Disciplinary Core Idea

4.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. (4-ESS1-1)

Disciplinary Core Idea

4.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. (4-ESS2-1)

Disciplinary Core Idea

4.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. (4-ESS2-2)

Disciplinary Core Idea

4.ESS2.E: Biogeology

Living things affect the physical characteristics of their regions. (4-ESS2-1)

Disciplinary Core Idea

4.ESS3.B: Natural Hazards

A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (4-ESS3-2)

Disciplinary Core Idea

4.ETS1.B: Developing Possible Solutions

Testing a solution involves investigating how well it performs under a range of likely conditions. (4-ESS3-2)

Disciplinary Core Idea

4.PS4.C: Information Technologies and Instrumentation

Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3)

Disciplinary Core Idea

4.ETS1.C: Optimizing the Design Solution

Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (4-PS4-3)

Performance Expectation

4-ESS1-1: Identify evidence from patterns in rock formations and fossils in rock layers for changes in a landscape over time to support an explanation for changes in a landscape over time.

Clarification Statement: Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and, a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.
Assessment Boundary: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.

Performance Expectation

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.

Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.
Assessment Boundary: Assessment is limited to a single form of weathering or erosion.

Performance Expectation

4-ESS2-2: Analyze and interpret data from maps to describe patterns of Earth's features.

Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.
Assessment Boundary: none

Performance Expectation

4-ESS3-2: Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

Clarification Statement: Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.
Assessment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.

Performance Expectation

4-PS4-3: Generate and compare multiple solutions that use patterns to transfer information.

Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.
Assessment Boundary: none

Science and Engineering Practice

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (4-ESS2-1)

Science and Engineering Practice

Analyzing and Interpreting Data

Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.

Analyze and interpret data to make sense of phenomena using logical reasoning. (4-ESS2-2)

Science and Engineering Practice

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

Identify the evidence that supports particular points in an explanation. (4-ESS1-1)

Science and Engineering Practice

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (4-ESS3-2)

Science and Engineering Practice

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (4-PS4-3)

Crosscutting Concept

Patterns

Patterns can be used as evidence to support an explanation. (4-ESS1-1), (4-ESS2-2)

Crosscutting Concept

Cause and Effect

Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS2-1), (4-ESS3-2)

Crosscutting Concept

Patterns

Similarities and differences in patterns can be used to sort and classify designed products. (4-PS4-3)

Connection to Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

Science assumes consistent patterns in natural systems. (4-ESS1-1)

Connection to Engineering, Technology, and Applications of Science

Influence of Science, Engineering, and Technology on Society and the Natural World

Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands. (4-ESS3-2)

Connection to Engineering, Technology, and Applications of Science

Interdependence of Science, Engineering, and Technology

Knowledge of relevant scientific concepts and research findings is important in engineering. (4-PS4-3)

Common Core State Standards for ELA/Literacy

Reading Informational Text

RI.4.1 - Key Ideas and Details

Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-ESS3-2)

Common Core State Standards for ELA/Literacy

Reading Informational Text

RI.4.7 - Integration of Knowledge and Ideas

Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. (4-ESS2-2)

Common Core State Standards for ELA/Literacy

Reading Informational Text

RI.4.9 - Integration of Knowledge and Ideas

Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-ESS3-2)

Common Core State Standards for ELA/Literacy

Card Type name

W.4.7 - Research to Build and Present Knowledge

Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-ESS1-1), (4-ESS2-2)

Common Core State Standards for ELA/Literacy

Card Type name

W.4.8 - Research to Build and Present Knowledge

Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-ESS1-1), (4-ESS2-1)

Common Core State Standards for ELA/Literacy

Card Type name

W.4.9 - Research to Build and Present Knowledge

Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-ESS1-1)

Common Core State Standards for Mathematics

Measurement & Data

4.MD.A.1 - Solve problems involving measurement and conversion of measurements.

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-ESS1-1), (4-ESS2-1)

Common Core State Standards for Mathematics

Measurement & Data

4.MD.A.2 - Solve problems involving measurement and conversion of measurements.

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-ESS2-1), (4-ESS2-2)

Common Core State Standards for Mathematics

Operations & Algebraic Thinking

4.OA.A.1 - Use the four operations with whole numbers to solve problems.

Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 x 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. (4-ESS3-2)

Common Core State Standards for Mathematics

Mathematical Practices

MP.2 - Reason abstractly and quantitatively

Reason abstractly and quantitatively. (4-ESS1-1), (4-ESS2-1), (4-ESS3-2)

Common Core State Standards for Mathematics

Mathematical Practices

MP.4 - Model with mathematics

Model with mathematics. (4-ESS1-1), (4-ESS2-1), (4-ESS3-2)

Common Core State Standards for Mathematics

Mathematical Practices

MP.5 - Use appropriate tools strategically

Use appropriate tools strategically. (4-ESS2-1)