh water, limited in supply, is essential for life and also for most industrial processes. Rivers, lakes, and  groundwater can be depleted or polluted, becoming unavailable or unsuitable for life. |  |

**Science GE DOK Alignment Chart EARTH/SPACE SCIENCE Grade 7-8 GE 50**

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| **DOK Levels** | **GE Statement with Ceiling DOK** | **Science Concepts** | | **Resources/Practice Items** |
| **Enduring Knowledge:** **Natural resources and agricultural systems are managed for specific purposes and in a variety of ways.** | | | | |
| **DOK 2-3**  **DOK 2-3**  **DOK 2-3** | **S7-8: 50 Students demonstrate their understanding why and how natural resources are managed by…**   * Explaining why certain natural/ agricultural resources grow and survive in specific topographic/ geological regions of Vermont.   **GE Connection: S7-8: 34**  **AND**   * Describe and explain how current agricultural and/or natural resource practices may have widespread and interdependent effects on multiple portions of Vermont’s environment.   **GE Connection: S7-8: 36**  **GE Connection: S7-8: 49**  **AND**   * Identify and evaluate the relationships among the components of a Vermont natural/agricultural resource systems. (e.g. Lake = system; Components are biotic factors, abiotic factors, lake use and development)   **GE Connection: S7-8: 36**  **GE Connection: S7-8: 37**  **GE Connection: S7-8: 49** | a. In any particular area the existence of natural/agricultural resources depends upon the physical conditions of that environment.  b. Human practices impact the sustainability of natural/agricultural resources.  The benefits of earth’s resources (water, air soil, trees) can be reduced by deliberately or inadvertently polluting them.  c. A relationship exists between the quality of management practices and the ability of the environment to sustain life.  Management of natural/agricultural resources prolongs the productivity of the system. | --Compare the physical conditions and existing natural/agricultural resources found in two topographical/geographical regions of Vermont.  --Nature Conservancy Preserves--map <http://www.nature.org/wherewework/northamerica/states/vermont/preserves/>  University of Vermont Natural Areas—map <http://www.uvm.edu/~envprog/?Page=naturalareas/default.html>  --Develop a plan to reduce/minimize the agricultural impact of a farm on a local stream environment.    --Create an annotated poster/chart/collage of agricultural or natural resource practices occurring in Vermont.  --Develop a visual representation of the interdependent effects of several of the current Vermont agricultural and natural resource practices.  --Vermont Agricultural Management Practices <http://www.vermontagriculture.com/regulations.htm>  -- Develop a logical argument to defend a specific environmental management practice. (e.g. use of lampricide in the lake).  --Evaluate when and how to harvest trees, fish, and wildlife in your region of Vermont and write a news article reporting your findings.  --Based on sound environmental management practices, develop and defend a position on where to locate a business or a home, or a wind farm.  --Vermont Department of Environmental Conservation site  <http://www.anr.state.vt.us/dec/dec.htm>  --Vermont Fish and Wildlife Management Areas  <http://www.vtfishandwildlife.com/library/reports_and_documents/fish_and_wildlife/WMA_Habitat_Report_2010.pdf> | |