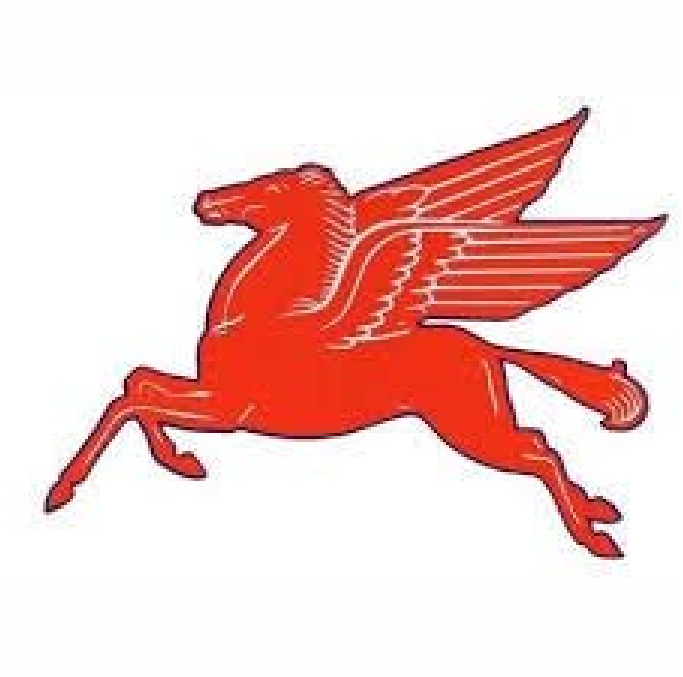

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Curriculum Writing Team

Miss Gina Mariano

Paulsboro Public Schools

Mission Statement

The mission of the Paulsboro School District is to provide each student the educational opportunities to assist in attaining their full potential in a democratic society. Our instructional programs will take place in a responsive, community based school system that fosters respect among all people. Our expectation is that all students will achieve the New Jersey Core Curriculum Content Standards (NJCCCS) at every grade level.

New Jersey State Department of Education
21st Century College and Career Readiness Standards

The 12 Career Ready Practices

These practices outline the skills that all individuals need to have to truly be adaptable, reflective, and proactive in life and careers. These are researched practices that are essential to career readiness.

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP3. Attend to personal health and financial well-being.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9. Model integrity, ethical leadership and effective management.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence.

Common Core Reading and Writing /Math Standards

English Language Arts
Students should use information from print and digital sources to build their understanding of:
• The Earth's gravitational force on objects.
• The differences in the apparent brightness of the sun compared to that of other stars due to their relative distances from Earth.
• Patterns of change that occur due to the position and motion of the Earth, sun, moon, and stars.

As students read and gather information from multiple sources, they should integrate and use the information to answer questions and support their thinking during discussions and in their writing.
Mathematics
Students reason abstractly and quantitatively when analyzing and using data as evidence to describe phenomena, including:
• The Earth's gravitational force pulls objects "down" (toward the center of the Earth).
• The differences in the apparent brightness of the stars are due to their relative distances from Earth.
• Patterns of change, such as the day/night cycle, the change in length and direction of shadows during the day, the apparent motion of the sun across the daytime sky and the moon across the nighttime sky, the changes in the appearance of the moon over a period of four weeks, and the seasonal changes in the position of the stars in the night sky.

Students will model with mathematics as they graphically represent data collected from direct observations and from multiple resources throughout the unit, and as they describe relative distances of the sun and other stars from the Earth. Students might also express relative distances between the Earth and stars using numbers that can be expressed using powers of 10.

MODIFICATIONS

Special Education:

Students Hands on activity, cooperative learning, peer tutoring, extended time, reteach in utilizing various methods. Utilize remediation resources which include assessment and intervention, in planning and instruction.

English Language Learners:

Provide hands-on activities and explanations. Use reduced text, so that print is not so dense. Assess comprehension through demonstration or other alternative means (gestures, drawings). Give instructions/directions in writing and orally. Use of translation dictionaries to locate words in the native language.

Use English Learners resources such as study guides, assessments and a visual glossary.

At-Risk Students:

Hands on activities cooperative learning, reteach using various methods. Make use of remediation lessons and quizzes when appropriate.

Gifted and Talented Students:

Utilize Pre-AP Resources such as the pacing, assignment and best practices guide.

Scope and Sequence

Quarter 1 – Grade __5_

Big Idea

1: Properties of Matter (draft 1.26.16) **Instructional Days: 15**

1

Unit Summary

When matter changes, does its weight change?

In this unit of study, students describe that matter is made of particles too small to be seen by developing a model. The crosscutting concept of *scale, proportion, and quantity* is called out as an organizing concept for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in *developing and using models*, *planning and carrying out investigations*, and use these practices to demonstrate understanding of the core ideas

Big Idea:

Unit 2: Changes to Matter (1.29.16) **Instructional Days: 15**

1

Unit Summary

If I have a frozen water bottle that weighs 500 mg, how much will it weigh if the water melts?

In this unit of study, students develop an understanding of the idea that regardless of the type of change that matter undergoes, the total weight of matter is conserved. Students determine whether the mixing of two or more substances results in new substances. The crosscutting concepts of *cause and effect* and *scale, proportion, and quantity* are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in *planning and carrying out investigations* and *using mathematics and computational thinking*. Students are expected to use these practices to demonstrate understanding of the core ideas.

This unit is based on 5-PS1-4 and 5-PS1

Scope and Sequence

Quarter 2 – Grade _5__

Big Idea:

Unit 3: Energy and Matter in Ecosystems (date 2.22.16) **Instructional Days: 15**
1

Unit Summary

What happens to the matter and energy that are part of each organism?

In this unit of study, students develop an understanding of the idea that plants get the materials they need for growth chiefly from air and water. Using models, students can describe the movement of matter among plants, animals, decomposers, and the environment, and they can explain that energy in animals' food was once energy from the sun. The crosscutting concepts of *energy and matter* and *systems and system models* are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in *developing and using models* and *engaging in argument from evidence.* Students are also expected to use these practices to demonstrate understanding of the core ideas.

This unit is based on 5-LS1-1, 5-LS2-1, and 5-PS3-1.

Big Idea

Unit 4: Water on the Earth (date 2.23.16) **Instructional Days: 15**
1

Unit Summary

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

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 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 understanding of the core ideas.
This unit is based on 5-ESS2-2 and 5-ESS3-1.

Scope and Sequence

Quarter 3 – Grade _5__

Big Idea: Unit 5: Earth Systems (date 2.23.16) **Instructional Days: 20**

1

Unit Summary

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

In this unit of study, students are 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 *developing and using models*, *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 5-ESS2-1 and 5-ESS3-1.

Scope and Sequence

Quarter 4 – Grade _5__

Big Idea:

Unit 6: Interactions Within the Earth, Sun, and Moon System (date 2.24.16)

Instructional Days: 20

1

Unit Summary

What patterns do we notice when observing the sky?

In this unit of study, students develop an understanding of patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. The crosscutting concepts of *patterns, cause and effect*, and *scale, proportion, and quantity* are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in *analyzing and interpreting data* and *engaging in argument from evidence*. Students are also expected to use these practices to demonstrate an understanding of the core ideas.

This unit is based on 5-PS2-1, 5-ESS1-1, and5-ESS1-2.

QUARTER 1
Big Idea: Properties of Matter
Topic: Understanding concepts of Matter

Standards:

Make **observations and measurements to identify materials based on their properties.** *[Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.] [Assessment Boundary: Assessment does not include density or distinguishing mass and weight.]* **(5-PS1-3)**

Develop a model to describe that matter is made of particles too small to be seen. *[Clarification Statement: Examples of evidence could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.] [Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.]* **(5-PS1-1)**

GOAL

Make observations and measurements to identify materials based on experiments.
Develop a model to describe that matter is made of particles too small to be seen

Essential Questions	Assessments
Part A: *How can properties be used to identify materials?* 3 **Unit Sequence** ***Part B:*** *What kind of model would best represent/describe matter as made of particles that are too small to be seen?*	*Students who understand the concepts can:* • Develop a model to describe phenomena. • Develop a model to describe that matter is made of particles too small to be seen. (Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.) Examples of evidence could include: ✓ Adding air to expand a basketball ✓ Compressing air in a syringe ✓ Dissolving sugar in water ✓ Evaporating salt water Formative: participation team activities, research, verbal response, observations, experiments, interactive notebooks, Summative: Interactive Science assessments, formal lab sheets, experiments Identify, test, and use cause-and-effect relationships to explain change. • Conduct an investigation collaboratively to produce data that

			can serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials is considered. • Conduct an investigation to determine whether the mixing of two or more substances results in new substances. Measure and describe physical quantities such as weight, time, temperature, and volume. • Measure and graph quantities such as weight to address scientific and engineering questions and problems. • Measure and graph quantities to provide evidence that regardless of the type of change that occurs when substances are heated, cooled, or mixed, the total weight is conserved. *(Note: Assessment does not include distinguishing between mass and weight.)* • Examples of reactions or changes could include: ✓ Phase changes ✓ Dissolving ✓ Mixing *English Language Arts* Students should use information from print and digital sources to build their understanding of: • The Earth's gravitational force on objects. • The differences in the apparent brightness of the sun compared to that

			of other stars due to their relative distances from Earth. • Patterns of change that occur due to the position and motion of the Earth, sun, moon, and stars. As students read and gather information from multiple sources, they should integrate and use the information to answer questions and support their thinking during discussions and in their writing. *Mathematics* Students reason abstractly and quantitatively when analyzing and using data as evidence to describe phenomena, including: • The Earth's gravitational force pulls objects "down" (toward the center of the Earth). • The differences in the apparent brightness of the stars are due to their relative distances from Earth. • Patterns of change, such as the day/night cycle, the change in length and direction of shadows during the day, the apparent motion of the sun across the daytime sky and the moon across the nighttime sky, the changes in the appearance of the moon over a period of four weeks, and the seasonal changes in the position of the stars in the night sky. Students will model with mathematics as they graphically represent data collected from direct observations and from multiple resources throughout

		the unit, and as they describe relative distances of the sun and other stars from the Earth. Students might also express relative distances between the Earth and stars using numbers that can be expressed using powers of 10. Measure and describe physical quantities such as weight, time, temperature, and volume. • Make observations and measurements to produce data that can serve as the basis for evidence for an explanation of a phenomenon. • Make observations and measurements to identify materials based on their properties. Examples of materials to be identified could include: ✓ Baking soda and other powders ✓ Metals ✓ Minerals ✓ Liquids Examples of properties could include: ✓ Color ✓ Hardness ✓ Reflectivity ✓ Electrical conductivity ✓ Thermal conductivity ✓ Response to magnetic forces ✓ *English Language Arts* Students should use information from print and digital sources to build their understanding of: • The Earth's gravitational force on objects.

		• The differences in the apparent brightness of the sun compared to that of other stars due to their relative distances from Earth. • Patterns of change that occur due to the position and motion of the Earth, sun, moon, and stars. As students read and gather information from multiple sources, they should integrate and use the information to answer questions and support their thinking during discussions and in their writing. *Mathematics* Students reason abstractly and quantitatively when analyzing and using data as evidence to describe phenomena, including: • The Earth's gravitational force pulls objects "down" (toward the center of the Earth). • The differences in the apparent brightness of the stars are due to their relative distances from Earth. • Patterns of change, such as the day/night cycle, the change in length and direction of shadows during the day, the apparent motion of the sun across the daytime sky and the moon across the nighttime sky, the changes in the appearance of the moon over a period of four weeks, and the seasonal changes in the position of the stars in the night sky. Students will model with mathematics as they graphically represent data collected from direct observations and from multiple resources throughout the unit, and as they describe relative distances of the sun and other stars from the Earth. Students might

		also express relative distances between the Earth and stars using numbers that can be expressed using powers of 10
	Enduring Understanding	**Resources**
	• Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. • Measurements of a variety of properties can be used to identify materials. *(At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.)* • Natural objects exist from the very small to the immensely large. • Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by means other than seeing. • A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects.	• In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations. (MS-PS1-4) • Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. • In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced out except when they happen to collide. In a solid, atoms are closely spaced and they vibrate in position but do not change relative locations. • Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). • The changes of state that occur with variations and temperature or pressure can be described and predicted using these models of matter.

QUARTER 1 –
Big Idea: Changes to Matter
Topic: Understanding transitions of Matter

Standard:	GOAL	
5-PS1-4Conduct an investigation to determine whether the mixing of two or more substances results in new substances. () **5-PS1-2) Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.** ***[Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.] [Assessment Boundary: Assessment does not include distinguishing mass and weight.].*** **(**	Conduct an investigation to determine whether mixing of two or more substances Measure and graph quantities to provide evidence of changes that occur when heating, cooling, substances of matter.	
	Essential Questions	Assessments
	Part A: *How can we make slime?* **Concepts** ***Part B:*** *How can baking soda and vinegar burst a zip-lock bag?*	Formative: participation team activities, research, verbal response, observations, experiments, interactive notebooks, Summative: Interactive Science assessments, formal lab sheets, experiments Identify, test, and use cause-and-effect relationships to explain change. • Conduct an investigation collaboratively to produce data that can serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials is considered. • Conduct an investigation to determine whether the mixing of two or more substances results in new substances. Measure and describe physical quantities such as weight, time, temperature, and volume.

		• Measure and graph quantities such as weight to address scientific and engineering questions and problems. • Measure and graph quantities to provide evidence that regardless of the type of change that occurs when substances are heated, cooled, or mixed, the total weight is conserved. *(Note: Assessment does not include distinguishing between mass and weight.)* • Examples of reactions or changes could include: ✓ Phase changes ✓ Dissolving ✓ Mixing *English Language Arts* Students should use information from print and digital sources to build their understanding of: • The Earth's gravitational force on objects. • The differences in the apparent brightness of the sun compared to that of other stars due to their relative distances from Earth. • Patterns of change that occur due to the position and motion of the Earth, sun, moon, and stars. As students read and gather information from multiple sources, they should integrate and use the information to answer questions and support their thinking during discussions and in their writing. *Mathematics* Students reason abstractly and quantitatively when analyzing and using data as evidence to describe phenomena, including:

		• The Earth's gravitational force pulls objects "down" (toward the center of the Earth). • The differences in the apparent brightness of the stars are due to their relative distances from Earth. • Patterns of change, such as the day/night cycle, the change in length and direction of shadows during the day, the apparent motion of the sun across the daytime sky and the moon across the nighttime sky, the changes in the appearance of the moon over a period of four weeks, and the seasonal changes in the position of the stars in the night sky. Students will model with mathematics as they graphically represent data collected from direct observations and from multiple resources throughout the unit, and as they describe relative distances of the sun and other stars from the Earth. Students might also express relative distances between the Earth and stars using numbers that can be expressed using powers of 10.
	Enduring Understanding	**Resources**
	Cause-and-effect relationships are routinely identified, tested, and used to explain change. • When two or more different substances are mixed, a new substance with different properties may be formed.	**the NGSS Practices in the Elementary Grades** The presenters were Heidi Schweingruber from the National Research Council, Deborah Smith from Penn State University, and Jessica Jeffries from State College Area School District. In this seminar the presenters talked about applying the scientific and engineering practices described in A Framework for K–12 Science Education in elementary-level classrooms.

	Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. • The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. • No matter what reaction or change in properties	Continue the discussion in the community forums. **Teaching *NGSS* in K-5: Constructing Explanations from Evidence** Carla Zembal-Saul, Mary Starr, and Kathy Renfrew, provided an overview of the NGSS for K-5th grade. The web seminar focused on the three dimensional learning of the NGSS, while introducing CLAIMS-EVIDENCE-REASONING (CER) as a framework for introducing explanations from evidence. The presenters highlighted and discussed the importance of engaging learners with phenomena, and included a demonstration on using a KLEWS chart to map the development of scientific explanations of those phenomena. View the resource collection. Continue discussing this topic in the community forums. ***NGSS* Core Ideas: Matter and Its Interactions** The presenter was Joe Krajcik from Michigan State University. The program featured strategies for teaching about physical science concepts that

QUARTER 2

Big Idea: Energy and Matter in the Ecosystems

Topic: Understanding flow of energy and matter

Standards:	GOAL

5-LS1-1Support an argument that plants get the materials they need for growth chiefly from air and water. *[Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]* () **5-LS2-1) Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.***[Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.] [Assessment Boundary: Assessment does not include molecular explanations.]* **(** **5-PS3-1) Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.** *[Clarification Statement: Examples of models could include diagrams, and flow charts.]* **(**	Support an argument that plants get materials they need for growth chiefly from air and water. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. Use models to describe that energy in animals' food that was once energy from the sun.	
	Essential Questions	**Assessments**
	Part A: *Where do plants get the materials they need for growth?* ***Part B:*** *How does matter move among plants, animals, decomposers, and the environment*	Describe how matter is transported into, out of, and within systems. • Support an argument with evidence, data, or a model. • Support an argument that plants get the materials they need for growth chiefly from air and water. *(Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.)* how energy can be transferred in various ways and between objects. • Use models to describe phenomena. • Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. • Examples of models could include: ✓ Diagrams ✓ Flowcharts Formative: participation team activities, research, verbal response, observations, experiments, interactive notebooks, Summative: Interactive Science assessments, formal lab sheets, experiments
	Enduring Understanding	**Resources**

	Matter is transported into, out of, and within systems. • Plants acquire their material for growth chiefly from air and water. Science explanations describe the mechanisms for natural events. • A system can be described in terms of its components and their interactions. • The food of almost any kind of animal can be traced back to plants. • Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. • Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as *decomposers*. • Decomposition eventually restores (recycles) some materials back to the soil. • Organisms can survive only in environments in which their particular needs	**Connections Between Practices in *NGSS*, Common Core Math, and Common Core ELA** The presenter was Sarah Michaels from Clark University. In this seminar Dr. Michaels talked about connecting the scientific and engineering practices described in A Framework for K–12 Science Education with the Common Core State Standards in Mathematics and English Language Arts. **Engineering Design as a Core Idea** The presenter was Cary Sneider, Associate Research Professor at Portland State University in Portland, Oregon. The seminar focused on the Core Idea of Engineering, led by Cary Sneider, Associate Research Professor at Portland State University. Cary explained the overall *NGSS* engineering components for K-2, MS and HS, and went through a number of practical examples of how teachers could develop modules and investigations for their students to learn them. Cary also spoke about the ways in which teachers could include cross-cutting engineering concepts to a number of classroom subjects. The seminar concluded Q & A session with Cary. Visit the resource collection. Continue discussing this topic in the community forums. ***NGSS* Core Ideas: Energy** The presenter was Jeff Nordine of the San Antonio Children's Museum. Ramon Lopez from the University of Texas at Arlington provided supporting remarks. The program featured strategies for teaching about physical science concepts that answer questions such as "How is energy transferred between objects or systems?" and "What is meant by conservation of energy?"

		Dr. Nordine began the presentation by talking about the role of disciplinary core ideas within *NGSS* and the importance of energy as a core idea as well as a crosscutting concept. He then shared physicist Richard Feynman's definition of energy and related it to strategies for teaching about energy. Dr. Nordine talked about the elements of the energy core idea and discussed common student preconceptions. Participants had the opportunity to ask questions and discuss ideas for classroom application with other participating teachers. Visit the resource collection. Continue discussing this topic in the community forums. ***NGSS* Core Ideas: Ecosystems: Interactions, Energy, and Dynamics** The presenters were Andy Anderson and Jennifer Doherty of Michigan State University. This was the ninth web seminar in a series focused on the disciplinary core ideas that are part of the Next Generation Science Standards (NGSS). The program featured strategies for teaching about life science concepts that answer questions such as "How do organisms interact with the living and nonliving environments to obtain matter and energy?" and "How do matter and energy move through an ecosystem?" Dr. Anderson and Dr. Doherty began the presentation by discussing the two main strands of the ecosystems disciplinary core idea: community ecology and ecosystem science. They talked about common student preconceptions and strategies for addressing

		them. Next, Dr. Anderson and Dr. Doherty shared learning progressions for this core idea, showing how student understanding builds from elementary through high school. Last, the presenters described approaches for teaching about ecosystems and shared resources to use with students. Participants had the opportunity to submit their questions and comments in the chat. Visit the resource collection. Continue discussing this topic in the community forums. Interactive Science Series

QUARTER 2:
Big Idea: Water on Earth
Topic: Importance of Water on Life

Standards:	GOAL	
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 Boundary: Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.]* **(5-ESS2-2)** **Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. (5-ESS3-**	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. Obtain and combine information about ways individuals communities use the science ideas to protect Obtain and combine information about ways individuals communities use science ideas to protect the Earth's resources and environment	
	Essential Questions	**Assessments**
	Part A: *Where is water found on the Earth? What percentage of the Earth's water is fresh water?*	Formative: participation team activities, research, verbal response, observations, experiments, interactive notebooks, Summative: Interactive Science assessments, formal lab sheets, experiments Describe physical quantities, such as weight and volume, in standard units.

	Part B: *How do individual communities use science ideas to protect Earth's resources and environment?*	• 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.
	Enduring Understanding	**Resources**
	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 fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. A system can be described in terms of its components and their interactions. • Science findings are limited to questions that can be answered with empirical evidence.	**Teaching *NGSS* in K-5: Making Meaning through Discourse** The 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 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

	• 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.	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. After a brief overview of the *NGSS,* 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 Interactive Science Series

QUARTER 3:
Big Idea: Earth Systems
Topic: Model the spheres and how they interact

Standards:	GOAL	
5-ESS2-1Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. ***[Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.]*** **()** **5-ESS3-1) Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. (**	Develop a model using an example to ways the variety of spheres interact. Obtain and combine information about ways individual communities use Science ideas to protect the Earth's resources and environment.	
	Essential Questions	**Assessments**
	Part A: *In what ways do the geosphere, biosphere, hydrosphere, and/or atmosphere interact?* ***Part B:*** *How do individual communities use science ideas to protect Earth's resources and environment?*	Formative: participation team activities, research, verbal response, observations, experiments, interactive notebooks, Summative: Interactive Science assessments, formal lab sheets, experiments • Describe a system in terms of its Obt. • 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.)* • Examples could include:

		✓ The influence of oceans on ecosystems, landform shape, and climate. ✓ The influence of the atmosphere on landforms and ecosystems through weather and climate. ✓ The influence of mountain ranges on the wind and clouds in 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.
	Enduring Understanding	**Resources**
	• 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.	View the resource collection. Continue discussing this topic in the community forums. ***NGSS* Crosscutting Concepts: Patterns** The presenter was Kristin Gunckel from the University of Arizona. Dr. Gunckel began the presentation by discussing how patterns fit in with experiences and explanations to make up scientific inquiry. Then she talked about the role of patterns in NGSS and showed how the crosscutting concept of patterns progresses across grade bands. After participants shared their ideas about using patterns in their own classrooms, Dr. Gunckel shared instructional examples from

	• Winds and clouds in the atmosphere interact with landforms to determine patterns • A system can be described in terms of its components and their interactions. • 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	the elementary, middle school, and high school levels. ***NGSS* Crosscutting Concepts: Structure and Function** The presenters were Cindy Hmelo-Silver and Rebecca Jordan from Rutgers University. Dr. Hmelo-Silver and Dr. Jordan began the presentation by discussing the role of the crosscutting concept of structure and function within NGSS. They then asked participants to think about the example of a sponge and discuss in the chat how a sponge's structure relates to its function. The presenters introduced the Structure-Behavior-Function (SBF) theory and talked about the importance of examining the relationships between mechanisms and structures. They also discussed the use of models to explore these concepts. Participants drew their own models for one example and shared their thoughts about using this strategy in the classroom. ***NGSS* Core Ideas: Earth and Human Activity** The presenters were Susan Buhr Sullivan, Director of the CIRES Education and Outreach Group at University of Colorado; and Aida Awad, Science Department Chair at Maine East High School in Park Ridge, IL and president of the National Association of Geoscience Teachers (NAGT). The program featured strategies for teaching about Earth science concepts that answer questions such as "How do humans depend on Earth's resources?" and "How do humans change the planet?" Dr. Buhr Sullivan began the presentation by describing the interconnections between this disciplinary core idea and other components

		of *NGSS*. She then talked about building a foundation for key concepts related to Earth and Human Activity at the elementary level. Ms. Awad continued the discussion by sharing the progression of this core idea through the middle school level and on to high school. The presenters provided a list of resources and activities that teachers can use to begin implementing *NGSS* in the classroom. Visit the resource collection. Continue discussing this topic in the community Interactive Science Series

QUARTER 4

Big Idea: Interactions within the Earth, Sun, and Moon sphere

Topic: Patterns and patterns of changes

Standards:	GOAL	
Support an argument that the gravitational force exerted by Earth on objects is directed down. *[Clarification Statement: "Down" is a local description of the direction that points toward the center of the spherical Earth.]* [Assessment Boundary: Assessment does not include mathematical representation of gravitational force.] **(5-PS2-1)** **Support an argument that the apparent brightness of the sun and stars is due to their relative distances from the Earth.** [Assessment Boundary: Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors	Support argument that the gravitational force exerted by Earth on objects is directed down. Support an argument that the brightness of the sun and starts to their relative distances from the Earth.	
	Essential Questions	Assessments
	Part A: *What effect does Earth's gravitational force have on objects?* ***Part B:*** *What effect does the relative distance from Earth have on the apparent brightness of the sun and other stars?*	Formative: participation team activities, research, verbal response, observations, experiments, interactive notebooks, Summative: Interactive Science assessments, formal lab sheets, experiments Identify cause-and-effect relationships in order to explain change.

that affect apparent brightness (such as stellar masses, age, stage).*]* **(5-ESS1-1)** **Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.** *[Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.] [*Assessment Boundary: Assessment does not include causes of seasons.*]* **(5-ESS1-2)**		• Support an argument with evidence, data, or a model. • Support an argument that the gravitational force exerted by Earth on objects is directed down. ("Down" is a local description of the direction that points toward the center of the spherical Earth.) *(Assessment does not include mathematical representation of gravitational force.).* Support an argument with evidence, data, or a model. • Support an argument that differences in the apparent brightness of the sun compared to that of other stars is due to their relative distances from Earth. *(Assessment is limited to relative distances, not sizes, of stars, and does not include other factors that affect apparent brightness, such as stellar masses, age, or stage.)* • Sort, classify, communicate, and analyze simple rates of change for natural phenomena using similarities and differences in patterns. • Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.
	Enduring Understanding	**Resources**
	Cause-and-effect relationships are routinely identified and used to explain change. • The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.	Carla Zembal-Saul, Professor of Science Education at Penn State University, Mary Starr, Executive Director of Michigan Mathematics and Science Centers Network, and Kathy Renfrew, K-5 Science Coordinator for VT Agency of Education, shared an overview of the NGSS for Fifth

	Natural objects exist from the very small to the immensely large. • The sun is a star that appears larger and brighter than other stars because it is closer. • Stars range greatly in their distance from Earth.	Grade level students. Strategies, such as Claims, Evidence and, Reasoning (CER) and Know, Learning, Evidence, Wondering and Science (KLEWS) were discussed. The bundling of performance expectations with a focus on scientific practices, disciplinary core ideas, and cross-cutting concepts was also presented as a strategy for pulling it all together. View the resource collection. Continue discussing this topic in the community forums. **NSTA Web Seminar: Teaching NGSS in K-5: Constructing Explanations from Evidence** Carla Zembal-Saul, Mary Starr, and Kathy Renfrew, provided an overview of the *NGSS* for K-5th grade. The web seminar focused on the three dimensional learning of the *NGSS*, while introducing CLAIMS-EVIDENCE-REASONING (CER) as a framework for introducing explanations from evidence. The presenters highlighted and discussed the importance of engaging learners with phenomena, and included a demonstration on using a KLEWS chart to map the development of scientific explanations of those phenomena. Interactive Science Series