



BOE Approved 8/18

Cliffside Park Public Schools

Science

Unit Name: Water and Climate (Earth Science)

Resource: FOSS Next Generation, Delta Education

Duration: Ten Weeks

Enduring Understandings

Water Observation

- Water is the most important substance on Earth.
- Water dominates the surface of our planet, changes the face of the land, and defines life.

Weather and Water

- Weather is driven by the Sun and involves the movement of water over the earth through evaporation, condensation, precipitation, and runoff—the water cycle.

Seasons and Climate

- Climate is determined in part by the amount of precipitation in a region and by temperature fluctuations.

Waterworks

- Human societies depend on water, and new technologies are being engineered to conserve and protect this natural resource, to provide for the needs of people around the world.

Essential Questions

Water Observation

- What happens when water falls on different surfaces?
- How does water move on a slope?
- How much water can a dry sponge soak up?
- What happens outdoors when rain falls on natural materials?

Hot Water/Cold Water

- How can you measure temperature accurately?
- What happens to water when it gets hot? cold?
- What happens when hot or cold water is put into room-temperature water?
- How does water change when it gets really cold? Where should an animal go to stay warm or to stay cool?

Weather and Water

- What does the weather forecast tell us?
- What happens to wet paper towels overnight?
- How does surface area affect evaporation?
- What else affects how fast water evaporates?
- What causes moisture to form on the side of a cup?

Seasons and Climate

- What are typical weather conditions in our region?
- How do we describe different climates?
- How do people deal with natural hazards such as floods?

Waterworks

- What happens when water is mixed with other earth materials?
- Do soils in the schoolyard drain water at the same rate
- What is needed to make a waterwheel system function well?

Focus of Standards

Student Outcomes	Skills	Assessments
<p>Water Observation</p> <ul style="list-style-type: none"> • I can discover how water-dome size, slope and speed are related. • I can use appropriate tools to make 	<ul style="list-style-type: none"> • Asking Questions and Defining Problems • Developing and Using Models 	<p>Assessments:</p> <ul style="list-style-type: none"> • Formative: Notebook Entries: <ul style="list-style-type: none"> ○ Notebook Entries ○ Define a simple design problem reflecting a need or a want that

<p>accurate measurements.</p> <ul style="list-style-type: none"> ● I can plan a procedure and apply it to solve a problem. ● I can collect and use measurement data to construct explanations. ● I can differentiate evidence from option. <p>Hot Water / Cold Water</p> <ul style="list-style-type: none"> ● I can observe and explain the interaction between masses of water at different temperatures. ● I can observe and explain the interaction between masses of water in liquid and solid states. ● I can construct a thermometer to observe that water expands as it warms and contracts as it cools. ● I can use thermometers to measure temperature. <p>Weather and Water</p> <ul style="list-style-type: none"> ● I can investigate the effect of surface area and air temperature on evaporations. ● I can investigate the effect of temperature on condensation. <p>Seasons and Climate</p> <ul style="list-style-type: none"> ● I can interpret the data displayed in tables and graphic displays. ● I can look for patterns over time. <p>Waterworks</p> <ul style="list-style-type: none"> ● I can compare what happens when water is poured through two different 	<ul style="list-style-type: none"> ● Classifying Information ● Observing Investigations ● Exploring New Ideas ● Planning and Carrying Out Investigations ● Analyzing and Interpreting Data ● Using Mathematics and Computational Thinking ● Constructing Explanations and Designing Solutions ● Engaging in Argument from Evidence ● Obtaining, Evaluating and Communicating Information 	<p>includes specified criteria for success and constraints on materials, time, or cost</p> <ul style="list-style-type: none"> ○ Teacher Observation ○ Anecdotal Records/Notes ○ Make predictions using patterns of change. ○ Science notebook- measurements of temperature ○ Embedded Assessment Notes <ul style="list-style-type: none"> ● Summative Performance <ul style="list-style-type: none"> ○ Foss Post-test on Water and Climate ○ Vocabulary check ● Benchmark Assessments: <ul style="list-style-type: none"> ○ Investigation Checks ○ Constructing models- Seasons and and patterns over time ○ Constructing models- natural water filtration ○ Diagraming- water cycle ○ Applying- temperature changes and its effects ● Alternative: <ul style="list-style-type: none"> ○ Conferences ○ Diagrams ○ Word Bank for vocabulary ○ Modeling ○ Illustrations of systems ○ Storybook assembly- seasons and Earth's positions
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earth materials, soil and gravel.

- I can test soil in a number of locations on the schoolyard to compare the drainage rates.
- I can learn about renewable natural resources and ways to conserve them.

NJ Student Learning Standards: Science

3-ESS2 Earth's Systems

3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

3-ESS2-2. Obtain and combine information to describe climates in different regions of the world.

3-ESS3 Earth and Human Activity

3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.*

3-5 ETS1 Engineering Design

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.

ELA: RI.3.1, RI.3.3, RI.3.4, RI.3.5, RI.3.7, RI.3.9

Math: 3.OA.1, 3.OA.2, 3.OA.3

NJ: 2014 SLS: 21st Century Life and Careers

Career Ready Practices

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP5. Consider the environmental, social and economic impacts of decisions.

CRP6. Demonstrate creativity and innovation.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP9. Model integrity, ethical leadership and effective management.

CRP11. Use technology to enhance productivity.

CRP12. Work productively in teams while using cultural global competence.

NJ SLS: Technology (Grades 3-5)

8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.

8.1.5.A.1 Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.

8.1.5.A.2 Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.

8.1.5.A.3 Use a graphic organizer to organize information about problem or issue.

D. Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

8.1.5.D.3 Demonstrate an understanding of the need to practice cyber safety, cyber security, and cyber ethics when using technologies and social media.

8.1.5.D.4 Understand digital citizenship and demonstrate an understanding of the personal consequences of inappropriate use of technology and social media.

F: Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

8.1.5.F.1 Apply digital tools to collect, organize, and analyze data that support a scientific finding.

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

A. The Nature of Technology: Creativity and Innovation: Technology systems impact every aspect of the world in which we live.

8.2.5.A.1 Compare and contrast how products made in nature differ from products that are human made in how they are produced and used.

8.2.5.A.2 Investigate and present factors that influence the development and function of a product and a system.

B. Technology and Society: Knowledge and understanding of human, cultural and societal values are fundamental when designing technology systems and products in the global society.

8.2.5.B.3 Investigate ways that various technologies are being developed and used to reduce improper use of resources.

C. Design: The design process is a systematic approach to solving problems.

8.2.5.C.4 Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.

8.2.5.C.7 Work with peers to redesign an existing product for a different purpose.

D. Abilities for a Technological World: The designed world is the product of a design process that provides the means to convert resources into products and systems.

8.2.5.D.1 Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade-offs to be considered..

8.2.5.D.3 Follow step by step directions to assemble a product or solve a problem.

8.2.5.D.4 Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.

8.2.5.D.6 Explain the positive and negative effect of products and systems on humans, other species and the environment, and when the product or system should be used.

ESS2: Earth's Systems

ESS2.D: Weather and Climate: 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. (3-ESS2-1) Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2)

ESS3: Earth and Human Activity

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. (3-ESS3-1) (Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.)

ETS1: Engineering Design

ETS1.B: Developing Possible Solutions: Research on a problem 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) (secondary to 4-PS4-3)

NJSLS: Science and Engineering Practices

Practice 1. Asking questions (for science) and defining problems (for engineering)

Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested.

Ask questions based on observations to find more information about the natural and/or designed world(s).

Ask and/or identify questions that can be answered by an investigation.

Practice 2. Developing and using models

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

Distinguish between a model and the actual object, process, and/or events the model represents.

Compare models to identify common features and differences.

Practice 3. Planning and carrying out investigations

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

With guidance, plan and conduct an investigation in collaboration with peers (for K).

Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.

Evaluate different ways of observing and/or measuring a phenomenon to determine which way can answer a question.

Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons.

Make observations (firsthand or from media) and/or measurements of a proposed object or tool or solution to determine if it solves a problem or meets a goal.

Make predictions based on prior experiences.

Practice 4. Analyzing and interpreting data

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

Record information (observations, thoughts, and ideas).

Use and share pictures, drawings, and/or writings of observations.

Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems.

Compare predictions (based on prior experiences) to what occurred (observable events).

Analyze data from tests of an object or tool to determine if it works as intended.

Practice 6. Constructing explanations (for science) and designing solutions (for engineering)

Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

Use tools and/or materials to design and/or build a device that solves a specific problem or a solution to a specific problem.

Practice 7. Engaging in argument from evidence

Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).

Identify arguments that are supported by evidence.

Distinguish between opinions and evidence in one’s own explanations.

Construct an argument with evidence to support a claim.

Practice 8. Obtaining, evaluating, and communicating information

Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.

Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).

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 and/or supporting a scientific claim.

Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.

Core Instructional Materials:

- FOSS Next Generation: Water and Climate(2016)

Supplemental Materials: (videos, leveled readers, Readworks, recommended books etc.)

Videos: <https://www.fossweb.com/moduledetail?dDocName=G3842595&classId=>

Recommended books: <https://www.fossweb.com/additional-resources-books-xslt?dDocName=G4292315#non-fiction-books>

21st Century Themes

- **Global Awareness:** students come to understand that humans use natural resources for everything they do and that people affect the world around them.
- **Environmental Literacy:** students will explore the origins of materials and resources that we use everyday (paper, fabric, wood.) Students will learn that these resources are finite and explore strategies for conserving natural resources (recycling.)
- Students will understand what plants and animals need to survive and the relationship between their needs and where they live. Students will gain an understanding of the importance of weather forecasts to prepare for severe weather.

21st Century Skills

Creativity and Innovation

- Critical Thinking and Problem Solving
- Communication and Collaboration
- Students engage in science and engineering practices by asking questions, participating in collaborative investigations, observing,

recording and interpreting data to build explanations.

Interdisciplinary Connections

NJSLS for ELA are introduced, developed, and practiced in the context of learning science content and engaging in the science and engineering practices.

ELA

- Read and comprehend science texts related to their prior experience and knowledge
- Write informational/explanatory texts, arguments to support claims, and narratives about experience in science
- Engage in collaborative discussions about science
- Learn new vocabulary and language structures in context

Math

- Participate in active investigations and apply mathematics during data gathering and analysis
- Interdisciplinary Extensions at the end of each investigation usually include a math problem of the week
- Analyze hypothetical data related to the context of the investigation
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Mathematical Practices

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics
- Use appropriate tools strategically.
- Attend to precision
- Look for and make use of structure
- Look for and express regularity in repeated reasoning

Differentiation/Accommodations/Modifications
(Alternate Modes of Instruction and Support)

Modifications to Support Gifted and Talented Students

Modifications to Support English Language Learners

Modifications to Support Our Learners (Students with IEPs/504s and At-Risk Learners)

<p>Newsela article: <i>In hot water climate change harms hot spots of ocean life.</i> Lexile: 650L</p> <p>Recommended non fiction books https://www.fossweb.com/additional-resources-books-xslt?dDocName=G4292315#non-fiction-books</p> <p>Independent research- Difference between weather and climate</p> <p>Construct a water cycle illustration incorporating humans multiple daily uses of water.</p> <p>Debate / Compare and contrast- Availability of water and human methods of getting it to dry places</p> <p>Provide appropriate challenge for wide ranging skills and development areas.</p> <p>Participate in inquiry and project-based learning units of study</p> <p>Assigning roles within partnerships</p> <p>Differentiated supports: content, process, product, environment</p>	<p>Newsela article: <i>In hot water climate change harms hot spots of ocean life.</i> Lexile: 420L (Spanish version)</p> <p>Equipment photo cards (spanish and english)</p> <p>Modeling water cycle in native language (illustrated)</p> <p>Visual cues- image gallery https://www.fossweb.com/additional-resources-image-galleries-xslt?dDocName=G4292315#image-galleries</p> <p>Vocabulary log-</p> <p>Pronunciation/translation assistance https://dictionary.cambridge.org/us/</p> <p>Vocabulary builder Thesaurus- https://www.thesaurus.com/</p> <p>Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary)</p> <p>Pair visual prompts with verbal presentations</p> <p>Frontload and immerse students in literacy and language experiences related to content</p> <p>Provide students with visual models, sentence stems, concrete objects, and hands-on materials.</p> <p>Model procedures for life skills.</p> <p>Collaboration between ELL and general education teacher to maximize learning</p>	<p>Newsela article: <i>In hot water climate change harms hot spots of ocean life.</i> Lexile: 420L</p> <p>Storyboard- cycle of water- from liquid to gas to solid</p> <p>NOAA What-a-Cycle Air Masses Glaciers, Water, and Wind, Oh My! Disappearing Water</p> <p>Weather Science content for Kids and Teens https://www.weather.gov/owlie/science_kt</p> <p>Equipment photo cards</p> <p>What if all ice melted on earth https://www.youtube.com/watch?v=b6CPsGanO_U</p> <p>Visual cues- image gallery https://www.fossweb.com/additional-resources-image-galleries-xslt?dDocName=G4292315#image-galleries</p> <p>Word walls</p> <p>Review student individual educational plan and/or 504 plan.</p> <p>Establish procedures for accommodations and modifications for assessments as per IEP/504.</p> <p>Establish procedures for modification of classwork and homework as per IEP/504.</p>
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		<p>Modify classroom environment to support academic and physical needs of the students as per IEP/504.</p> <p>Provide appropriate accommodations, instructional adaptations, and/or modifications as determined by the IEP or 504 team.</p> <p>Differentiation through content, process, product, environment</p> <p>Provide Title I services to students not meeting academic standards in ELA and/or Math.</p> <p>Provide instructional adaptations and interventions in the general education classroom.</p> <p>Modify classroom environment to support student needs.</p> <p>Differentiated instruction</p> <p>Basic Skills</p> <p>Intensive individual intervention</p>
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Sources

NJSLS Science Standards (2017): <http://www.nj.gov/education/cccs/2016/science/>
 NJ: 2014 SLS: Technology: <http://www.state.nj.us/education/cccs/2014/tech/8.pdf>
 NJSLS-S: Science and Engineering Practices: <http://www.nj.gov/education/cccs/2016/science/3-5-ETS1.pdf>
 21st Century Life and Careers: <http://www.state.nj.us/education/cccs/2014/career/9.pdf>
 Career Ready Practices: <http://www.state.nj.us/education/cccs/2014/career/9.pdf>
 2015 FOSS Next Generation: www.FOSSweb.com
 NSTA: <https://ngss.nsta.org/>
 NOAA Education Resources: