Quinton Township School
Second Grade
Science

Grade 2 Science Unit 4: The Earth's Land and Water

Unit Summary- Marking Period 3 Approx. 15 days
Where do we find water? In this unit of study, students use information and models to identify and represent the shapes and kinds of land and bodies of water in an area and where water is found on Earth. The crosscutting concept of *patterns* is called out as an organizing concept for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in *developing and using models* and *obtaining, evaluating, and communicating information*. Students are also expected to use these practices to demonstrate understanding of the core ideas. This unit is based on 2-ESS2-3 and 2-ESS2-2.
Student Learning Objectives
Obtain information to identify where water is found on Earth and that it can be solid or liquid. (2-ESS2-3)
Develop a model to represent the shapes and kinds of land and bodies of water in an area. *[*Assessment Boundary: Assessment does not include quantitative scaling in models.*]* **(2-ESS2-2)**
Objectives Aligned with National Geographic Resource: Approximate Time Frame
Day 1 ● Explain how rivers form and connect to the ocean. Day 2 ● Explain that water is found in lakes and ponds. ● Describe how lakes and ponds form. Days 3, 4, and 5 ● Develop a model to represent the shapes and kinds of land and bodies of water in an area. ● Explain how their model helps them understand how land is shaped.

Day 6
- Describe Earth's water that exists as solid ice.

Day 7
- Obtain information from a map to identify where solid and liquid water can be found on Earth

Day 8 and Day 9
- Connect the concept of looking for patterns and order when making observations about the world with the career of a glaciologist

Quick Links		
Unit Sequence p. 2 What it Looks Like in the Classroom p. 2 Connecting with ELA/Literacy and Math p. 3 Modifications p. 4	Research on Learning p. 4 Prior Learning p. 4 Future Learning p. 5 Connections to Other Units p. 5	Sample Open Education Resources p. 5 Teacher Professional Learning Resources p. 5 Appendix A: NGSS and Foundations p. 7

Unit Sequence	
Part A: *How can we identify where water is found on Earth and if it is solid or liquid?*	
Concepts	**Formative Assessment**
• Patterns in the natural world can be observed. • Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form.	*Students who understand the concepts are able to:* • Observe and record patterns in the natural world. • Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons) and other media that will be useful in answering a scientific question. • Obtain information to identify where water is found on Earth and to communicate that it can be a solid or liquid.

Unit Sequence	
Part B: *In what ways can you represent the shapes and kinds of land and bodies of water in an area?*	
Concepts	**Formative Assessment**
• Patterns in the natural world can be observed. • Maps show where things are located. One can map the shapes and kinds of land and water in any area.	*Students who understand the concepts are able to:* • Observe patterns in the natural world. • Develop a model to represent patterns in the natural world. • Develop a model to represent the shapes and kinds of land and bodies of water in an area. (*Assessment does not include quantitative scaling in models.)* • Exit Tickets • Journal Responses • End of Unit Assessment

What It Looks Like in the Classroom
Students look for patterns as they identify where water is found on Earth and explore the shapes and kinds of land and bodies of water found in an area. Students also develop models to identify and represent the shapes and kinds of land and bodies of water in an area. To begin this unit's progression of learning, students identify where water is found on Earth and whether it is solid or liquid. Using texts, maps, globes, and other resources (including appropriate online resources), students will observe that water is found in liquid form in oceans, rivers, lakes, and ponds. They also discover that water exists as a solid in the Earth's snowcaps and glaciers. After students identify where water is found on the Earth, they take a closer look at bodies of water and landforms that can be found in the natural world. Using firsthand observations and media resources, students should look for patterns among the types of landforms and bodies of water. For example, students should notice that mountains are much taller and more rugged than hills, lakes are an enclosed body of water surrounded by land, and streams flow across land and generally end at a larger body of water, such as a lake or the ocean.

Students should also have opportunities to use maps to determine where landforms and bodies of water are located. As students become more familiar with the types and shapes of landforms and bodies of water, they develop models to represent the landforms and bodies of water found in an area. For example, students can draw/create a map of the area of the state in which they live, showing various landforms (e.g., hills, coastlines, and islands) and bodies of water (e.g., rivers, lakes, ponds, and the ocean). Teachers should keep in mind that assessment does not include quantitative scaling of models (an accurate proportional relationship with the real world).

Connecting with English Language Arts/Literacy and Mathematics

English Language Arts

Students gather information about the types of landforms and bodies of water from experiences or from text and digital resources. They can use this information to answer questions such as, "Where can water be found as solid ice or snow year round?" Students should also have the opportunity to use their research to publish a writing piece, with guidance and support from adults or collaboratively with peers, based on their findings about various landforms and bodies of water. Diagrams, drawings, photographs, audio or video recordings, poems, dioramas, models, or other visual displays can accompany students' writing to help recount experiences or clarify thoughts and ideas.

Mathematics

As students collect data about the size of landforms and bodies of water, these numbers can be used to answer questions, make comparisons, or solve problems. For example,

- ✓ If students know that a mountain is 996 feet in height, a lake is 550 feet deep, a river is 687 miles long, and a forest began growing about 200 years ago, have students show each number in three ways using base-ten blocks, number words, and expanded form.
- ✓ A stream was 17 inches deep before a rainstorm and 33 inches deep after a rainstorm. How much deeper did it get during the rainstorm?

As students engage in these types of mathematical connections, they are also modeling with mathematics and reasoning abstractly and quantitatively. When modeling with mathematics, students diagram situations mathematically (using equations, for example) and/or solve addition or subtraction word problems. When students reason abstractly and quantitatively, they manipulate symbols (numbers and other math symbols) abstractly and attend to the meaning of those symbols while doing so.

Modifications

(Note: Teachers identify the modifications that they will use in the unit. See NGSS Appendix D: All Standards, All Students/Case Studies for vignettes and explanations of the modifications.)

- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
- Use project-based science learning to connect science with observable phenomena.
- Structure the learning around explaining or solving a social or community-based issue.
- Provide ELL students with multiple literacy strategies.
- Collaborate with after-school programs or clubs to extend learning opportunities.
- Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA).

Research on Student Learning

Students of all ages may hold the view that the world was always as it is now, or that any changes that have occurred must have been sudden and comprehensive. The students in these studies did not, however, have any formal instruction on the topics investigated. Moreover, middle-school students taught by traditional means are not able to construct coherent explanations about the causes of volcanoes and earthquakes (NSDL, 2015).

Prior Learning
Kindergarten Unit 1: Pushes and Pulls ● A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. *(secondary)*

Future Learning
Grade 4 Unit 2: Earth Processes ● 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. **Grade 5 Unit 4: Water on the Earth** ● Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.

Connections to Other Units
Grade 2 Unit 2: Properties of Matter. Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. Different properties are suited to different purposes. A great variety of objects can be build up from a small set of pieces.

Sample of Open Education Resources
National Geographic Learning- Teacher's Guide- "Rivers and Oceans" pages 102-103 (1 Day)
National Geographic Learning- Teacher's Guide- "Lakes and Ponds" pages 104-105 (
National Geographic Learning- Teacher's Guide- Think Like a Scientist- "Make a Model" pages 106-107b (3 days)
National Geographic Learning- Teacher's Guide- "Ice on Earth" pages 108-109 (1 Day)
National Geographic Learning- Teacher's Guide- Think Like a Scientist- "Obtain Information" pages 110-111 (2 DAys)
National Geographic Learning- Teacher's Guide- "Glaciologist" pages 112-113 (2 Days)

Teacher Professional Learning Resources
Resources from the National Geographic Kit: Modeling Clay; sheets of sturdy cardboard; sand; glue; light blue tissue paper; white tissue paper; shredded green construction paper; markers or crayons; scissors (3 Days) *Only from Make a Model pgs 106-107b **Enhancement Resources:** **Teaching *NGSS* in K-5: Making Meaning through Discourse** Presenters were Carla Zembal-Saul, (Penn State University), Mary Starr, (Michigan Mathematics and Science Centers Network), and Kathy Renfrew (Vermont Agency of Education). After a brief introduction by NSTA's Ted Willard about the Next Generation Science Standards (NGSS), Zembal-Saul, Starr, and Renfrew gave context to the NGSS specifically for K-5 teachers, discussing three-dimensional learning, performance expectations, and background information on the NGSS framework for K-5. The presenters also gave a number of examples and tips on how to approach NGSS with students, and took participants' questions. The web seminar ended with the presentation of a number of recommended NSTA resources for participants to explore.

View the resource collection.
Continue discussing this topic in the community forums.

Evaluating Resources for *NGSS*: The EQuIP Rubric

The presenters were Brian J. Reiser, Professor of Learning Sciences in the School of Education and Social Policy at Northwestern University, and Joe Krajcik, Director of the CREATE for STEM Institute.

Ted Willard, NSTA's NGSS Director, introduced the web seminar by providing an overview of the Next Generation Science Standards, including how the standards were developed, which states have adopted them and which organization, including the NSTA, have been instrumental in providing assistance in the development of the NGSS. Ted also discussed the NSTA's commitment to helping teachers and educators understand the NGSS, so that teachers can begin implementing the new standards in their instructional practices. After this brief overview, Brian Reiser, Professor of Learning Sciences, School of Education at Northwestern University and Joe Krajcik, Director of CREATE for STEM Institute of Michigan State University introduced the Educators Evaluating Quality Instructional Products (EQuIP) Rubric.

The web seminar focused on how explaining how the EQuIP rubric can be used to evaluate curriculum materials, including individual lessons, to determine alignment of the lesson and/or materials with the NGSS. Three-dimensional learning was defined, highlighted and discussed in relation to the rubric and the NGSS. An emphasis was placed on how to achieve the conceptual shifts expectations of NGSS and three-dimensional learning using the rubric as a guide. Links to the lesson plans presented and hard copies of materials discussed, including the EQuIP rubric, were provided to participants. The web seminar concluded with an overview of NSTA resources on the NGSS available to teachers by Ted, and a Q & A with Brian Reiser and Joe Krajcik.

View the resource collection.

Continue discussing this topic in the community forums.

NGSS Crosscutting Concepts: Systems and System Models

The presenter was Ramon Lopez from the University of Texas at Arlington. This was the seventh web seminar in a series of seven focused on the crosscutting concepts that are part of the Next Generation Science Standards (NGSS).
Continue the discussion in the community forums.

Appendix A: NGSS and Foundations for the Unit

Obtain information to identify where water is found on Earth and that it can be solid or liquid. (2-ESS2-3)

Develop a model to represent the shapes and kinds of land and bodies of water in an area. *[*Assessment Boundary: Assessment does not include quantitative scaling in models.*]* **(2-ESS2-2)**

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Obtaining, Evaluating, and Communicating Information • Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3) **Developing and Using Models** • Develop a model to represent patterns in the natural world. (2-ESS2-2)	**ESS2.C: The Roles of Water in Earth's Surface Processes** • Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3) **ESS2.B: Plate Tectonics and Large-Scale System Interactions** • Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2)	**Patterns** • Patterns in the natural world can be observed. (2-ESS2-2),(2-ESS2-3)

English Language Arts	Mathematics
With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (2-ESS2-3) **W.2.6** Recall information from experiences or gather information from provided sources to answer a question. (2-ESS2-3) **W.2.8** Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when	Reason abstractly and quantitatively. (2-ESS2-2) **MP.2** Model with mathematics. (2-ESS2-2) **MP.4** Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. (2-ESS2-2) **2.NBT.A.3** Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using

appropriate to clarify ideas, thoughts, and feelings. (2-ESS2-2) **SL.2.5**	drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem. (2-ESS2-1) **2.MD.B.5**