5th Grade Unit 3 - Earth's Interactive Systems

Content Area: **Science**
Course(s): **Science Grade 5**
Time Period: **MP3**
Length: **45 days**
Status: **Published**

NJSLS - Science

3-5-ETS1-1	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
3-5-ETS1-2	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
3-5-ETS1-3	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
5-ESS2-1	Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
5-ESS2-2	Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.
5-ESS3-1	Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources, environment, and address climate change issues.

Science and Engineering Practices

Developing and Using Models

Develop a model using an example to describe a scientific principle. (5-ESS2-1)

Using Mathematics and Computational Thinking

Describe and graph quantities such as area and volume to address scientific questions. (5-ESS2-2)

Obtaining, Evaluating, and Communicating Information

Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5-ESS3-1)

Asking Questions and Defining Problems

Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)

Planning and Carrying Out Investigations

Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3)

Constructing Explanations and Designing Solutions

Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)

Disciplinary Core Ideas

ESS2.A: Earth Materials and Systems

Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)

ESS2.C: The Roles of Water in Earth's Surface Processes

Nearly all of Earth's available water is in the ocean. Most freshwater is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)

ESS3.C: Human Impacts on Earth Systems

Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)

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. (3-5- ETS1-1)

ETS1.B: Developing Possible Solutions

Research on a problem, such as climate change, should be carried out before beginning to design a solution.

Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)

At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)

Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3)

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. (3-5-ETS1-3)

Crosscutting Concepts

Systems and System Models

A system can be described in terms of its components and their interactions. (5-ESS2-1, 5-ESS3-1)

Scale, Proportion, and Quantity

Standard units are used to measure and describe physical quantities such as weight and volume. (5-ESS2-2)

Science Addresses Questions About the Natural and Material World.

Science findings are limited to questions that can be answered with empirical evidence. (5-ESS3-1)

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

People’s needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1)

Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks,

and meet societal demands. (3-5-ETS1-2)

Rationale and Transfer Goals

In this unit of study, students describe and graph data to provide evidence about the distribution of water on Earth. The crosscutting concepts of scale, proportion, quantity and systems, and systems models are called out as organizing concepts for these disciplinary core ideas. Students will also be able to describe ways in which the geosphere, biosphere, hydrosphere, and atmosphere interact. The crosscutting concept of systems and system models is called out as an organizing concept for this disciplinary core idea. Students are expected to demonstrate grade appropriate proficiency in using mathematics and computational thinking and in obtaining, evaluating, and communicating information. Students are also expected to use these practices to demonstrate an understanding of the core ideas.

Enduring Understandings

Nearly all of Earth's available water is in the ocean.

Most freshwater is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.

Individuals and communities are doing things to help protect Earth's resources and environments.

Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air),

and the biosphere (living things, including humans).

The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate.

Individuals and communities are doing things to help protect Earth's resources and environments.

Essential Questions

In what ways do the geosphere, biosphere, hydrosphere, and atmosphere interact?

How do individual communities use science ideas to protect Earth’s resources and environment?

Where is water found on the Earth?

What percentage of the Earth’s water is freshwater?

How do humans impact Earth's water?

Content - What will students know?

- A system can be described in terms of its components and their interactions.
- Earth’s major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans).
- The Earth’s major systems interact in multiple ways to affect Earth’s surface materials and processes.
- The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate.
- Winds and clouds in the atmosphere interact with landforms to determine patterns of weather.
- Science findings are limited to questions that can be answered with empirical evidence.
- Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space.
- Individuals and communities are doing things to help protect Earth’s resources and environments.
- Standard units are used to measure and describe physical quantities such as weight and volume.
- Nearly all of Earth’s available water is in the ocean.
- Most freshwater is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and

the atmosphere.

- Science findings are limited to questions that can be answered with empirical evidence.
- Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space.
- Individuals and communities are doing things to help protect Earth's resources and environments.

Skills - What will students be able to do?

- Describe a system in terms of its components and interactions.
- Develop a model using an example to describe a scientific principle.
- Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. (The geosphere, hydrosphere, atmosphere, and biosphere are each a system. Assessment is limited to the interactions of two systems at a time.)
- Describe a system in terms of its components and interactions.
- Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.
- Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.
- Describe physical quantities, such as weight and volume, in standard units.
- Describe and graph quantities such as area and volume to address scientific questions.
- Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. (Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.).
- Describe a system in terms of its components and interactions.
- Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.
- Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Activities - How will we teach the content and skills?

- Inspire Science Grade 5 Unit 3 Earth's Interactive Systems Module: Lesson 1 Water Distribution on

Earth

- Inspire Science Grade 5 Unit 3 Earth's Interactive Systems Module: Lesson 2 Human Impact on Water Resources
- Inspire Science Grade 5 Unit 3 Earth's Interactive Systems Module: Lesson 3 Effects of the Hydrosphere
- Inspire Science Grade 5 Unit 3 Earth's Other Systems Module: Lesson 1 Effects of the Geosphere
- Inspire Science Grade 5 Unit 3 Earth's Other Systems Module: Lesson 2 Effects of the Atmosphere
- Inspire Science Grade 5 Unit 3 Earth's Other Systems Module: Lesson 3 Effects of the Biosphere
- 5-ESS2-1 Lesson Examples
- 5-ESS2-2 Lesson Examples
- 5-ESS3-1 Lesson Examples

Formative Assessments

- Inspire Science Labs
- Inspire Science STEM Module Projects
- Inspire Science Grade 5 Unit 3 Earth's Interactive Systems Module: Lesson 1 Lesson Check
- Inspire Science Grade 5 Unit 3 Earth's Interactive Systems Module: Lesson 2 Lesson Check
- Inspire Science Grade 5 Unit 3 Earth's Interactive Systems Module: Lesson 3 Lesson Check
- Inspire Science Grade 5 Unit 3 Earth's Other Systems Module: Lesson 1 Lesson Check
- Inspire Science Grade 5 Unit 3 Earth's Other Systems Module: Lesson 2 Lesson Check
- Inspire Science Grade 5 Unit 3 Earth's Other Systems Module: Lesson 3 Lesson Check
- Daily Warm Ups
- Daily Exit Tickets
- Science Journal

Summative Assessments

- Inspire Science STEM Module Projects
- Tests/Quizzes
- Grade 5 Unit 3 Benchmark Assessment

Spiraling for Mastery

Content or Skill for this Unit	Spiral Focus from Previous Unit	Instructional Activity
• Winds and clouds in the atmosphere interact with landforms to determine patterns of weather. • Nearly all of Earth's available water is in the ocean. • Most freshwater is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.	Grade 2: Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. Grade 2: Wind and water can change the shape of the land. Grade 3: Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. Grade 3: Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. Grade 4: 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.	2-ESS2-1 Activities 2-ESS2-3 Activities 3-ESS2-1 Activities 3-ESS2-2 Activities 4-ESS2-1 Activities

Key Resources

Inspire Science

Simulating an Oil Spill

What-a-Cycle

Water Cycle Science Court

Lindenwold Sewer come into class and discuss how water is treated

Lab to teach students about water pollution: Water Filtration Experiment

Water Cycle Exploration

The Water Bodies Video

Changing Water Video

Weathering and Erosion Video

Weather Systems and Patterns

Climate Article

Career Readiness, Life Literacies, & Key Skills

9.4.5.CI.1	Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3,7.1.NM.IPERS.6).
9.2.5.CAP.1	Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.
9.1.5.CR.1	Compare various ways to give back and relate them to your strengths, interests, and other personal factors.
9.4.5.CI.2	Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue (e.g., 6.3.5.CivicsPD.3, W.5.7).
9.2.5.CAP.3	Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
9.2.5.CAP.4	Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements.
9.4.5.DC.4	Model safe, legal, and ethical behavior when using online or offline technology (e.g., 8.1.5.NI.2).
9.4.5.DC.8	Propose ways local and global communities can engage digitally to participate in and promote climate action (e.g., 6.3.5.GeoHE.1).
9.4.5.IML.2	Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3).
9.4.5.IML.3	Represent the same data in multiple visual formats in order to tell a story about the data.
9.4.5.TL.2	Sort and filter data in a spreadsheet to analyze findings.
9.4.5.TL.3	Format a document using a word processing application to enhance text, change page formatting, and include appropriate images graphics, or symbols.

Interdisciplinary Connections

NJSLS ELA

RI.CR.5.1. Quote accurately from an informational text when explaining what the text says explicitly and make relevant connections when drawing inferences from the text. (5-ESS3-1, 3-5-ETS1-2)

RI.MF.5.6. Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, timelines, animations, or interactive elements on web pages) and explain how the information contributes to an understanding of the text in which it appears. (5-ESS2-1, 5-ESS2-2, 5-ESS3-1, 3-5-ETS1-2)

RI.CT.5.8. Compare and contrast the authors' approaches across two or more informational texts within the same genre or about texts on the same or similar topics. (5-ESS3-1, 3-5-ETS1-2)

W.WR.5.5. Establish a central idea about a topic, investigation, issue or event and use several sources to

support the proposed central idea. (3-5-ETS1-1, 3-5-ETS1-3)

W.SE.5.6. Gather relevant information from multiple valid and reliable print and digital sources; summarize or paraphrase information in notes and finished work, making note of any similarities and differences among ideas presented; and provide a list of sources. (5-ESS2-2, 5-ESS3-1, 3-5-ETS1-1, 3-5-ETS1-3)

SL.UM.5.5. Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-ESS2-1, 5-ESS2-2)

NJSLS Mathematics

MP.2 Reason abstractly and quantitatively. (5-ESS2-1, 5-ESS2-2, 5-ESS3-1, 3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3)

MP.4 Model with mathematics. (5-ESS2-1, 5-ESS2-2, 5-ESS3-1, 3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3)

MP.5 Use appropriate tools strategically. (3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3)

3-5.OA Operations and Algebraic Thinking (3-5-ETS1-1, 3-5-ETS1-2)

5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (5-ESS2-1)