Science

4th Grade

CURRICULUM GUIDE

Approved

Date

August 22, 2017

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This curriculum may be modified through varying techniques, strategies and materials, as per an individual student's Individualized Education Plan (IEP).

Approved by the Great Meadows Regional School District

At the regular meeting held on August 22, 2017

and *Aligned with the New Jersey Student Learning Standards*

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Philosophy and Rationale

Science, engineering, and technology influence and permeate every aspect of modern life. Some knowledge of science and engineering is required to engage with the major public policy issues of today as well as to make informed everyday decisions, such as selecting among alternative medical treatments or determining how to invest public funds for water supply options. In addition, understanding science and the extraordinary insights it has produced can be meaningful and relevant on a personal level, opening new worlds to explore and offering lifelong opportunities for enriching people's lives. In these contexts, learning science is important for everyone, even those who eventually choose careers in fields other than science or engineering.

Scope and Sequence

Unit 1-Engineering and Technology (13 days)

Students who understand the concepts can:

- Define a design problem and identify the constraints and criteria for a design solution.
- Research and design possible solutions to a problem, and investigate how well your solution performs.
- Plan, design, and test possible solutions for a prototype to determine which design best solves a problem within given criteria and constraints.
- Identify failure points or difficulties with a design and suggest and implement changes that improve it
- Communicate in order to share observations, gain insight, and optimize future solutions and designs

Unit 2 - Energy (13 days)

Students who understand the concepts can:

- Recognize common transformations of electrical energy.
- Understand and observe energy transfer involving light, sound, and heat and provide evidence illustrating the changes that result.
- Observe energy transfer and recognize the correlation between speed and the amount of energy an object possesses, and identify collisions as a form of motion energy transfer.

Unit 3- Waves and Information Transfer (13 days)

Students who understand the concepts can:

- Differentiate between wavelength and amplitude, and observe how waves interact.
- Describe the effects of mater on light.
- Identify how light interacts with mirrors, lenses, prisms, and non-reflective surfaces due to their unique properties.
- Explore and compare patterns in multiple methods of transferring information, and actually transfer informations using codes and a pixilated image.

Unit 4- Plant Structure and Function (10 days)

Students who understand the concepts can:

- To gather evidence about the function and structure of plant parts in order to construct an argument that these parts are used for survival, growth, reproduction, and behavior.

- Describe the process of pollinations and fertilization in both flowering and non-flowering plants.
- Identify the basic reproductive structures of plants and how the parts form a system for reproduction.

Unit 5- Structure and Function in Animals (13 days)

Students who understand the concepts can:

- Identify the external parts animals have and how their parts are used for growth, survival, behavior, and reproduction.
- Observe and describe some of the internal structures of animals, compare similar body parts that have similar and different uses from species to species or multiple uses within a species, and recognize that some animals have modified systems or don't have them at all.

Unit 6: Changes to Earth's Surface (17 days)

Students who understand the concepts can:

- To identify, explain, and record evidence about how water shapes Earth's surface and describe ways in which water causes weathering, erosion, and deposition to take place.
- Identify how the speed and volume of water affect weathering, erosion, and deposition.
- To identify, explain, and record evidence about factors that shape Earth's surface, such as rainfall, organisms, weathering, erosion, and deposition.
- To interpret map contents that illustrate topographical features and use maps as sources of data about Earth's features.
- To identify and explain where on Earth's surface earthquakes, volcanoes, mountains, and ocean trenches can be found.
- Use maps to describe the patterns they observe in the locations of those land and water forms.

Unit 7-Rocks and Fossils (13 days)

Students who understand the concepts can:

- Construct explanations for the ways in which rock layers reveal patterns and reflect the history of planet Earth.

- Examine fossil evidence to determine how and in what environments organisms of the pat lived, based on their physical traits and similarities to living organisms.
- Examine fossils and other geologic evidence to understand what past environments were like, how they changed over time, and how the changes to Earth's surface have affected them.

<u>Unit 8-</u> Natural Resources and Hazards (16 days)

Students who understand the concepts can:

- To understand that humans use energy and fuels derived from natural resources.
- Students will rely on various sources of media to explain the use and reuse of natural resources as well as gaining the knowledge that human needs change over time.
- To understand that humans use energy and fuels derived from natural resources.
- Apply what students know about the interdependence of science and technology to evaluate the benefits and drawbacks of renewable resources.
- To describe a variety of Earth processes on land that can be hazardous to humans, and how the impact of these processes can be lessened.
- To analyze and describe a variety of water-based processes that can be hazardous to humans and design and test multiple solutions to lessen the impacts of these natural Earth processes on humans.

<u>Mission Statement</u>

The GMRSD will provide quality educational opportunities that ensure the individual success of all students within a safe and supportive environment and to build life-long learners who will meet society's challenges into and beyond the 21st century. To that end, it is anticipated that all students will achieve the New Jersey Core Curriculum Content Standards (NJCCCS) at all grade levels.

Unit #1 - Engineering and Technology
Stage 1: Desired Results

Content Standards:

- **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.

Essential Questions:

- How do engineers define problems and design solutions?
- How do engineers test and improve prototypes?

Enduring Understandings:

- A situation that people want to change or create can be approached as a problem to be solved through engineering.
- Asking questions, making observations, and gathering information are helpful in thinking about problems.
- Before beginning to design a solution, it is important to clearly understand the problem.
- Designs can be conveyed through sketches, drawing, or physical models. These representations are useful in communicating ideas for a problems solutions to other people.
- Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

Knowledge and Skills: (SWBAT embedded course proficiencies)

Students who understand the concepts can:

- Define a design problem and identify the constraints and criteria for a design solution.
- Research and produce possible solutions to a problem, and investigate how well your solution performs.
- Plan, design, and test possible solutions for a prototype to determine which design best solves a problem within given criteria and constraints.
- Recognize failure points or difficulties with a design and modify to improve it.
- Communicate in order to share observations, gain insight, and optimize future solutions and designs

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)

Assessment Methods Science Lab activities, student notebook recordings, student graphs and models, Teacher Observation

Stage 3: Learning Plan

In this unit of study, students will define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. Students will be prepared to 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. At the end of the learning experience in this unit, students will 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.

In the first lesson, students will be exposed to introductory concepts related to engineering and technology. They will explore engineering problems and learn how to

develop solutions to problems based on criteria and constraints. By investigating different problems and solutions, students will gain a deeper understanding of how engineering and technology impacts society and people on a daily basis. For example, in lesson 1, students will be expected to ask questions and define problems related to food to plan menus. They will analyze constraints, such as a budget, to come up with criteria, such as desirable food items.

In the second lesson, students will explore the ways engineers come up with solutions to problems. They will learn about how these solutions are then integrated into technology that has an important impact on society and the environment. They will participate in a variety of activities and use various print and digital sources to come up with explanations and design solutions of their own, as well as learn about the processes that engineers go through, including using constraints and criteria. Students will learn how Engineers design solutions using strategies such as observing surroundings, researching the past, and testing ideas. Students will create their own ideas to develop their own “hearing helpers”.

In the last lesson of the unit, students will plan, design, and test possible solutions for a prototype to determine which design best solves a problem within the given criteria and constraints. Students will then identify failure points or difficulties with a design and suggest and implement changes that improve it. Students learn that engineers must communicate in order to share observations, gain insight, and optimize future solutions and designs. Through class collaborations, students will experience first hand that things fail and improve. Using strategies like failure analysis, students will create plans to make experiences get better, or optimize their solutions and designs.

After completing these lessons, the Unit Project: Extend a Sense, provides students with opportunities to practice aspects of and demonstrate their understanding of the standards as they apply engineering and design concepts to come up with a device that would enhance one of their senses.

Additionally, students can practice or be assessed on aspects of the Performance Expectations by completing the Unit Performance Task: Designing a portable chair, in which students apply design and engineering concepts to make a model of a portable chair. Students develop models for a more comfortable chair. Students will complete this task through the following process:

- Stating the goal
- researching the current market
- brainstorming ideas that might fit with the goal
- making a plan considering: materials, chair features, etc.
- visualizing-creating a sketch of the product
- evaluating and redesigning to improve the design.
- Communicating with group on how to best present the chair.

In this unit, the 21st Century Skill of creativity and innovation will be realized through a series of independent problem based learning opportunities that will cause the students to use a wide range of idea creation techniques, create new and worthwhile ideas, elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative effort, develop, implement, and communicate new ideas to others effectively, and to demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas.

Literacy and Mathematics

English Language Arts/Literacy

English Language Arts can be leveraged in this unit in a number of ways. Students can participate in shared research using trade books and online resources to learn about the engineering process and how it changes our lives daily. Students can record their findings in science journals or use the research present ideas and information to an audience of peers. Students can also learn to take notes in their journals order to help them recall information from experiences or gather information from provided sources. They can add drawings or other visual displays to their work, when appropriate, to clarify ideas, thoughts, and feelings. Along with the topics come sets of vocabulary words and ways you can incorporate that vocabulary into the context of a lesson, even into centers that can occur during English Language Arts time, creating cross curricular opportunities.

Mathematics

Throughout this unit of study, students need opportunities to represent and interpret categorical data by drawing picture graphs and/or bar graphs (with a single-unit scale) to represent a data set with up to four categories. This will lead to opportunities to solve simple put-together, take-apart, and compare problems using information presented in these types of graphs. For example, students will be working with the constraints of money and time as they create a menu plan. They could also measure the change a variable has on the motion of a vehicle. They will record measurements and chart the changes variables create. As students analyze the data in these types of graphs, they can use the data to answer simple put-together, take apart, and compare problems. This unit also presents opportunities for students to model with mathematics. They can diagram situations mathematically or solve multi-step word problems to help support claims. Data collected in bar graphs and picture graphs can easily be used to present information to their peers.

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.

Time Allotment: 13 days

Resources - Sample Open Education Resources

Suggested resources will include but are not limited to the following:
- District approved science textbook
- Assessments- Online, Textbook, Team Created
- Websites- Duckster, Fact Monster, Kahoot, Quizizz, Readworks Digital
- Videos- Edpuzzle
- Nonfiction/fiction sources
- Laboratory investigations
- STEM/STEAM activities

Unit #2- Energy
Stage 1: Desired Results

Content Standards:
- **4-PS3-1- Use evidence to construct an explanation relating the speed of an object to the energy of that object.**
- **4-PS3-2-Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.**
- **4-PS3-4-Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.**

Essential Questions:
- What is energy and how is it transferred?
- How do collisions show energy?

Enduring Understandings:

- The faster a given object is moving, the more energy it possesses.
- Energy can be moved from place to place by moving objects or through sound,

light, or electric currents.

- Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced.
- Light also transfers energy from place to place.
- Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. the currents may have been produced to begin with by transforming the energy of motion into electrical energy.
- When objects collide, the contact forces transfer energy so as to change the object's' motions.
- The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use.
- Possible solutions to 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.

Knowledge and Skills: (SWBAT embedded course proficiencies)

- Recognize common transformations of electrical energy.
- Understand and observe energy transfer involving light, sound, and heat and provide evidence illustrating the changes that result.
- Observe energy transfer and recognize the correlation between speed and the amount of energy an object possesses, and identify collisions as a form of motion energy transfer.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)

Assessment Methods Science Lab activities, student notebook recordings, student graphs and models, Teacher Observation

Stage 3: Learning Plan

The learning experiences in this unit prepare students in using evidence to construct an explanation relating the speed of an object to the energy of that object. They will also be able to make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. Students will learn to apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

To begin the progression of this unit, We start with a lesson where students will define energy and explore the ways in which energy can be transferred or moved from one object to another. Students will learn to recognize the ways humans rely on energy for

their everyday lives and the impact energy has on society and the nature around us. Students will gain a more in-depth understanding of these concepts through observation, as well as by participating in activities that require them to think strategically and creatively about design solutions to problems that meet specific criteria. Students may apply what they know by asking and explaining where energy comes from, how algae farming can improve air quality, how batteries work, and the different ways we can see or feel energy in the world around us.

The unit progresses with a lesson on how energy is transferred. Students will collect evidence for the storage of energy, learn ways energy moves in waves, and how energy transfers through the addition or subtraction of heat. Working as a team, students plan and build a solar cooker, which they transfer the sun's energy into an object, thereby increasing its heat energy. By looking at how energy transfers through matter, students develop a greater understanding of how the application of energy can be used to effect changes in matter.

In the last lesson of this unit, students learn that every object contains energy. When object collide, they transfer that energy. Students will observe this concept by experimenting with rubber bands and toy cars, applying the knowledge they gain to situations involving collisions between objects. Students will begin to visualize how potential energy can become stored energy and can then be transferred through impacts. Students' investigations will lead them to an understanding that the size and speed of moving objects affects how much energy they have and how much can transfer. They will also observe when objects collide with the ground, some of their energy transfers to the ground.

The unit culminates with students applying their knowledge of energy transfer through a student-lead presentation. Students will work in teams to plan and carry out investigations to demonstrate their understanding of energy transfer and in support of performance in the content standards 4-PS3-1, 4-PS3-3, and 4-PS3-4. Students will complete this through the following process:

- Design a task you will present.
- Research physical energy experiments
- Examine the experiments and find a team approach
- Plan a procedure you will follow to create your experiment
- Record data from your expiremen
- Communicate their findings through a multimedia presentation.

In this unit, the 21st Century Skill of communication and collaboration will be realized through a series of independent problem based learning opportunities that will cause the students to demonstrate ability to work effectively and respectfully with diverse team, exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal, assume shared responsibility for collaborative work, and value the individual contributions made by each team member.

Connecting with English Language Arts/Literacy and Mathematics

Literacy and Mathematics

English Language Arts/Literacy

English Language Arts can be leveraged in this unit in a number of ways. Students can participate in shared research using trade books and online resources to learn about the different types of energy in our world and how we interpret it. Students can record their findings in science journals or use the research present ideas and information to an audience of peers. Students can also learn to take notes in their journals order to help them recall information from experiences or gather information from provided sources. They can add drawings or other visual displays to their work, when appropriate, to clarify ideas, thoughts, and feelings. Along with the topics come sets of vocabulary words and ways you can incorporate that vocabulary into the context of a lesson, even into centers that can occur during English Language Arts time, creating cross curricular opportunities.

Mathematics

Throughout this unit of study, students need opportunities to represent and interpret categorical data by drawing picture graphs and/or bar graphs (with a single-unit scale) to represent a data set with up to four categories of variables. This will lead to opportunities to solve simple put-together, take-apart, and compare problems using information presented in these types of graphs. For example, students will be working with heat energy in a solar oven to measure the amount of energy gained in a certain amount of time. As students analyze the data in these types of graphs, they can use the data to answer simple put-together, take apart, and compare problems. This unit also presents opportunities for students to model with mathematics. They can diagram situations mathematically or solve multi-step word problems to help support claims. Data collected in bar graphs and picture graphs can easily be used to present information to their peers.

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.

Time Allotment: 13 days

Resources - Sample Open Education Resources
Suggested resources will include but are not limited to the following:
- District approved science textbook
- Assessments- Online, Textbook, Team Created
- Websites- Duckster, Fact Monster, Kahoot, Quizizz, Readworks Digital
- Videos- Edpuzzle
- Nonfiction/fiction sources
- Laboratory investigations
- STEM/STEAM activities

Unit #3- Waves and Informational Transfer
Stage 1: Desired Results

Content Standards:
- **4-PS4-1:** Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.
- **4-PS4-2:** Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
- **4-PS4-3:**Generate and compare multiple solutions that use patterns to transfer information.

Essential Questions:
- What are waves and how can they reflect?
- How is information transferred from place to place?

Enduring Understandings:
- Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach.
- Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks).
- An object can be seen when light reflected from its surface enters the eyes.
- Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information-convert it from digitized form to voice- and vise versa.
- Different solutions need to be tested in order to determine which of them best solve the problem, given the criteria and the constraints.

Knowledge and Skills: (SWBAT embedded course proficiencies)

- Differentiate between wavelength and amplitude, and observe how waves interact.
- Describe the effects of mater on light.
- Identify how light interacts with mirrors, lenses, prisms, and non-reflective surfaces due to their unique properties.
- Explore and compare patterns in multiple methods of transferring information, and actually transfer informations using codes and a pixilated image.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)

Assessment Methods Science Lab activities, student notebook recordings, student graphs and models, Teacher Observation

Stage 3: Learning Plan

The learning experiences in this unit will prepare students to develop a model of waves to describe a pattern in terms of amplitude and wavelength and that waves can cause objects to move. Students will develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. Additionally, students will generate and compare multiple solutions that use patterns to transfer information.

In the first lesson students will explore the properties and characteristics of waves and the patterns they create. They will use models to learn about the ways in which waves create motion through the transfer of energy. Through the use of diagrams, students will be able to visualize transverse waves and differentiate between wavelength and amplitude. This information will help deepen their understanding of the movement of energy.

In the second lesson students will investigate how light interacts with the surface of objects to form an image that we can see. Students will develop and use models to manipulate a variety of objects to observe how the behavior of light changes the images sent to our eyes and perceived by our brains. By investigating how light interacts with mirrors and lenses students will deepen their understanding of the development of many useful tools and technologies that utilize light.

In lesson third lesson students will explore a variety of communication devices that are a result of science, engineering, and technology working together to meet people's needs. Students will decide how well each device solves a problems. Afterwards, students will design their own devices to communicate information over a distance using the engineering process.

The unit culminates with students applying their knowledge of information transfer by

using models to demonstrate how binary code is used to transfer information. They will demonstrate their understanding of 4-PS4-3 in support of 4-PS4.C and 4-ETS1.c. Students will complete this through the following process:

- Creating a model
- Constructing explanations
- Asking questions and predicting outcomes
- Creating multiple solutions
- Presenting ideas to a group

In this unit, the 21st Century Skill of communication and collaboration will be realized through a series of independent problem based learning opportunities that will cause the students to articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts, listen effectively to decipher meaning, including knowledge, values, attitudes and intentions, use communication for a range of purposes, and utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact.

Connecting with English Language Arts/Literacy and Mathematics

Literacy and Mathematics

English Language Arts/Literacy

English Language Arts can be leveraged in this unit in a number of ways. Students can participate in shared research using trade books and online resources to learn about waves, light reflection, and information transfer. Students can record their findings in science journals or use the research present ideas and information to an audience of peers. Students can also learn to take notes in their journals order to help them recall information from experiences or gather information from provided sources. They can add drawings or other visual displays to their work, when appropriate, to clarify ideas, thoughts, and feelings. Along with the topics come sets of vocabulary words and ways you can incorporate that vocabulary into the context of a lesson, even into centers that can occur during English Language Arts time, creating cross curricular opportunities.

Mathematics

Throughout this unit of study, students need opportunities to represent and interpret categorical data by drawing and interpreting binary code. This will lead to opportunities to solve simple put-together, take-apart, and compare problems using information presented in these types of topics. For example, students measure wavelength and the change in wavelength at different amplitudes. They will record measurements and chart the changes variables create. As students analyze the data in these types of graphs, they can use the data to answer simple put-together, take apart, and compare problems. This unit also presents opportunities for students to model with mathematics. They can diagram situations mathematically or solve multi-step word problems to help support claims. Data collected in bar graphs and picture graphs can easily be used to present information to their peers.

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.

Time Allotment: 13 days

Resources - Sample Open Education Resources

Suggested resources will include but are not limited to the following:

- District approved science textbook
- Assessments- Online, Textbook, Team Created
- Websites- Duckster, Fact Monster, Kahoot, Quizizz, Readworks Digital
- Videos- Edpuzzle
- Nonfiction/fiction sources
- Laboratory investigations
- STEM/STEAM activities

Unit #4 - Plant Structure and Function

Stage 1: Desired Results

Content Standards:

- **4-LS1-1-** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Essential Questions:

- What are some plant parts and how do they function?
- How do plants grow and reproduce?

Enduring Understandings:

- Plants and animals have both internal and external structures that serve functions in growth, survival, behavior, and reproduction.

Knowledge and Skills: (SWBAT embedded course proficiencies)

- To gather evidence about the function and structure of plant parts in order to construct an argument that these parts are used for survival, growth, reproduction, and behavior.
- Describe the process of pollinations and fertilization in both flowering and non-flowering plants.
- Identify the basic reproductive structures of plants and how the parts form a system for reproduction.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)

Assessment Methods Science Lab activities, student notebook recordings, student graphs and models, Teacher Observation

Stage 3: Learning Plan

The learning experiences in this unit prepare students for mastery of understanding how plant part functions and how plants grow and reproduce. Students will construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

In the first lesson, students will gather evidence about the function on internal and external plant parts to construct an argument that these parts work together to form a system used for growth, survival, reproduction, and behavior. Students also investigate how plants move, and they design and build a system to grow a plant in water rather than soil.

In the second lesson, students develop an understanding of how the internal and external structures of both flowering and non-flowering plants function to support survival, growth, and reproduction. Students will construct arguments from evidence to explain the components and interactions of systems and how they work together to enable reproduction.

After completing these lessons, the Unit Project, Flower Parts, will have students analyze flower to learn about the structures and parts of flowers. They will study how the flower's parts function together as a whole to demonstrate understanding. Students will complete this activity by following these steps:

- Define their task
- Research
- Make a plan
- Dissect and Illustrate
- Communicate to class

In this unit, the 21st Century Skill of communication and collaboration will be realized through a series of independent problem based learning opportunities that will cause the students to articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts, listen effectively to decipher meaning, including knowledge, values, attitudes and intentions, use communication for a range of purposes, and utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact.

Literacy and Mathematics

English Language Arts/Literacy

English Language Arts can be leveraged in this unit in a number of ways. Students can participate in shared research using trade books and online resources to learn about the structures and parts of flowers. Students can record their findings in science journals or use the research present ideas and information to an audience of peers. Students can also learn to take notes in their journals order to help them recall information from experiences or gather information from provided sources. They can add drawings or other visual displays to their work, when appropriate, to clarify ideas, thoughts, and feelings. Along with the topics come sets of vocabulary words and ways you can incorporate that vocabulary into the context of a lesson, even into centers that can occur during English Language Arts time, creating cross curricular opportunities.

Mathematics

Throughout this unit of study, students will recognize a line of symmetry for the flower as a line across the figure such that the figure can be folded across the line into matching parts. Students will also use the strategy of reflection in their illustrations for their flower parts. This give students opportunities to find patterns in plant structure while also seeking out different geometrical shapes in the structures. This unit also presents opportunities for students to model with mathematics. They can diagram situations mathematically or solve multi-step word problems to help support claims. Data collected in bar graphs, picture graphs, and diagrams can easily be used to present information to their peers.

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.

Time Allotment: 10 days

Resources - Sample Open Education Resources

Suggested resources will include but are not limited to the following:

- District approved science textbook
- Assessments- Online, Textbook, Team Created
- Websites- Duckster, Fact Monster, Kahoot, Quizizz, Readworks Digital
- Videos- Edpuzzle
- Nonfiction/fiction sources
- Laboratory investigations
- STEM/STEAM activities

Unit #5- Animal Structure and Function

Stage 1: Desired Results

Content Standards:

- **4-LS1-1:** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
- **4-LS1-2**: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
- **4-PS4-2:** Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.

Essential Questions:

- What are some external and internal structures of animals?
- How do senses work?

Enduring Understandings:

- Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions.

Knowledge and Skills: (SWBAT embedded course proficiencies)

- Identify the external parts animals have and how their parts are used for growth, survival, behavior, and reproduction.
- Observe and describe some of the internal structures of animals, compare similar body parts that have similar and different uses from species to species or multiple uses within a species, and recognize that some animals have modified systems or don't have them at all.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)

Assessment Methods Science Lab activities, student notebook recordings, student graphs and models, Teacher Observation

Stage 3: Learning Plan

The learning experiences in this unit prepare students for mastery of the structures and processes in molecules in organisms as well as mastery of waves and their applications in technologies for information transfer.

In the first lesson, students will learn and understand that plants have external and internal structures. They will use evidence from the lesson to engage arguments and they will be able to describe the components of systems and their interactions.

In lesson 2, students will gather evidence to support an argument regarding the importance of the internal structures of animals in growth, survival, behavior, and reproduction. They explore the components and functions of several body systems of animals. They also compare and contrast the systems to identify similarities and differences of the body systems in different groups of animals. Using classroom and media resources, students plan and conduct online research on similar systems, such as the circulatory, digestive, or respiratory systems, in two or more different animals.

In the third lesson, students will explore the ways in which people and animals use their senses. They will learn about the physical parts and unique structures that make it possible for people and animals to analyze information through the senses, through which sensory information can be processed in the brain. Students will interpret sensory systems and apply what they learn to construct intelligent explanations using evidence and data.

After completing these lessons, students can practice or be assessed on aspects of the objectives by completing the task called Breathing In and Out, in which they apply

concepts of body systems to develop models of portable inventions. Students can use models of the human body to help them visualize and understand how their devices will work to help people who have trouble breathing. Students will use online or library resources to learn about ways of measuring human lung capacity. As a team, they will come up with at least two methods of safely gathering air from human lungs. While planning their data-gathering procedure, students have these questions to consider:

-What materials will they need?
-How will they gather air from the test subjects lungs?
-How will they measure the quantity of air they gather?
-How many test subjects will they use?
-How will they record, graph, and present their results?

Once the students get approval from their teacher, they will perform their procedure as they planned it.

Students developing models of a portable invention through the design process and applying the concepts of the body systems demonstrates understanding of LS1.A in support of 4-LS1-1 and 4-LS1-2.

Students will be assessed on their abilities to:

- Design a task
- Research
- Brainstorm and assemble their data
- Plan a procedure
- Perform a procedure and record information
- Communicate their ideas through media

In this unit, the 21st Century Skill of critical thinking and problem solving will be realized through a series of independent problem based learning opportunities that will cause the students to solve different kinds of non-familiar problems in both conventional and innovative ways and identify and ask significant questions that clarify various points of view and lead to better solutions.

Literacy and Mathematics

English Language Arts/Literacy

English Language Arts can be leveraged in this unit in a number of ways. Students can participate in shared research using trade books and online resources to learn about the external and internal structures of animals and their functions. Students can record their findings in science journals or use the research present ideas and information to an audience of peers. Students can also learn to take notes in their journals order to help them recall information from experiences or gather information from provided sources. They can add drawings or other visual displays to their work, when appropriate, to clarify ideas, thoughts, and feelings. Along with the topics come sets of vocabulary words and ways you can incorporate that vocabulary into the context of a lesson, even into centers that can occur during English Language Arts time, creating cross curricular

opportunities.

Mathematics

Throughout this unit of study, students need opportunities to represent and interpret categorical data by drawing picture graphs and/or bar graphs (with a single-unit scale) to represent a data set with up to four categories. This will lead to opportunities to solve simple put-together, take-apart, and compare problems using information presented in these types of graphs. For example, students will chart mountains and valleys throughout the world to find the highest, loweset, and largest range in hieghts. They may also create topographical maps of elevation for data analysis. As students analyze the data in these types of graphs, they can use the data to answer simple put-together, take apart, and compare problems. This unit also presents opportunities for students to model with mathematics. They can diagram situations mathematically or solve multi-step word problems to help support claims. Data collected in bar graphs and picture graphs can easily be used to present information to their peers.

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.

Time Allotment: 13 days

Resources - Sample Open Education Resources

Suggested resources will include but are not limited to the following:

- District approved science textbook
- Assessments- Online, Textbook, Team Created
- Websites- Duckster, Fact Monster, Kahoot, Quizizz, Readworks Digital
- Videos- Edpuzzle

- Nonfiction/fiction sources
- Laboratory investigations
- STEM/STEAM activities

Unit #6- Changes to Earth's Surface
Stage 1: Desired Results

Content Standards:

- **4-ESS2-1-** Make observations and/or measurements to provide evidence of the effects of weathering or the effect of erosion by water, ice, wind, or vegetation.
- **4-ESS-2-** Analyze and interpret data from maps to describe patterns of Earth's features.

Essential Questions:

- How does water, and other factors, shape Earth's surface?
- How can maps help us to learn about Earth's surface?

Enduring Understandings:

- 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.
- 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.
- Living things affect the physical characteristics of their regions.

Knowledge and Skills: (SWBAT embedded course proficiencies)

- To identify, explain, and record evidence about how water shapes Earth's surface and describe ways in which water causes weathering, erosion, and deposition to take place.
- Identify how the speed and volume of water affect weathering, erosion, and deposition.
- To identify, explain, and record evidence about factors that shape Earth's surface, such as rainfall, organisms, weathering, erosion, and deposition.
- To interpret map contents that illustrate topographical features and use maps as sources of data about Earth's features.
- To identify and explain where on Earth's surface earthquakes, volcanoes, mountains, and ocean trenches can be found.
- Use maps to describe the patterns they observe in the locations of those land and water forms.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)

Assessment Methods Science Lab activities, student notebook recordings, student

graphs and models, Teacher Observation

Stage 3: Learning Plan

The learning experiences of this unit prepare students for mastery of understanding Earth's systems by making observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation; and analyzing and interpreting data from maps to describe patterns of Earth's features.

In lesson 1, students will identify and record evidence of how water, weathering, erosion, and deposition shape Earth's surface. Students will investigate how water impacts Earth and then examine the relationships between Earth's surface and the physical forces of weathering, erosion, and deposition.

In the second lesson, students will identify, explain, and record evidence regarding how rainfall, weathering, erosion, and deposition shape Earth's surface. Students will investigate how living things impact Earth and then examine and explain the relationships between them all.

In the third lesson, students will make observations and analyze data about maps. Students will understand that maps can help locate the different land and water features of Earth and reveal how large scale systems interacts, as shown in the patterns of mountain ranges, ocean trenches, and other natural phenomena.

The last lesson has students analyzing and interpreting data about the locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes and use maps to identify the patterns of the locations in which they appear on land and in the oceans.

After completing the lessons, the students will complete the Performance Task, called Model it, Map It, which students can practice or be assessed on their knowledge of Earth's Systems. Students will complete this task by following these steps:

- Define the task
- Research
- Plan the models
- Build the models
- Map the models
- Caption the maps
- Communicate

In this unit, the 21st Century Skill of informational literacy will be realized through a series of independent problem based learning opportunities that will cause the students to access information efficiently and effectively, evaluate information critically and competently, use information accurately and creatively for the issue or problem at hand, manage the flow of information from a wide variety of sources, and apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information.

Literacy and Mathematics

English Language Arts/Literacy

English Language Arts can be leveraged in this unit in a number of ways. Students can participate in shared research using trade books and online resources to learn about the differences in Earth's layers. Students can record their findings in science journals or use the research present ideas and information to an audience of peers. Students can also learn to take notes in their journals order to help them recall information from experiences or gather information from provided sources. They can add drawings or other visual displays to their work, when appropriate, to clarify ideas, thoughts, and feelings. Along with the topics come sets of vocabulary words and ways you can incorporate that vocabulary into the context of a lesson, even into centers that can occur during English Language Arts time, creating cross curricular opportunities.

Mathematics

Throughout this unit of study, students need opportunities to represent and interpret categorical data by drawing picture graphs and/or bar graphs (with a single-unit scale) to represent a data set with up to four categories. This will lead to opportunities to solve simple put-together, take-apart, and compare problems using information presented in these types of graphs. For example, students will be working with the constraints of money and time as they create a menu plan. They could also measure the change a variable has on the motion of a vehicle. They will record measurements and chart the changes variables create. As students analyze the data in these types of graphs, they can use the data to answer simple put-together, take apart, and compare problems. This unit also presents opportunities for students to model with mathematics. They can diagram situations mathematically or solve multi-step word problems to help support claims. Data collected in bar graphs and picture graphs can easily be used to present information to their peers.

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.

Time Allotment: 17 days

Resources - Sample Open Education Resources
Suggested resources will include but are not limited to the following:
- District approved science textbook
- Assessments- Online, Textbook, Team Created
- Websites- Duckster, Fact Monster, Kahoot, Quizizz, Readworks Digital
- Videos- Edpuzzle
- Nonfiction/fiction sources
- Laboratory investigations
- STEM/STEAM activities

Unit #7- Rocks and Fossils
Stage 1: Desired Results

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

Essential Questions:
- How do rock layers change?
- What do fossils tell us about ancient environments and patterns about changes of the Earth's surface?

Enduring Understandings:
- Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed.

Knowledge and Skills: (SWBAT embedded course proficiencies)
- Construct explanations for the ways in which rock layers reveal patterns and reflect the history of planet Earth.
- Examine fossil evidence to determine how and in what environments organisms of the pat lived, based on their physical traits and similarities to living organisms.
- Examine fossils and other geologic evidence to understand what past environments were like, how they changed over time, and how the changes to Earth's surface have affected them.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)

Assessment Methods Science Lab activities, student notebook recordings, student graphs and models, Teacher Observation

Stage 3: Learning Plan

The learning experiences in this unit prepare students to be able to identify evidence from patterns in rock formations and fossils in rock layers to support and explanation for changes in landscape over time.

In the first lesson students will model rock layers to gather evidence about how they form and what information they contain about the history of planet Earth. They will look at examples of exposed rock layers in different formations and come up with explanations how these layers tell a story about the past and the Earth processes that shape and change rocks.

In the next lesson students examine fossils representing life from different periods of time in Earth's history to determine the habitats in which those fossils lived, and draw conclusions about what modern day organisms the fossils may be related to. By looking closely at the structures of fossils and living organisms , students see repeated forms and traits that helped these organisms survive in specific environments.

In the third lesson students use evidence to determine what past environments were like, examine fossils in different layers of rock to reveal the history of planet Earth, and construct explanations for how environments have changed over time. Studying patterns in rocks and fossils, students learn how changes to Earth's surface have affected and will continue to affect rock layers.

The culminating activity in this unit will have students providing explanations and developing models to demonstrate rock processes and patterns demonstrating understanding of ESS1.C in support of 4-ESS1-1.
Students will complete this task by:

- Defining the task
- Researching
- Brainstorming
- Planning a procedure
- Making a models
- Presenting their findings

In this unit, the 21st Century Skill of communication and collaboration will be realized through a series of independent problem based learning opportunities that will cause the students to articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and context, listen effectively to

decipher meaning, including knowledge, values, attitudes and intentions, and use communication for a range of purposes.

Literacy and Mathematics

English Language Arts/Literacy

English Language Arts can be leveraged in this unit in a number of ways. Students can participate in shared research using trade books and online resources to learn about the formation of rock layers and types of fossil and their relationship to the living organisms of today. Students can record their findings in science journals or use the research present ideas and information to an audience of peers. Students can also learn to take notes in their journals order to help them recall information from experiences or gather information from provided sources. They can add drawings or other visual displays to their work, when appropriate, to clarify ideas, thoughts, and feelings. Along with the topics come sets of vocabulary words and ways you can incorporate that vocabulary into the context of a lesson, even into centers that can occur during English Language Arts time, creating cross curricular opportunities.

Mathematics

Throughout this unit of study, students need opportunities to represent and interpret categorical data by drawing diagrams with labeled measurements to help present the information to an audience. This will lead to opportunities to solve simple put-together, take-apart, and compare problems using information presented in these types of graphs. They will collect data on various fossils and share results with peers. As students analyze the data in these types of graphs and tables, they can use the data to answer simple put-together, take apart, and compare problems. This unit also presents opportunities for students to model with mathematics. They can diagram situations mathematically or solve multi-step word problems to help support claims. Data collected in bar graphs and picture graphs can easily be used to present information to their peers.

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.

Time Allotment: 13 days

Resources - Sample Open Education Resources

Suggested resources will include but are not limited to the following:
- District approved science textbook
- Assessments- Online, Textbook, Team Created
- Websites- Duckster, Fact Monster, Kahoot, Quizizz, Readworks Digital
- Videos- Edpuzzle
- Nonfiction/fiction sources
- Laboratory investigations
- STEM/STEAM activities

Unit #8- Natural Resources and Hazards
Stage 1: Desired Results

Content Standards:
- **4-ESS3-1:** Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
- **4-ESS3-3:** Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

Essential Questions:
- What nonrenewable and renewable resources are used for energy?
- How can people reduce the impact of land and water based hazards?

Enduring Understandings:
- Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not.
- A variety of hazards result from natural processes (e.g.- earthquakes, tsunamis, volcanic eruptions.) Humans cannot eliminate the hazards but can take steps to

reduce their impacts.
- Testing a solution involves investigating how well it performs under a range of likely conditions.

Knowledge and Skills: (SWBAT embedded course proficiencies)

- To understand that humans use energy and fuels derived from natural resources.
- Students will rely on various sources of media to explain the use and reuse of natural resources as well as gaining the knowledge that human needs change over time.
- To understand that humans use energy and fuels derived from natural resources.
- Apply what students know about the interdependence of science and technology to evaluate the benefits and drawbacks of renewable resources.
- To describe a variety of Earth processes on land that can be hazardous to humans, and how the impact of these processes can be lessened.
- To analyze and describe a variety of water-based processes that can be hazardous to humans and design and test multiple solutions to lessen the impacts of these natural Earth processes on humans.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)

Assessment Methods Science Lab activities, student notebook recordings, student graphs and models, Teacher Observation

Stage 3: Learning Plan

The learning experiences in this unit prepare students for mastery of Earth and Human Activity. Students will obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. Students will also generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

In lesson 1, students will obtain, evaluate, and communicate information about nonrenewable resources, protecting and reducing the use of nonrenewable resources. They will learn how people's need and wants change over time as they demand new and better technologies.

In the second lesson, students will learn about renewable energy resources, including how we make use of them. They will evaluate the benefits and drawbacks of renewable resources.

In lesson 3, Students learn about natural hazards that take place on land, such as volcanic eruptions, earthquakes, landslides, and wildfires. They explore the causes and effects of these events and analyze information about how maps can be used to assess the risk of natural hazards.

In the last lesson, students will study a variety of water based Earth processes that can be hazardous to humans and design and test multiple solutions to lessen the impacts of these processes on humans.

After completing these lessons, the Unit Performance Task: Avoiding Disaster, has students applying concepts of weather patterns to analyze the risk of weather-related hazards in the local area. Students will obtain informations and develop solutions to demonstrate minimize the risk of flood hazards in the community by following these steps:

- Define the task
- Research
- Brainstorm
- Plan the procedure
- Report
- Communicate

In this unit, the 21st Century theme of environmental literacy by investigating and analyzing environmental issues and making accurate conclusions about effective solutions. Through communication and collaboration, students utilize multiple media and technologies, and know how to judge their effectiveness as a priority as well as assess their impact. Lastly, using information literacy, students will evaluate information critically and competently. They will use information accurately and creatively for the issue or problem at hand.

Literacy and Mathematics

English Language Arts/Literacy

English Language Arts can be leveraged in this unit in a number of ways. Students can participate in shared research using trade books and online resources to learn about the natural resources and hazards that surround their local community daily, along with preventive strategies. Students can record their findings in science journals or use the research present ideas and information to an audience of peers. Students can also learn to take notes in their journals order to help them recall information from experiences or gather information from provided sources. They can add drawings or other visual displays to their work, when appropriate, to clarify ideas, thoughts, and feelings. Along with the topics come sets of vocabulary words and ways you can incorporate that vocabulary into the context of a lesson, even into centers that can occur during English Language Arts time, creating cross curricular opportunities.

Mathematics

Throughout this unit of study, students need opportunities to represent and interpret categorical data by drawing picture graphs and/or bar graphs (with a single-unit scale) to represent a data set with up to four categories. This will lead to opportunities to solve

simple put-together, take-apart, and compare problems using information presented in these types of graphs. For example, students will be working with the constraints of money and time as they research energy efficient product. As students analyze the data in these types of graphs, they can use the data to answer simple put-together, take apart, and compare problems. This unit also presents opportunities for students to model with mathematics. They can diagram situations mathematically or solve multi-step word problems to help support claims. Data collected in bar graphs and picture graphs can easily be used to present information to their peers.

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.

Time Allotment: 16 days

Resources - Sample Open Education Resources

Suggested resources will include but are not limited to the following:

- District approved science textbook
- Assessments- Online, Textbook, Team Created
- Websites- Duckster, Fact Monster, Kahoot, Quizizz, Readworks Digital
- Videos- Edpuzzle
- Nonfiction/fiction sources
- Laboratory investigations
- STEM/STEAM activities

New Jersey Student Learning Standards

http://www.state.nj.us/education/cccs/

Integration of 21st Century Theme(s)

The following websites are sources for the following 21st Century Themes and Skills:
http://www.nj.gov/education/code/current/title6a/chap8.pdf

http://www.p21.org/about-us/p21-framework .

http://www.state.nj.us/education/cccs/standards/9/index.html

21st Century Interdisciplinary Themes (into core subjects)

- **Global Awareness**
- **Financial, Economic, Business and Entrepreneurial Literacy**
- **Civic Literacy**
- **Health Literacy**
- **Environmental Literacy**

Learning and Innovation Skills

- **Creativity and Innovation**
- **Critical Thinking and Problem Solving**
- **Communication and Collaboration**

Information, Media and Technology Skills

- **Information Literacy**
- **Media Literacy**
- **ICT (Information, Communications and Technology) Literacy**

Life and Career Skills

- **Flexibility and Adaptability**
- **Initiative and Self-Direction**
- **Social and Cross-Cultural Skills**
- **Productivity and Accountability**
- **Leadership and Responsibility**

Integration of Digital Tools

- **Classroom computers/laptops**
- **Technology Lab**
- **FM system**
- **Other software programs**