**Virginia Discovery Education Science Experience – Earth and Space Science**

Overall Rating of Standards

| **Standard** | **Determined Rating** |
| --- | --- |
| ES.1 The student will demonstrate an understanding of the scientific and engineering practices. | This standard was evaluated in the context of the content standards. |
| ES.2 The student will demonstrate an understanding that there are scientific concepts related to the origin and evolution of the universe. | Adequate |
| ES.3 The student will investigate and understand that Earth is unique in our solar system. | Adequate |
| ES.4 The student will investigate and understand that there are major rock-forming and ore minerals. | Adequate |
| ES.5 The student will investigate and understand that igneous, metamorphic, and sedimentary rocks can transform. | Adequate |
| ES.6 The student will investigate and understand that resource use is complex. | Adequate |
| ES.7 The student will investigate and understand that plate tectonic theory explains Earth’s internal and external geologic processes. | Adequate |
| ES.8 The student will investigate and understand that freshwater resources influence and are influenced by geologic processes and human activity. | Adequate |
| ES.9 The student will investigate and understand that many aspects of the history and evolution of Earth and life can be inferred by studying rocks and fossils. | Adequate |
| ES.10 The student will investigate and understand that oceans are complex, dynamic systems and are subject to long- and short-term variations. | Adequate |
| ES.11 The student will investigate and understand that the atmosphere is a complex, dynamic system and is subject to long-and short-term variations. | Adequate |
| ES.12 The student will investigate and understand that Earth’s weather and climate are the result of the interaction of the sun’s energy with the atmosphere, oceans, and the land. | Adequate |

Overall Rating for Instructional Design and Support

| **Instructional Design and Support** | **Determined Rating** |
| --- | --- |
| Materials emphasize the use of effective instructional practices and learning theory | Adequate |
| The science content is significant and accurate | Adequate |
| Materials present content in an accurate, unbiased manner. | Adequate |

Review of Standards with Curriculum Framework

| Standard | Expectation |
| --- | --- |
| ES.1 The student will demonstrate an understanding of the scientific and engineering practices by:   1. asking questions and defining problems 2. planning and carrying out investigations 3. interpreting, analyzing, and evaluating data 4. constructing and critiquing conclusions and explanations 5. developing and using models 6. obtaining, evaluating, and communicating information. | The expectation of the 2018 *Science Standards of Learning* is that the scientific and engineering practices are embedded into the instruction of content standards.  The rating for an individual standard includes the evaluation of standard 1 as it pertained to that standard.  For specific grade level/course expectations for standard 1, see the Standards of Learning and the Curriculum Framework. |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| ES.2 The student will demonstrate an understanding that there are scientific concepts related to the origin and evolution of the universe. Key ideas include |  |  |  |
| 1. the big bang theory explains the origin of universe; | X |  |  |
| 1. stars, star systems, and galaxies change over long periods of time; | X |  |  |
| 1. characteristics of the sun, planets and their moons, comets, meteors, asteroids, and dwarf planets are determined by materials found in each body; and | X |  |  |
| 1. evidence from space exploration has increased our understanding of the structure and nature of our universe. | X |  |  |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| ES.3 The student will investigate and understand that Earth is unique in our solar system. Key ideas include |  |  |  |
| 1. Earth supports life because of its relative proximity to the sun and other factors; and | X |  |  |
| 1. the dynamics of the sun-Earth-moon system cause seasons, tides, and eclipses. | X |  |  |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| ES.4 The student will investigate and understand that there are major rock-forming and ore minerals. Key ideas include |  |  |  |
| 1. analysis of physical and chemical properties supports mineral identification; | X |  |  |
| 1. characteristics of minerals determine the uses of minerals; and | X |  |  |
| 1. minerals originate and are formed in specific ways. | X |  |  |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| ES.5 The student will investigate and understand that igneous, metamorphic, and sedimentary rocks can transform. Key ideas include |  |  |  |
| 1. Earth materials are finite and are transformed over time | X |  |  |
| 1. the rock cycle models the transformation of rocks; | X |  |  |
| 1. layers of Earth have rocks with specific chemical and physical properties; and | X |  |  |
| 1. plate tectonic and surface processes transform Earth materials. | X |  |  |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| ES.6 The student will investigate and understand that resource use is complex. Key ideas include |  |  |  |
| 1. global resource use has environmental liabilities and benefits; | X |  |  |
| 1. availability, renewal rates, and economic effects are considerations when using resources; | X |  |  |
| 1. use of Virginia resources has an effect on the environment and the economy; and |  | X |  |
| 1. all energy sources have environmental and economic effects. | X |  |  |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| ES.7 The student will investigate and understand that plate tectonic theory explains Earth’s internal and external geologic processes. Key ideas include |  |  |  |
| 1. convection currents in Earth’s interior lead to the movement of plates and influence the distribution of materials in Earth’s layers, and may impact the magnetic field; | X |  |  |
| 1. features and processes occur within plates and at plate boundaries; | X |  |  |
| 1. interaction between tectonic plates causes the development of mountain ranges and ocean basins; and | X |  |  |
| 1. evidence of geologic processes is found in Virginia’s geologic landscape. | X |  |  |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| ES.8 The student will investigate and understand that freshwater resources influence and are influenced by geologic processes and human activity. Key ideas include |  |  |  |
| 1. water influences geologic processes including soil development and karst topography; |  | X |  |
| 1. the nature of materials in the subsurface affect the water table and future availability of fresh water; | X |  |  |
| 1. weather and human usage affect freshwater resources, including water locations, quality, and supply; and | X |  |  |
| 1. stream processes and dynamics affect the major watershed systems in Virginia, including the Chesapeake Bay and its tributaries. | X |  |  |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| ES.9 The student will investigate and understand that many aspects of the history and evolution of Earth and life can be inferred by studying rocks and fossils. Key ideas include |  |  |  |
| 1. traces and remains of ancient, often extinct, life are preserved by various means in sedimentary rocks; | X |  |  |
| 1. superposition, cross-cutting relationships, index fossils, and radioactive decay are methods of dating rocks and Earth events and processes; | X |  |  |
| 1. absolute (radiometric) and relative dating have different applications but can be used together to determine the age of rocks and structures; and | X |  |  |
| 1. rocks and fossils from many different geologic periods and epochs are found in Virginia. | X |  |  |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| ES.10 The student will investigate and understand that oceans are complex, dynamic systems and are subject to long- and short-term variations. Key ideas include |  |  |  |
| 1. chemical, biological, and physical changes affect the oceans; | X |  |  |
| 1. environmental and geologic occurrences affect ocean dynamics; | X |  |  |
| 1. unevenly distributed heat in the oceans drives much of Earth’s weather; | X |  |  |
| 1. features of the sea floor reflect tectonic and other geological processes; and | X |  |  |
| 1. human actions, including economic and public policy issues, affect oceans and the coastal zone including the Chesapeake Bay. | X |  |  |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| ES.11 The student will investigate and understand that the atmosphere is a complex, dynamic system and is subject to long-and short-term variations. Key ideas include |  |  |  |
| 1. the composition of the atmosphere is critical to most forms of life; | X |  |  |
| 1. biologic and geologic interactions over long and short time spans change the atmospheric composition; | X |  |  |
| 1. natural events and human actions may stress atmospheric regulation mechanisms; and | X |  |  |
| 1. human actions, including economic and policy decisions, affect the atmosphere. | X |  |  |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| ES.12 The student will investigate and understand that Earth’s weather and climate are the result of the interaction of the sun’s energy with the atmosphere, oceans, and the land. Key ideas include |  |  |  |
| 1. weather involves the reflection, absorption, storage, and redistribution of energy over short to medium time spans; | X |  |  |
| 1. weather patterns can be predicted based on changes in current conditions; | X |  |  |
| 1. extreme imbalances in energy distribution in the oceans, atmosphere, and the land may lead to severe weather conditions; | X |  |  |
| 1. models based on current conditions are used to predict weather phenomena; and | X |  |  |
| 1. changes in the atmosphere and the oceans due to natural and human activity affect global climate. | X |  |  |

Rubric for Instructional Design and Support

| **Adequate**  (Note: Provide examples to support this rating.) | **Limited**  (Note: Provide examples to support this rating.) | **No Evidence** |
| --- | --- | --- |
| 1. Materials emphasize the use of effective instructional practices and learning theory. | | |
| * 1. Students are guided through critical thinking and problem-solving approaches. | | |
| Materials consistently include content promoting use of critical thinking and problem-solving approaches. | Materials inconsistently include content promoting use of critical thinking and problem-solving approaches. | Materials do not include content promoting use of critical thinking and problem-solving approaches. |
| * 1. Concepts are introduced through concrete experiences that incorporate the scientific and engineering practices. | | |
| Materials consistently promote the introduction of concepts through concrete experiences. | Materials inconsistently promote the introduction of concepts through concrete experiences. | Materials do not promote the introduction of concepts through concrete experiences. |
| * 1. Multiple opportunities are provided for students to develop and apply concepts through scientific and engineering practices. | | |
| Materials consistently provide development and application of concepts through appropriate technologies. | Materials inconsistently provide development and application of concepts through appropriate technologies. | Materials do not provide development and application of concepts through appropriate technologies. |
| * 1. Students use a variety of representations (graphical, numerical, symbolic, verbal, and physical) to connect science concepts. | | |
| Materials provide consistent use of a variety of representations of science content and concepts. | Materials provide inconsistent use of a variety of representations of science content and concepts. | Materials do not provide use of a variety of representations of science content and concepts. |
| 1. The science content is significant and accurate. | | |
| * 1. Materials are presented in an organized, logical manner which represents the current thinking on how students learn science. | | |
| Materials consistently support the balanced use of conceptual and procedural approaches. | Materials inconsistently support the balanced use of conceptual and procedural approaches. | Materials do not support a balanced use of conceptual and procedural approaches. |
| * 1. Materials are organized appropriately within and among units of study. | | |
| Materials are consistently organized within and among units of study. | Materials are inconsistently organized within and among units of study. | Materials are inappropriately organized within and among units of study. |
| * 1. Format design includes titles, subheadings, and appropriate cross-referencing for ease of use. | | |
| Materials consistently use formatting that is user-friendly. | Materials inconsistently use formatting that is user-friendly. | Materials do not use formatting that is user-friendly. |
| * 1. Writing style, length of sentences, vocabulary, graphics, and illustrations are appropriate. | | |
| Materials consistently include writing and visuals that are appropriate for the grade level. | Materials inconsistently include writing and visuals that are appropriate for the grade level. | Materials do not include writing and visuals that are appropriate for the grade level. |
| * 1. Level of abstraction is appropriate, and practical/real-life examples, including careers, are provided. | | |
| Materials consistently provide the appropriate level of abstraction and appropriate practical/real-life examples. | Materials inconsistently provide the appropriate level of abstraction and appropriate practical/real-life examples. | Materials do not provide the appropriate level of abstraction and appropriate practical/real-life examples. |
| * 1. Sufficient applications are provided to promote depth of application. | | |
| Materials consistently provide sufficient applications to promote depth of application and are appropriate for the grade level. | Materials inconsistently provide sufficient applications to promote depth of application and are appropriate for the grade level. | Materials do not provide sufficient applications to promote depth of application and are not appropriate for the grade level. |
| 1. Materials present content in an accurate, unbiased manner. | | |
| Materials consistently present content in an accurate, unbiased manner. | Materials inconsistently present content in an accurate, unbiased manner. | Materials do not present content in an accurate, unbiased manner. |