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| **4th Grade: Soils, Rocks and Landforms** | | |
| **Content Area:** Science | | |
| **Unit Title:** Soils, Rocks and Landforms | | |
| **Target Course/Grade Level:** 4 | | |
| **Unit Summary:**  The **Soils, Rocks, and Landforms Module** provides students with firsthand experiences with soils and rocks and modeling experiences using tools such as topographic maps and stream tables to study changes to rocks and landforms at Earth’s surface.  **Primary Interdisciplinary Connections**  **ELA/Literacy**  RI 1: Refer to details/examples when explaining what the text says and when drawing inferences from text.  RI 2: Determine the main idea of a text and explain how it is supported by key details; summarize the text.  RI 3: Explain procedures or concepts in a scientific text.  RI 4: Determine the meaning of general academic domain-specific words or phrases.  RI 5: Describe overall structure of information in a text.  RI 6: Compare and contrast a firsthand and secondhand account of the same topic.  RI 7: Interpret information presented visually; explain how information contributes to an understanding of the text.  RI 8: Explain how an author uses reasons and evidence to support particular points in a text.  RI 9: Integrate information from two texts on a topic.  RI 10: Read and comprehend science text.  ---  W 5: Strengthen writing by revising.  W 7: Conduct short research projects that build knowledge through investigation of different aspects of a topic.  W 8: Gather relevant information from experiences and print, and categorize the information.  ---  SL 1: Engage in collaborative discussions.  SL 2: Paraphrase portions of a text presented in diverse media.  SL 4: Report on a text in an organized manner, using appropriate facts and relevant details.  SL 5: Add visual displays to presentations.  ---  L 4: Determine or clarify the meaning words.  L 5: Demonstrate understanding of word relationships.  **Math**  MP.2 Reason abstractly and quantitatively.  MP.4 Model with mathematics.  MP.5 Use appropriate tools strategically.  ---  4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.  4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.  ---  4.OA.A.1 Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal  statements of multiplicative comparisons as multiplication equations | | |
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| **21st Century Themes:**  Digital media will be used incorporated in project presentations. This module will develop students’ abilities to do and understand scientific inquiry. Students will identify questions, design and conduct scientific investigations to answer those questions, employ tools to gather, analyze, and interpret data. They will use data to construct reasonable explanations, develop and communicate investigations and evidence and understand that scientists use different kinds of investigations and tools to develop explanations using evidence and knowledge. This module will develop and extend students’ understandings about science and technology. Students will work collaboratively in teams and use tools and scientific techniques to make better observations. | | |
| **Unit Rationale**  Geology is the study of our planet’s earth materials and natural resources. Because they are so ubiquitous and abundant, they are often taken for granted. This module has four investigations that focus on the concepts that weathering by water, ice, wind, living organisms, and gravity breaks rocks into smaller pieces, erosion (water, ice, and wind) transports earth materials to new locations, and deposition is the result of that transport process that builds new land. | | |
| **Learning Targets** | | |
| **Disciplinary Core Ideas**  *ESS1.C: The History of Planet Earth*   * Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed.   *ESS3.A: Natural Resources*   * Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not.   *ESS3.B: Natural Hazards*   * A variety of hazards result from natural processes (e.g., earthquakes,tsunamis, volcanic eruptions). Humans cannot eliminate the hazards, but can take steps to reduce their impacts.   *ETS1.B: Designing Solutions to Engineering Problems*   * Testing a solution involves investigating how well it performs under a range of likely conditions.   *ESS2.A: Earth Materials and Systems*   * Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.   *ESS2.B: Plate Tectonics and Large-Scale System Interactions*   * The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth.   *ESS2.E: Biogeology*   * Living things affect the physical characteristics of their regions.   *ETS1.A: Defining and delimiting engineering problems*   * Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. | | |
| **PE #** | **Performance Expectations** | |
| 4-ESS1-1 | Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. | |
| 4-ESS2-1 | Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. | |
| 4-ESS2-2 | Analyze and interpret data from maps to describe patterns of Earth’s features. | |
| 4-ESS3-1 | Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. | |
| 4-ESS3-2 | Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.\* | |
| **ETS #** | **Engineering, Technology, and Applications of Science** | |
| 3-5-ETS1-1 | Defining and delimiting engineering problems. | |
| 3-5-ETS1-2 | Developing possible solutions. | |
| 3-5-ETS1-3 | Optimizing the design solution. | |
| **Unit Essential Questions**  What is soil?  What causes big rocks to break down into smaller rocks?  How are rocks affected by acid rain?  What’s in our schoolyard soils?  How do weathered rock pieces move from one place to another?  How does slope affect erosion and deposition?  How do floods affect erosion and deposition?  Where are erosion and deposition happening in our schoolyard?  How do fossils get in rocks and what can they tell us about the past?  How can we represent the different elevations of landforms?  How can we draw the profile of a mountain from a topographic map?  How can scientists and engineers help reduce the impacts that events like volcanic eruptions might have on people?  What events can change Earth’s surface quickly?  What are natural resources and what is important to know about them?  How are natural resources used to make concrete?  How do people use natural resources to make or build things? | | **Unit Enduring Understandings**  Soils are composed of different kinds and amounts of earth materials and humus; they can be described by their properties.  Water exists in three states.  Earth materials are natural resources. Some resources are renewable, others are not.  Humans can use scientific knowledge and engineering design to reduce the impact of Earth’s hazards.  Landforms and bodies of water can be represented in models and maps.  Physical and chemical weathering breaks rock into smaller pieces (sediments).  Downhill movement of water as it flows to the ocean shapes land.  Erosion is the movement of sediments; deposition is the process by which sediments come to rest in another place.  Sediments usually form flat, horizontal layers. Sediments turn into solid rock over time. The presence and location of certain fossil types indicate the order in which rock layers were formed.  Landslides, earthquakes, and volcanoes can produce significant changes in landforms in a short period of time.  Some changes to Earth’s surface happen quickly, others more slowly.  Some events happen in cycles; others have a beginning and an end. |
| **Unit Learning Targets**  Students conduct controlled experiments by incrementally changing specific environmental conditions to determine the impact of changing the variables of slope and amount of water in stream tables. Students interpret data from diagrams and visual representations to build explanations from evidence and make predictions of future events. They develop model mountains and represent the landforms from different perspectives to look for change. Students gain experiences that will contribute to the understanding of crosscutting concepts of patterns; cause and effect; scale, proportion, and quantity; systems and system models; structure and function; and stability and change. | | |
| **Evidence of Learning** | | |
| **Embedded Assessments:**   * Response Sheets * Performance Assessments * Science Notebook Entries   **Benchmark Assessments:**   * Investigation I-Checks * Surveys | | |
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