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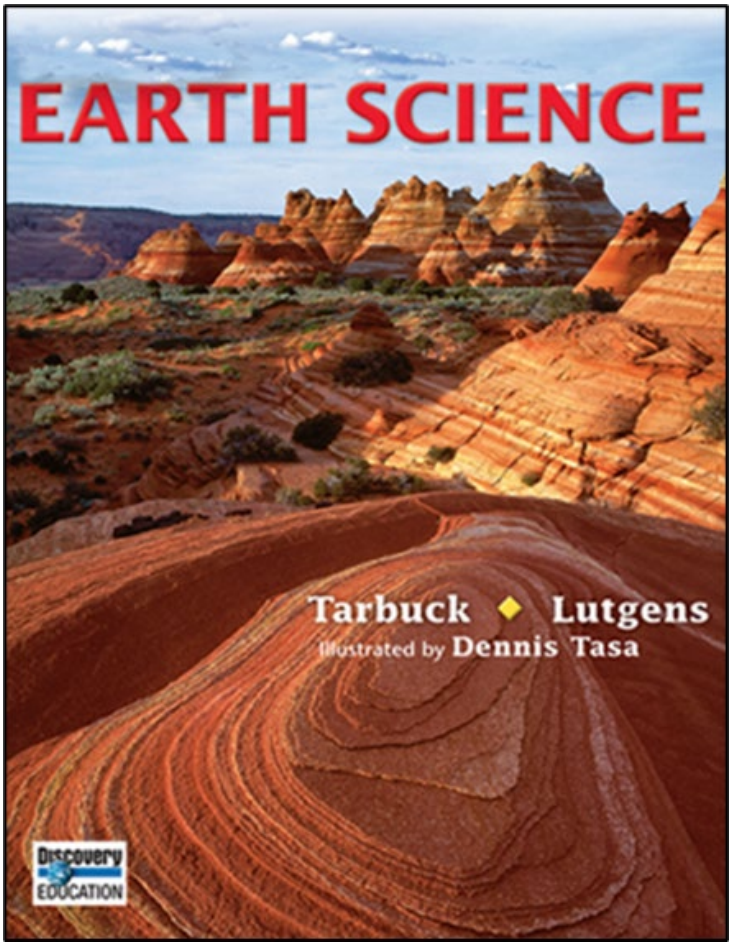

To the

Oklahoma
2020 Academic Standards for Science
Earth and Space Science

Prepared by Savvas Learning Company, formerly Pearson K12 Learning

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To the
Oklahoma 2020 Academic Standards for Science: Earth and Space Science

Introduction

This document demonstrates how ***Earth Science ©2017*** supports the Oklahoma 2020 Academic Standards for Science: Earth and Space Science. Correlation page references are to the Student and Teacher Editions and cited at the page level.

Engage in a journey of observation, explanation, and participation with ***Earth Science***!

Renowned authors Edward Tarbuck and Frederick Lutgens invite students on a journey of observation, explanation, and participation in the study of Earth's processes. An accessible writing style combined with digital support create a fresh new program that leads your diverse classroom on a path to discovery. Detailed illustrations by Dennis Tasa provide students with a comprehensive and immersive look at the science behind our planet.

The ©2017 edition of Earth Science features support for the **Next Generation Science Standards** and STEM activities, as well as enhanced resources for both students and teachers:

21st Century Skills: Each chapter of Earth Science an activity geared toward developing one or 21st Century skills. All of these activities task students to capture what they are learning in the science classroom and apply their knowledge to solving real-life problems in order to encourage productive, thoughtful members of the 21st century world.

STEM Activities: STEM activities support the implementation of the engineering process in an engaging and hands-on way. Excite students with real-world engineering design problem and hands-on inquiry. These activities promote higher-order critical thinking skills and result in improved student student performance. Teachers are provided with point-of-use STEM activities and teaching strategies.

Savvas Realize: On savvasrealize.com, you can go digital with online Student Editions and online Teacher Editions, as well as access to editable worksheets.

In addition, Earth Science ©2017 supports the today's diverse classroom with key Spanish resources, including the *Spanish Guided Reading and Study Workbook* and the *Spanish Chapter Tests*.

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(ES.ESS2.6.DCI.2) Changes in the atmosphere due to human activity have increased carbon dioxide concentrations and thus affect climate.	**SE/TE:** Factors that Determine Climate, 588-591Human Impact on Climate, 602-603 Figure 15: Change in CO2 Levels, 602 Inquiry: Exploration Lab: Human Impact on Climate and Weather, 606-607
Science and Engineering Practices	
(ES.ESS2.6.SEP.1) Developing and Using Models: Develop a model based on evidence to illustrate the relationships between systems or components of a system.	**SE/TE:** TE: Modeling Exfoliation, 128 How Earth Works: Earth's Atmosphere, 495-496 **TE only:** Modeling Exfoliation, 128 Modeling Humid Climates, 596

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Crosscutting Concepts	
(ES.ESS2.6.CCC.1) Energy and Matter: Energy drives the cycling of matter within and between systems.	For supporting content, please see: **SE/TE:** Earth & Its Systems: The Carbon Cycle, 85 The Water Cycle, 158-159 Figure 2: The Water Cycle, 159 How Earth Works: Earth's Atmosphere, 495-496
Performance Expectation	
(ES.ESS2.7) Engage in argument from evidence for how the simultaneous co-evolution of Earth's systems and life on Earth led to periods of stability and change over geologic time.	For supporting content, please see: **SE/TE:** The Cambrian Earth, 364-366 Precambrian Life, 367-368 Cambrian Period, 369-370 Ordovician Period, 371 Silurian Period, 372 Devonian Period, 372-373 Carboniferous Period, 374 Permian Period, 375-376 13.2 Assessment: Big Idea, 376 Triassic Period, 377-378 Jurassic Period, 379-380 Cretaceous Period, 380 Cretaceous Extinction, 381 The Rise of Mammals, 382-383 Tertiary Period, 383 Quaternary Period, 384-385 Chapter 13 Assessment, 390
Disciplinary Core Ideas	
(ES.ESS2.7. DCI.1) Gradual atmospheric changes were due to plants and other organisms that captured carbon dioxide and released oxygen.	**SE/TE:** The Cambrian Earth, 364-366 Precambrian Life, 367-368 Cambrian Period, 369-370
(ES.ESS2.7. DCI.2) The many dynamic and delicate feedback mechanisms between the biosphere and other Earth systems cause a continual co-evolution of Earth's surface and the life that exists on it.	**SE/TE:** Earth's Major Spheres, 7-9 What is a System, 18 The Water Cycle, 158-159 The Cambrian Earth, 364-366 Precambrian Life, 367-368 Cambrian Period, 369-370
Science and Engineering Practices	
(ES.ESS2.7. SEP.1) Engaging in Argument from Evidence: Construct an oral and written argument or counter- argument based on data and evidence.	For supporting content, please see: **SE/TE:** 13.2 Assessment, 376 Chapter 13 Assessment, 390

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Crosscutting Concepts	
(ES.ESS2.7.CCC.1) Stability and Change: Much of science deals with constructing explanations of how things change and how they remain stable.	For supporting content, please see: **SE/TE:** The Cambrian Earth, 364-366 Precambrian Life, 367-368 Cambrian Period, 369-370 Ordovician Period, 371 Silurian Period, 372 Devonian Period, 372-373 Carboniferous Period, 374 Permian Period, 375-376 Triassic Period, 377-378 Jurassic Period, 379-380 Cretaceous Period, 380 Cretaceous Extinction, 381 The Rise of Mammals, 382-383 Tertiary Period, 383 Quaternary Period, 384-385 Stability, 514-515
Earth and Human Activities (ESS3)	
Performance Expectation	
(ES.ESS3.1) Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate effect human activity.	**SE/TE:** Renewable and Nonrenewable Resources, 94-95 Fossil Fuels, 95-96 Tar Sands and Oil Shale, 97 Solar Energy, 102 Nuclear Energy, 103-104 Wind Energy, 104 Hydroelectric Power, 105 Geothermal Energy, 105-106 Tidal Power, 106-107 The Water Planet, 108-109 Earth's Blanket of Air, 110 Land Resources, 111-112 Keeping Water Clean and Safe, 114 Protecting the Air, 114-115 Caring for Land Resources, 115-116 Floods and Flood Control, 168-169 Causes of Earthquake **Damage**, 228-230 Reducing Earthquake Damage, 231-232 8.3 Assessment, 232 How Earth Works: Winds and Storms, 578-579 Chapter 20 Assessment, 584 Human Impact on Climate, 602-603 Inquiry: Exploration Lab: Human Impact on Climate and Weather, 606-607

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Oklahoma 2020 Academic Standards for Science Earth and Space Science	Earth Science
Disciplinary Core Ideas	
(ES.ESS3.1.DCI.1) Resource availability has guided the development of human society.	For supporting content, please see: **SE/TE:** The Water Planet, 108-109 Earth's Blanket of Air, 110 Land Resources, 111-112 Keeping Water Clean and Safe, 114 Protecting the Air, 114-115 Caring for Land Resources, 115-116 Chapter 4 Assessment, 122
(ES.ESS3.1.DCI.2) Natural hazards and other geologic events have shaped the course of human history; they have significantly altered the sizes of human populations and have driven human migrations.	For supporting content, please see: **SE/TE:** People and the Environment, 20-21 Environmental Problems, 21-22Floods and Flood Control, 168-169 Causes of Earthquake Damage, 228-230 Reducing Earthquake Damage, 231-232 8.3 Assessment, 232 Volcanic Hazards, 294 How Earth Works: Effects of Volcanoes, 298-299 Tornadoes, 573-574 Hurricanes, 575-577 How Earth Works: Winds and Storms, 578-579 Chapter 20 Assessment, 584
Science and Engineering Practices	
(ES.ESS3.1.SEP.1) Constructing Explanations: Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.	**SE/TE:** The Process of Science, 23 Scientific Knowledge, 24 10..1 Assessment, 285 10.2 Assessment, 294 Chapter 10 Assessment, 304 Uniformitarianism, 336 Inquiry: Exploration Lab: Middle-Latitude Cyclones, 580-581 Inquiry: Exploration Lab: Human Impact on Climate and Weather, 606-607 Chapter 21 Assessment, 610
Crosscutting Concepts	
(ES.ESS3.1.CCC.1) Cause and Effect: Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.	For supporting content, please see: **SE/TE:** 21.1 Assessment, 591 Inquiry: Exploration Lab: Human Impact on Climate and Weather, 606-607

Oklahoma 2020 Academic Standards for Science Earth and Space Science	Earth Science
Performance Expectation	
(ES.ESS3.2) Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios on large and small scales.	For supporting content, please see: **SE/TE:** Try It!: How Can You Determine the Resources You Use?, 93 Earth & Its Resources: Bingham Canyon, Utah: The Largest Open-Pit Mine, 117 Inquiry: Exploration Lab: Finding the Product that Best Conserves Resources, 118-119 Chapter 4 Assessment, 122 Earth and Human Activity: Science and Engineering Practices: Designing Solutions: Design to Reduce Waste, 729
Disciplinary Core Ideas	
(ES.ESS3.2.DCI.1) All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors.	**SE/TE:** Try It!: How Can You Determine the Resources You Use?, 93 Renewable and Nonrenewable Resources, 94-95 Fossil Fuels, 95-96 Tar Sands and Oil Shale, 97 Formation of Mineral Deposits, 98-100 Nonmetallic Mineral Resources, 100-101 4.1 Assessment, 101 Solar Energy, 102 Nuclear Energy, 103-104 Wind Energy, 104 Hydroelectric Power, 105 Geothermal Energy, 105-106 Inquiry: Apply It, 106 Tidal Power, 106-107 The Water Planet, 108-109 Earth's Blanket of Air, 110 Land Resources, 111-112 Keeping Water Clean and Safe, 114 Protecting the Air, 114-115 Caring for Land Resources, 115-116 Inquiry: Exploration Lab: Finding the Product that Best Conserves Resources, 118-119

Oklahoma 2020 Academic Standards for Science Earth and Space Science	Earth Science
(ES.ESS3.2.DCI.2) When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.	**SE/TE:** Try It!: How Can You Determine the Resources You Use?, 93 4.1 Assessment, 101 Wind Energy, 104 Hydroelectric Power, 105 Geothermal Energy, 105-106 Inquiry: Apply It, 106 Tidal Power, 106-107 Caring for Land Resources, 115-116 Chapter 4 Assessment, 122
Science and Engineering Practices	
(ES.ESS3.2.SEP.1) Engaging in Argument from Evidence: Evaluate competing design solutions to a real-world problem based on scientific ideas and principles, empirical evidence, and logical arguments regarding relevant factors (e.g. economic, societal, environmental, ethical considerations).	For supporting content, please see: **SE/TE:** Try It!: How Can You Determine the Resources You Use?, 93 4.1 Assessment, 101 Chapter 4 Assessment, 122 Earth and Human Activity: Science and Engineering Practices: Designing Solutions: Design to Reduce Waste, 729
Crosscutting Concepts	
(ES.ESS3.2.CCC.1) Scale Proportion and Quantity: Using concepts of orders of magnitude allows one to understand how a model at one scale relates to a model at another scale.	For supporting content, please see: **SE/TE:** Figure 4: Tar Sands Deposits, 97 Figure 5: Distribution of Oil Shale in the Green River Formation, 98 Nuclear Energy, 103-104 Map It! And Figure 21: Virgin Forests 1620-1992, 112
Performance Expectation	
(ES.ESS3.5) Construct a scientific explanation from evidence for how geological processes cause uneven distribution of natural resources.	**SE/TE:** Fossil Fuels, 95-96 Figure 2: U.S. Coal Fields, 95 Map It!, 95 Tar Sands and Oil Shale, 97 Figure 4: Tar Sands Deposits, 97 Figure 5: Distribution of Oil Shale in the Green River Formation, 98 Formation of Mineral Deposits, 98-100

Oklahoma 2020 Academic Standards for Science Earth and Space Science	Earth Science
Disciplinary Core Ideas	
(ES.ESS3.5.DCI.1) Most elements exist in Earth's crust at concentrations too low to be extracted, but in some locations-where geological processes have concentrated them-extraction is economically viable.	**SE/TE:** Minerals, 45 How Minerals Form, 45-46 Fossil Fuels, 95-96 Tar Sands and Oil Shale, 97 Formation of Mineral Deposits, 98-100 Nonmetallic Mineral Resources, 100-101 Land Resources, 111-112 Layers Defined by Composition, 233-234 Discovering Earth's Composition, 237
Science and Engineering Practices	
(ES.ESS3.5.SEP.1) Constructing Explanations: Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.	**SE/TE:** The Process of Science, 23 Scientific Knowledge, 24 4.2 Assessment, 107 4.4 Assessment, 116 Earth & Its Resources: Bingham Canyon, Utah: The Largest Open-Pit Mine, 117 & TE Notes Chapter 4 Assessment, 122 Uniformitarianism, 336
Crosscutting Concepts	
(ES.ESS3.5.CCC.1) Cause and Effect: Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.	For supporting content, please see: **SE/TE:** TE, Build Reading Literacy, 111 4.3 Assessment, 112 4.4 Assessment, 116 Inquiry: Exploration Lab: Finding the Product that Best Conserves Resources, 118-119 Chapter 4 Assessment, 122