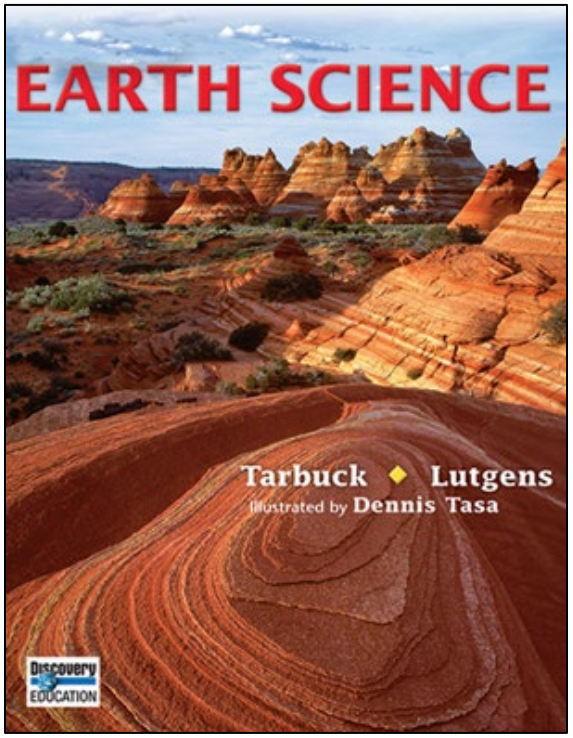
SAVVAS
LEARNING COMPANY

A Correlation of

Earth Science
©2017



To the

Loudoun County Public Schools
Earth Science Rubric

Prepared by Savvas Learning Company, formerly Pearson K12 Learning

Science Textbook Correlation to LCPS Science Office Criteria and 2018 Earth Science Standards of Learning and Curriculum Framework

LCPS Earth Science Rubric

Publisher: Savvas Learning Company, LLC	**Text: Earth Science**	**Copyright date: 2017**
Contact: Mark Welsh, VP Proposal Services	**Phone#: (201) 236-7000**	**E-mail: mark.welsh@savvas.com**

Earth Science, as with all sciences, includes making decisions about the generation and testing of ideas; prediction, measurement, data collection and representation; evaluation of sources of information; collaborative investigation; interpretation and communication of findings; evaluation and verification of findings and considerations relating to the social context of research. Earth Science is a study of the interrelationships between the Earth's composition, structure, processes and history, its atmosphere, meteorology, and astronomy. Students interpret various maps, charts, and tables. They utilize technology such as probeware and GIS technologies to collect, organize and analyze data. Facility in using many different kinds of maps and graphics is a major outcome of learning Earth Science. Students also consider the costs and benefits of using the Earth's resources in problem-solving situations. Additional technologies and scientific tools, including graphing calculators, computers, and probeware are used when appropriate and feasible. Mathematics, computational thinking, and experiences in the engineering design process gain importance as students advance in their scientific thinking.

Resources Meet the LCPS Science Philosophy and Practice	
Criteria	**Correlation: Must address the identified need. When appropriate, provide examples in the resource. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
Instructional resources should develop students' ability to know, use, and interpret scientific explanations of the natural world; including developing and using models.	*Earth Science* requires students to engage in scientific inquiry as they think, investigate, and interact with natural phenomena through activities designed to integrate elements of three-dimensional learning, such as developing and using models, lab experiments, research activities, problem-based exercises and more. **Please see the following examples:** **ATE:** Inquiry Exploration Lab: Finding *Savvas Earth Science* that Best Conserves, Go Further, p. 119 Inquiry Try It!: How Can Buildings Be Made Earthquake-Safe?, p. 217 Inquiry Try It!: How do the Continents Fit Together?, p. 247

Instructional resources should develop students' ability to generate and evaluate scientific evidence and explanations; including developing and using models.	*Earth Science* is designed to facilitate the development of students' ability to generate and evaluate scientific evidence and explanations through activities that integrate elements of three-dimensional learning, such as analyzing and interpreting data, constructing explanations and designing solutions, developing and using models, and more. **Please see the following examples:** **ATE:** Inquiry Exploration Lab: Fossil Occurrence and the Age of Rocks, p. 356-357 Inquiry Try It!: Global Climate Change: What is Causing It?, p. 587 Inquiry Exploration Lab: Human Impact on Climate and Weather, p. 606-607
Instructional resources should develop students' ability to understand the nature and development of scientific knowledge; When appropriate, instructional resources present multiple scientific perspectives and interpretations of scientific ideas as a representation of how science develops understanding of the natural world.	A variety of student-centered activities are incorporated in each topic to provide students with multiple perspectives on a theme. Furthermore, teachers can find all activities online and can download and edit these worksheets for easy customization.
Instructional resources should develop students' ability to participate productively in scientific practices and discourse.	*Earth Science* puts students on a path toward success in science learning and connects performance expectations within and across grades, creating a balanced and coherent sequence designed to deepen student understanding and develop their ability to participate productively in scientific practices and discourse. **Please see the following examples:** **ATE:** Chapter 11 Review Science Concepts, p. 306 Lesson 13.2: Reteach, p. 376 Chapter 14 Review Science Concepts, p. 396

Instructional resources reflect current best practices in the field of science instruction (pedagogy).	Students and teachers will benefit from Savvas' experience in developing instructional materials informed by a strong research base. Savvas is the only major publisher that consistently invests in outside validation studies that meet the rigorous criteria of the What Works Clearinghouse. A research team, including educational research methodologists, has been working with Savvas for eight years to integrate scientific research practices into the development of our curricula. We incorporate the following four phases of research into the development of each new curriculum. • During the **first phase** of the research process, we evaluate previous editions of the curriculum to determine best instructional practices as demonstrated by scientific evidence. These practices are incorporated into the new curriculum, establishing a sound research base. • During the **second phase**, authors and researchers conduct extensive literature reviews on content, instructional practices, and education standards. This information is synthesized and embedded into the curriculum. • During the **third phase**, formative research is conducted on the curriculum under development. Classroom field tests investigate usability, teacher and student feedback, and preliminary measures of curriculum effectiveness. School administrators, content specialists, and classroom teachers systematically evaluate the curriculum in development. • The **final phase** of research examines the implementation and effectiveness of the curriculum. Independent, randomized control trial studies are conducted to provide scientific evidence of student achievement on standardized assessments. Implementation details and best practices are documented throughout the study period for synthesis into revised and future curricula, further contributing to their effectiveness.

Materials consistently provide development and application of concepts and scientific practices through the exploration and use of appropriate technologies.	Flexible classroom management tools within the digital platform provide freedom and control to use a digital, print, or blended format. The digital platform provides powerful data reporting for personal data-driven instruction, while technology enhanced items allow students to develop and apply concepts and scientific practices and experience next generation assessment formats.
Resource provides opportunities to engage in a meaningful scientific investigation of a watershed (stream or bay) as defined by the Virginia Department of Education (MWEE)	The *Earth Science* curriculum includes many options for customization. Instructors can easily substitute a related or local phenomenon such as a meaningful investigation of a watershed (stream or bay) as defined by the VA DOE. **For engagement in meaningful investigations related to watersheds, please refer to *Chapter 6: Running Water and Groundwater*, pp. 156-185.**
Resource provides opportunities for students to engage in computational thinking by solving problems that logically organize and classify data and use a series of steps (algorithms).	*Earth Science* puts students on a path toward success in science learning by making science relevant and meaningful for today's students and teaching them to work similarly to actual scientists and engineers to understand real-world phenomena. Scientific inquiry, investigating phenomena, computational thinking, problem-solving and analysis and application of core concepts are emphasized as a goal for all students. **Please see the following examples:** **ATE:** Using Mathematical and Computational Thinking: The Bycatch Problem, p. 728 Skills Handbook: Math Skills, pp. 740-741

Resources provide opportunities for students to use technology to learn science content and science process skills.	Our innovative technology-enhanced items, performance-based assessments, and adaptive learning programs help measure and build key 21st-century skills in learners of all abilities—including the elements of conceptual understanding, basic and procedural skills, and problem solving. **Please see the following examples:** **ATE:** Build Science Skills: Research, p. 230 Build Science Skills: Apply Concepts. p. 565
Resources provide opportunities for students to explore advances in technology and scientific discovery that have occurred since your last publication date.	The intuitive digital path is more than an ancillary to *Earth Science*; it is a vital component of our approach to learning that places the student at the center of the process of discovery. The digital path enables students to explore science in a way that emphasizes their own quest for knowledge and creativity in exploring and organizing the material and explore advances in technology and scientific discovery that develop beyond publication of printed materials.

Resources Support the LCPS Mission, Core Beliefs and Strategic Goals **https://bit.ly/2VV3lDB**	
Criteria	**Correlation: Must address the identified need. When appropriate, provide examples in the resource. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
Instructional resources support the potential for integration into Project-Based Learning (PBL).	In *Earth Science,* anchoring phenomena is accompanied by project-based learning, such as Inquiry Exploration labs. With this project students define the problem and design a solution. **Please see the following examples:** **ATE:** Inquiry Exploration Lab: Finding *Savvas Earth Science* that Best Conserves Resources, pp. 118-119 Inquiry Exploration Lab: Effect of Temperature on Chemical Weathering, pp. 150-151 Inquiry Exploration Lab: Paleomagnetism and the Ocean Floor, pp. 272-273
Instructional resources provide opportunities for Personalized Learning and the exercise of student voice and choice.	*Earth Science* offers comprehensive differentiation instruction and intervention support to address the needs of all learners—whether they are struggling, on-level, or advanced learners. This support provides system-driven opportunities to personalize learning for students and a library of resources to support the teacher in personalizing instruction and allowing students to exercise their voice and choice.
Instructional resources include grade level performance assessments that are formative and summative.	Learning outcomes are at the heart of each assessment we create, including those in our science textbooks. Our innovative technology-enhanced items, performance-based formative and summative assessments, and adaptive learning programs help measure and build key 21st-century skills in learners of all abilities—including the elements of conceptual understanding, basic and procedural skills, and problem solving.

Instructional resources support individual, small group, and whole class learning opportunities and collaboration.	*Earth Science* provides opportunities for students to work individually, in small, cooperative groups and engage in science and engineering practices as a whole class.
Instructional resources consistently include content promoting use of critical thinking skills and problem-solving approaches and provide opportunities for students to use critical thinking skills and problem solving through a process of sustained inquiry.	*Earth Science* includes performance-based tasks, research projects, inquiry investigations, labs, open-ended response questions, multiple choice questions, drag-and-drop questions, and other content that provides opportunities for students to use critical thinking and problem solving through a process of sustained inquiry.
Materials consistently promote the introduction of concepts through concrete experiences.	Up-to-date, accurate, themed text is used to build knowledge in each unit, emphasizing the common characteristics of a unifying, relevant concept and promoting in-depth understanding through daily lessons. Visual analogies connect difficult concepts to real world issues to help students better understand the concepts presented. **Please see the following examples:** **ATE:** Inquiry Exploration Lab: Finding *Savvas Earth Science* that Best Conserves Resources, p. 119 Inquiry Exploration Lab: Observing Stars, 723
Instructional resources provide opportunities for students to apply learning in real-world situations.	Up-to-date, accurate, themed text is used to build knowledge in each unit, emphasizing the common characteristics of a unifying, relevant concept and promoting in-depth understanding through daily lessons. Visual analogies connect difficult concepts to real world issues to help students better understand the concepts presented. **Please see the following examples:** **ATE:** Inquiry Try It!: How Do Local Bodies of Water Affect Your Community?, p. 157 Inquiry Try It!: How Can Buildings Be Made Earthquake-Safe?, p. 217

Materials consistently provide the appropriate level of abstraction and appropriate practical/real-life examples.	A rigorous curriculum offers students equal opportunities to develop understanding, practice key concepts and skills, and apply these concepts and skills in real-world or abstract situations.
Materials consistently provide sufficient, grade-level appropriate examples of applications of concepts to promote depth of understanding.	Materials present current, scientifically accurate, and grade-appropriate scientific information, phenomena, and representations. Outside fact-checkers verify data used and authenticity of identified facts. A full research bibliography is available showing the research reviewed and sources cited that informed development of *Savvas Earth Science*.

Resources are Inclusive, Accessible, Culturally Responsive, and Free of Bias	
Criteria	**Correlation: Must address the identified need. When appropriate, provide examples in the resource. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
Instructional resources represent women, people of different ages, religious, ethnic and racial minorities and persons with disabilities in many different environments and occupations, and in the roles of current science career fields.	Savvas systematically develops its educational products and vets its partnership products by implementing criteria and standards that reflect multiethnic, multiracial, and multicultural perspectives. Over the years, we have worked with numerous experts and consultants from universities and other educational institutions to provide a broad perspective in our educational materials. While creating high-quality educational content, our standards are aimed at the following: ▪ Integrating multicultural experiences into program content so students see themselves as part of what is valued in the school's curriculum ▪ Fostering self-esteem for greater academic achievement ▪ Empowering students to act effectively in a democratic society and reach their full potential ▪ Reducing prejudice by showing multicultural friendships and people from different backgrounds, working, playing, and living together Our educational materials consider the needs of all students and are designed to provide a fair, balanced representation of various cultural groups and members, including racial, ethnic and religious groups; males and females; older people; and people with disabilities.
Instructional resources are free from stereotypes which assign a rigid set of characteristics to all members of a group.	Educational materials consider the needs of all students, are free from stereotypes, and are designed to provide a fair, balanced representation of various cultural groups and members, including racial, ethnic and religious groups; males and females; older people; and people with disabilities.

Instructional resources provide teachers with strategies for meeting the needs of Advanced Learners, English Learners and Special Education students.	Instructional materials provide LCPS teachers with research-based social and emotional learning curriculum and materials for all learners, including students who receive special education services and students who receive gifted and talented services. Instructional materials also provide differentiating instruction based on diverse learners (i.e., sections provide scaffolds for ELLs and students with disabilities, teacher guidance in the introductory section, etc.) and scaffolded tools for remediation (for example, appendix resources for writing and editing, teacher guidance for assigning reading, etc.).
Instructional resources include accessibility features and tools for Advanced Learners, English Learners and Special Education students.	Instructional materials provide LCPS students with research-based social and emotional learning curriculum and materials for all learners, including students who receive special education services and students who receive gifted and talented services. Instructional materials also provide differentiating instruction based on diverse learners (i.e., sections provide scaffolds for ELLs and students with disabilities, teacher guidance in the introductory section, etc.) and scaffolded tools for remediation (for example, appendix resources for writing and editing, teacher guidance for assigning reading, etc.). **Please see the following examples:** **ATE:** Build Reading Literacy, p. 216D Chapter Pre-Test, p. 216
Instructional resources include Tier 2 and Tier 3 vocabulary necessary to support English Learners and Special Education students.	LCPS can be confident in high-quality instructional materials and services that are developed for quality, efficacy, and usability, and are based on critical foundational research and proven classroom results. *Savvas Earth Science* was developed to meet the needs of a diverse, high-need student population, including economically disadvantaged students, underrepresented racial/ethnic groups, and large populations of ELLs. **Please see the following examples:** **ATE:** Lesson 6.3 Build Vocabulary, p. 171 Lesson 9.1 Build Vocabulary, p. 248

Publisher: Savvas Learning Co., LLC **Text: Earth Science ©2017**

2018 Earth Science Standards of Learning	
STANDARD	**Correlation: Must address both the standards and the curriculum framework. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
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	
a) the big bang theory explains the origin of universe;	**ATE:** Earth & Space: Earth's Place in the Universe, 6 Figure 4 Big Bang Theory, 6 The Big Bang, 720-721 Figure 23 The Big Bang, 720 25.3 Assessment: Review Key Concepts, Question 5, 721
b) stars, star systems, and galaxies change over long periods of time;	**ATE:** 25.2 Stellar Evolution, 707-714 Figure 10 Life Cycle of a Sun-like Star, 709 Figure 11 Stellar Evolution, 710 The Expanding Universe, 718-719 25.3 Assessment: Review Key Concepts, Question 4, 721

c) characteristics of the sun, planets and their moons, comets, meteors, asteroids, and dwarf planets are determined by materials found in each body; and	**ATE:** The Interior of the Planets, 646 Structure, 650-654 Jupiter's Moons, 655 Figure 14 Jupiter's Moons, 655 Pluto: Dwarf Planet, 659 23.4 Minor Members of the Solar System, 660-664 Figure 12 Structure of the Sun, 685 The Solar Interior, 689-690
d) evidence from space exploration has increased our understanding of the structure and nature of our universe.	**ATE:** 1.2 A View of Earth, 7-10 The Robotic Explorer, 649 Figure 5 Mars Rover, 649 Structure of the Milky Way, 716 24.2 Tools for Studying Space, 678-683 The Sun 684 Figure 11 The McMath-Pierce Solar Telescope at Kitt Peak Near Tucson, Arizona

Publisher: Savvas Learning Co., LLC **Text: Savvas Earth Science ©2017**

2018 Earth Science Standards of Learning	
STANDARD	**Correlation: Must address both the standards and the curriculum framework. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
ES.3 The student will investigate and understand that Earth is unique in our solar system. Key ideas include	
a) Earth supports life because of its relative proximity to the sun and other factors; and	**ATE:** Earth & Space: Earth's Place in the Universe, 6 Earth's Major Spheres, 7-9 Figure 7 Interacting Spheres, 9 Earth as a System, 19-20 Earth-Sun Relationships, 481-482 Earth's Atmosphere, 476 How Earth Works: Earth's Atmosphere, 494-495 The Sun, 684
b) the dynamics of the sun-Earth-moon system cause seasons, tides, and eclipses.	**ATE:** Tides, 458-459 Figure 13 Tidal Bulges on Earth Caused by the Moon, 458 Figure 14 Earth-Moon-Sun Positions and the Tides, 459 16.2 Assessment: Review Key Concepts, Questions 5-6, 460 Earth's Axis and Seasons, 626 Eclipses, 628-629 Visual Summary Solar and Lunar Eclipse: Figure 18 Moving in and Out of Shadow, 628 22.2 Assessment: Review Concepts, Questions 5-6, 629

Publisher: Savvas Learning Co., LLC **Text: Earth Science ©2017**

2018 Earth Science Standards of Learning	
STANDARD	**Correlation: Must address both the standards and the curriculum framework. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
ES.4 The student will investigate and understand that there are major rock-forming and ore minerals. Key ideas include	
a) analysis of physical and chemical properties supports mineral identification;	**ATE:** Inquiry Try It!: How Are a Group of Minerals Alike and Different?, 33 2.2 Minerals 44-49 2.2 Assessment: Review Key Concepts, Think Critically, BIG IDEA: Earth's Materials and Systems, Questions #1-8, 49 2.3 Properties of Minerals, 50-55 Table 2 Some Common Minerals and Their Properties, 54-55 2.3 Assessment: Review Key Concepts, Think Critically, Connecting Concepts, Questions 1-7, 55 Earth & Its Resources: Gemstones, 56-57 Inquiry Exploration Lab: Mineral Identification, 58-59
b) characteristics of minerals determine the uses of minerals; and	**ATE:** 2.2 Minerals, 44-49 Figure 9 Many Objects Are Made From Minerals, 44 2.3 Properties of Minerals, 50-55 Earth & Its Resources: Gemstones, 56-57 Figure 23 Two Examples of Diamond, 57 Table 3 Some Important Gemstones, 57 Nonmetallic Mineral Resources, 100-101 Table 1 Uses and Occurrences of Nonmetallic Minerals, 101

c) minerals originate and are formed in specific ways.	**ATE:** Rocks, 66 3.1 Assessment: Review Key Concepts, Question 1, 69 Classification of Metamorphic Rocks, 82-83 Inquiry Quick Lab: Observing Some of the Effects of Pressure on Mineral Grains, 83 Formation of Mineral Deposits, 98-100

Publisher: Savvas Learning Co., LLC **Text: Earth Science ©2017**

2018 Earth Science Standards of Learning	
STANDARD	**Correlation: Must address both the standards and the curriculum framework. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
ES.5 The student will investigate and understand that igneous, metamorphic, and sedimentary rocks can transform. Key ideas include	
a) Earth materials are finite and are transformed over time;	**ATE:** 3.1 The Rock Cycle, 66-69 Visual Summary: Rock Cycle, Figure 3, 68 3.1 Assessment: Review Key Concepts, Questions 4-5, 69 3.2 Igneous Rocks, 70-74 3.3 Sedimentary Rocks, 75-79 3.4 Metamorphic Rocks, 80-84 Chapter 3 Assessment, 89-90

b) the rock cycle models the transformation of rocks;	**ATE:** 3.1 The Rock Cycle, 66-69 Visual Summary: Rock Cycle, Figure 3, 68 3.1 Assessment: Review Key Concepts, Questions 4-5, 69 Formation of Igneous Rocks, 70-71 3.2 Assessment: Review Key Concepts, Question 1, 74 Formation of Sedimentary Rocks, 76 Types of Metamorphism, 80-81 Agents of Metamorphism, 81-82
c) layers of Earth have rocks with specific chemical and physical properties; and	**ATE:** 3.2 Igneous Rocks, 70-74 3.3 Sedimentary Rocks, 75-79 3.4 Metamorphic Rocks, 80-84 Chapter 3 Assessment, 89-90
d) plate tectonic and surface processes transform Earth materials.	**ATE:** Earth's Changing Surface, 9-10 Mechanical Weathering, 126-128 Figure 1 Weathering, 126 Visual Summary: Mechanical Weathering and Surface Area, Figure 2, 127 Chemical Weathering, 129-130 5.1 Assessment: Review Key Concepts, Questions 1 & 3, 132 9.3 Theory of Plate Tectonics, 261-268 9.3 Assessment: Review Key Concepts, Question 1, 268

Publisher: Savvas Learning Co., LLC **Text: Earth Science ©2017**

2018 Earth Science Standards of Learning	
STANDARD	**Correlation: Must address both the standards and the curriculum framework. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
ES.6 The student will investigate and understand that resource use is complex. Key ideas include	
a) global resource use has environmental liabilities and benefits;	**ATE:** Tar Sands and Oil Shale, 97-98 Figure 5 Distribution of Oil Shale in the Green River Formation, 98 Land Resources, 111-112 Figure 20 Effects of Surface Mining, 111 Map It Activity, Figure 21 Virgin Forests 1620-1992, 112 Bingham Canyon, Utah: The Largest Open-Pit Mine, 117 Chapter 4 Assessment: Concepts in Action, Question 31, 122 Chapter 4 Assessment: Performance-Based Assessment, Draw Conclusions, 122
b) availability, renewal rates, and economic effects are considerations when using resources;	**ATE:** Renewable and Nonrenewable Resources, 94-95 Figure 2 U.S. Coal Fields, 95 Fossil Fuels, 95-96 Tar Sands and Oil Shale, 97-98 Figure 5 Distribution of Oil Shale in the Green River Formation, 98 4.1 Assessment: Review Key Concepts, Questions 1 & 2, 101 Bingham Canyon, Utah: The Largest Open-Pit Mine, 117

c) use of Virginia resources has an effect on the environment and the economy; and	Supporting Content: **ATE:** Land Resources, 111-112 Figure 20 Effects of Surface Mining, 111 Map It Activity, Figure 21 Virgin Forests 1620-1992, 112 Inquiry Exploration Lab: Finding *Savvas Earth Science* that Best Conserves Resources, 118-119 Chapter 4 Assessment: Performance-Based Assessment, Draw Conclusions, 122
d) all energy sources have environmental and economic effects.	**ATE:** Tar Sands and Oil Shale, 97-98 Figure 5 Distribution of Oil Shale in the Green River Formation, 98 Land Resources, 111-112 Figure 20 Effects of Surface Mining, 111 Map It Activity, Figure 21 Virgin Forests 1620-1992, 112 4.4 Protecting Resources, 113-116 4.4 Assessment: Review Key Concepts, Think Critically, Writing in Science, Questions 1-8, 116 Inquiry Exploration Lab: Finding *Savvas Earth Science* that Best Conserves Resources, 118-119

Publisher: Savvas Learning Co., LLC **Text: Earth Science ©2017**

2018 Earth Science Standards of Learning	
STANDARD	**Correlation: Must address both the standards and the curriculum framework. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
ES.7 The student will investigate and understand that plate tectonic theory explains Earth's internal and external geologic processes. Key ideas include	
a) 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;	**ATE:** Evidence for Sea-Floor Spreading, 257 Magnetic Strips, 258 Earth's Moving Plates, 261 9.3 Assessment: Review Key Concepts, Question 1, 268 What Causes Plate Motion?, 270 9.4 Assessment: Review Key Concepts, Question 1, 273 9.4 Assessment: BIG IDEA Dynamic Earth, Question 6, 273 Convection, 484
b) features and processes occur within plates and at plate boundaries;	**ATE:** Types of Plate Boundaries, 262-263 Divergent Boundaries, 264 Convergent Boundaries, 265-267 Transform Fault Boundaries, 268 9.4 Mechanisms of Plate Motion, 270-271 9.4 Assessment: Review Key Concepts, Think Critically, Questions 1-5, 271

c) interaction between tectonic plates causes the development of mountain ranges and ocean basins; and	**ATE:** Visual Summary: Breakup of Pangaea, Figure 5, 252 Types of Mountains, 316-317 Basins, 319 Figure 13 Basin, 319 11.3 Mountains and Plates, 320-325 Figure 15 Oceanic-Oceanic Convergence, 321 Figure 16 Oceanic-Continental Convergence, 321 Figure 17 Continental-Continental Convergence, 322
d) evidence of geologic processes is found in Virginia's geologic landscape.	Supporting Content: **ATE:** 11.2 Folds, Faults, and Mountains, 312-317 11.3 Mountains and Plates, 320-325 Figure 16 Oceanic-Continental Convergence, 321 Figure 17 Continental-Continental Convergence, 322 11.3 Assessment: Review Key Concepts, Think Critically, Question 1-7, 325 16.3 Shoreline Processes and Features, 461-467

Publisher: Savvas Learning Co., LLC **Text: Earth Science ©2017**

2018 Earth Science Standards of Learning	
STANDARD	**Correlation: Must address both the standards and the curriculum framework. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
ES.8 The student will investigate and understand that freshwater resources influence and are influenced by geologic processes and human activity. Key ideas include	
a) water influences geologic processes including soil development and karst topography;	**ATE:** Characteristics of Soil, 133-135 Figure 10 Composition by Volume of Good-Quality Soil, 133 Soil Formation, 135-137 Soil Erosion, 140-142 5.2 Assessment: Review Key Concepts, Questions 1-3, 142 Karst Topography, 178-179 6.3 Assessment: Review Key Concepts, Question 5, 179 16.3 Shoreline Processes and Features, 461-467
b) the nature of materials in the subsurface affect the water table and future availability of fresh water;	**ATE:** 6.3 Water Beneath the Surface, 171-179 Figure 14 Distribution of Groundwater, 172 Wells, 173-174 Figure 17 Well, 174 6.3 Assessment: Review Key Concepts, Question 1, 179

c) weather and human usage affect freshwater resources, including water locations, quality, and supply; and	**ATE:** Freshwater Pollution, 108-109 Table 2 Major Types of Water Pollution, 109 Environmental Problems Associated with Groundwater, 174-176 Figure 19 Fertilizers and Pesticides, 175 Figure 20 Landfill, 175 Figure 21 Land Subsidence, 176 6.3 Assessment: Review Key Concepts, Question 3, 179 6.3 Assessment: Think Critically, Questions 7 & 9, 179
d) stream processes and dynamics affect the major watershed systems in Virginia, including the Chesapeake Bay and its tributaries.	Supporting Content: **ATE:** Streamflow, 160-161 Figure 3 Stream Velocity, 160 Figure 4 Stream Gradient, 160 6.2 The Work of Streams, 164-170 6,2 Assessment: Review Key Concepts, Think Critically, Questions 1-6, 170

Publisher: Savvas Learning Co., LLC **Text: Earth Science ©2017**

2018 Earth Science Standards of Learning	
STANDARD	**Correlation: Must address both the standards and the curriculum framework. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
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	
a) traces and remains of ancient, often extinct, life are preserved by various means in sedimentary rocks;	**ATE:** Sedimentary Rock Features, 78-79 12.2 Fossils: Evidence of Past Life, 342-346 Figure 10 Correlating With Fossils, 344 Figure 11 Evidence of a Past Environment, 345 Radiometric Dating of Sedimentary Rock, 350-351
b) superposition, cross-cutting relationships, index fossils, and radioactive decay are methods of dating rocks and Earth events and processes;	**ATE:** Inquiry Exploration Lab: Investigating Anticlines and Synclines, 328-329 Law of Superposition 337 Principle of Cross-Cutting Relationship, 338 Figure 3 Principle of Cross-cutting Relationship, 338 Fossils and Correlation, 345 12.2 Assessment: BIGIDEA Earth History, Question 9, 346 Radiometric Dating of Sedimentary Rock, 350-351 Figure 16 Estimating the Age of Sedimentary Rock Layers, 351

c) absolute (radiometric) and relative dating have different applications but can be used together to determine the age of rocks and structures; and	**ATE:** Relative Dating, 337-340 Correlation, 340-341 12.1 Assessment: Review Key Concepts, Think Critically, Writing in Science, Questions 1-9, 341 What Is Radioactivity, 347-348 Radiometric Dating, 348-349 Dating with Carbon-14, 350 Figure 16 Estimating the Age of Sedimentary Rock Layers, 351 Radiometric Dating of Sedimentary Rock, 350-351
d) rocks and fossils from many different geologic periods and epochs are found in Virginia.	Supporting Content: **ATE:** Sedimentary Rock Features, 78-79 12.2 Fossils: Evidence of Past Life, 342-346 Periods and Epochs, 355 Inquiry Exploration Lab: Fossil Occurrence and the Age of Rocks, 356-357

Publisher: Savvas Learning Co., LLC **Text: Earth Science ©2017**

2019 Earth Science Standards of Learning	
STANDARD	**Correlation: Must address both the standards and the curriculum framework. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
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	
a) chemical, biological, and physical changes affect the oceans;	**ATE:** Earth & Its Systems: Explaining Coral Atolls – Darwin's Hypothesis, 406 14.3 Assessment: Review Key Concepts, Think Critically, Connecting Concepts, Questions 1-8, 409 Processes Affecting Salinity, 423 Figure 2 Natural Processes Affect the Salinity of Seawater, 423 15.3 Oceanic Productivity, 433-437 15.3 Assessment: Review Key Concepts, Think Critically, Questions 1-6, 437 Assessment: Questions 2 & 5, 439 Upwelling, 450-451
b) environmental and geologic occurrences affect ocean dynamics;	**ATE:** Continental Margins, 401-403 Ocean Basin Floor, 403-404 Mid-Ocean Ridges, 405 14.2 Assessment: Review Key Concepts, Questions 3-7, 405 How Earth Works: Ocean Life, 438-439 Assessment: Questions 2 & 5, 439

c) unevenly distributed heat in the oceans drives much of Earth's weather;	**ATE:** Ocean Temperature Variation, 424-425 Ocean Currents and Climate, 450 Figure 3 Gulf Stream, 450 Chapter 16 Assessment: Understand Concepts, Question 12, 471 Land and Water, 489 World Distribution of Temperature, 492-493 17.3 Assessment: Review Key Concepts, Question 4, 493
d) features of the sea floor reflect tectonic and other geological processes; and	**ATE:** Mapping the Ocean Floor, 396-400 Figure 3 A Map of the Ocean Floor, 396-397 14.2 Ocean Floor Features, 401-405 14.2 Assessment: Review Key Concepts, Questions 3-5, 405
e) human actions, including economic and public policy issues, affect oceans and the coastal zone including the Chesapeake Bay.	**ATE:** 14.4 Resources from the Seafloor, 410-413 14.4 Assessment: Review Key Concepts, Think Critically, Questions 1-8, 413 Chapter 14 Assessment: Performance-Based Assessment, Research, 418 Food Chains and Food Webs, 437 Figure 18 A Food Chain and Food Web of the Chesapeake Bay, 437 Stabilizing the Shore, 466-467 16.3 Assessment: Think Critically, Question 12, 467 Chapter 16 Assessment: Performance-Based Assessment, Synthesize, 472

Publisher: Savvas Learning Co., LLC **Text: Earth Science ©2017**

2018 Earth Science Standards of Learning	
STANDARD	**Correlation: Must address both the standards and the curriculum framework. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
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	
a) the composition of the atmosphere is critical to most forms of life;	**ATE:** Earth's Atmosphere, 476 Composition of the Atmosphere, 47 7-478 Figure 2 Volume of Clear, Dry Air, 477 How Earth Works: Earth's Atmosphere, 494-495
b) biologic and geologic interactions over long and short time spans change the atmospheric composition;	**ATE:** How Earth Works: Effects of Volcanoes, 298-299 Assessment, Question 3(b), 299 Variable Components, 477-478 Absorption, 487 How Earth Works: Earth's Atmosphere, 494-495

c) natural events and human actions may stress atmospheric regulation mechanisms; and	**ATE:** Earth as a System: Linked Effects, 19 How Earth Works: Effects of Volcanoes, 298-299 Assessment: Question 3(b), 299 Composition of the Atmosphere, 477-478 Figure 3 Primary Pollutants in the Atmosphere, 478 How Earth Works: Earth's Atmosphere, 494-495 Figure 14 Ash in the Atmosphere, 601
d) human actions, including economic and policy decisions, affect the atmosphere.	**ATE:** Earth's Blanket of Air, 110 Figure 18 Sources of Air Pollution, 110 Figure 19 Major Primary Pollutants and Their Sources, 110 Human Influence, 478 Figure 3 Primary Pollutants in the Atmosphere, 478 How Earth Works: Earth's Atmosphere, 494-495 Earth & Its Resources: Atmospheric Stability and Air Pollution, 523

Publisher: Savvas Learning Co., LLC **Text: Earth Science ©2017**

2018 Earth Science Standards of Learning	
STANDARD	**Correlation: Must address both the standards and the curriculum framework. Use page number and ATE for Annotated Teacher Edition or CT for Core Technology. (Identify no more than 8 correlations.)**
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	
a) weather involves the reflection, absorption, storage, and redistribution of energy over short to medium time spans;	**ATE:** Earth's Atmosphere, 476 Figure 1 Weather, 476 What Happens to Solar Radiation, 486-487
b) weather patterns can be predicted based on changes in current conditions;	**ATE:** Measuring Air Pressure, 533 Figure 2 Two Types of Barometers, Apply Concepts, 533 Weather and Air Pressure, 538 Visual Summary: Airflow Patterns, Surface and Aloft, 539 Weather Forecasting, 539 Planet Diary: Weather Forecasting, 539 Air Masses and Weather, 559 Types of Fronts, 565-567

c) extreme imbalances in energy distribution in the oceans, atmosphere, and the land may lead to severe weather conditions;	**ATE:** El Niño and La Niña, 546-547 Figure 16 Normal Conditions, 546 Figure 17 El Niño, 547 Severe Storms, 568 Air Mases and Weather, 559 20.3 Severe Storms, 571-577 20.3 Assessment: Review Key Concepts, Think Critically, Questions 1-8, 577 How Earth Works: Winds and Storms, 578-579
d) models based on current conditions are used to predict weather phenomena; and	**ATE:** Stability, 514-515 Figure 10 Clouds from Unstable Air, 515 Weather Forecasting, 539 Planet Diary: Weather Forecasting, 539 Weather in North America, 561-563
e) changes in the atmosphere and the oceans due to natural and human activity affect global climate.	**ATE:** Earth's Blanket of Air, 110 Figure 19 Major Primary Pollutants and Their Sources, 110 Inquiry Apply It, 487 Inquiry Try It!: Global Climate Change: What is Causing It?, 587 Absorption, 487 Human Impact on Climate, 602-603 Figure 15 Change in CO_2 Levels, 602 21.3 Assessment: Review Key Concepts, Questions 3 & 4, 603