Allamuchy Township School District
Allamuchy, NJ

Science
Grade 1

CURRICULUM GUIDE

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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).

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And
Aligned with the New Jersey Core Curriculum Content Standards
And Common Core Content Standards

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Philosophy and Rationale

Science, technology, and engineering influence and permeate every aspect of modern life. The primary goal of the science curriculum is to develop substantive science literacy in all students. The program must provide students with opportunities to expand, change, enhance, and modify the ways in which they view the world. 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. Students will be empowered to express and share points of view, solve problems, and make decisions based on evidence. Teachers facilitate an environment that promotes student's thinking, honesty, curiosity, and questioning. As a human endeavor, science seeks to provide an explanation of phenomena occurring in the natural world. This endeavor merges three pillars: Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts.

Project-based learning activities provide opportunities for students to develop materials that show evidence of their engagement with issues raised in the course and, more practically, that may be adapted for their own courses in the future.

Mission Statement

Building on tradition and success, the mission of the Allamuchy Township School District is to foster a caring and creative environment where students grow as learners and citizens while developing 21st century skills. We provide a culture for social emotional learning that contributes to a positive school climate, increased academic success, and a sense of ownership within the community.

The Allamuchy Learner

The Allamuchy Township School District pursues a holistic approach to encouraging the educational growth of every student. We consider each student as an individual with particular strengths and weaknesses, likes and dislikes and varying motivations. The goal of the Allamuchy educational program is to develop young people who are curious, well rounded, knowledgeable, caring, respectful and responsible so that they can evolve into self-sufficient and confident citizens and members of a diverse society.

Unit 1 - Light and Sound

Scope and Sequence

Time: Approximately 25 days

In this unit of study, students develop an understanding of the relationship between sound and vibrating materials as well as between the availability of light and the ability to see objects. The idea that light travels from place to place can be understood by students at this level by placing objects with different materials in the path of a beam of light and determining the effect of the different materials.

Corresponds to Unit 2 & 3 in textbook

Stage 1: Desired Results

Content Standards

1-PS4-1: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
1-PS4-2: Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.
1-PS4-3: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
1-PS4-4: Use tools and materials to design and build a device that uses sound to solve the problem of communicating over a distance.

Essential Questions

How can you prove that you can only see something when someone shines a light on it or if the object gives off its own light?
What is sound and how can we communicate with sound?

Enduring Understandings

- Simple tests can be designed to gather evidence to support or refute student ideas about causes.
- Objects can be seen if light is available to illuminate them or if they give off their own light.
- Some materials allow light to pass through them, others allow only some light through, and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach.
- Mirrors can be used to redirect a light beam.
- Sound can make matter vibrate, and vibrating matter can make sound.

Knowledge and Skills (SWBAT embedded course proficiencies)

Students who understand the concepts are able to:

- Design simple tests to gather evidence to support or refute ideas about cause and effect relationships.
- Make observations to construct an evidence-based account for natural phenomena.
- Make observations to construct an evidence-based account that objects can be seen only when illuminated.
- Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question.

- Plan and conduct an investigations to determine the effect of placing objects made with different materials in the path of a beam of light. Materials can be:
    - Transparent (clear plastic, glass)
    - Translucent (wax paper, thin cloth)
    - Opaque (cardboard, construction paper)

- Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
    - Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string.
    - Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)

Assessment Methods (formative, summative, other evidence and/or student self- assessment)

Stage 3: Learning Plan

In this unit of study, students plan and conduct investigations and make observations as they explore sound and light energy. Students describe the relationships between sound and vibrating materials and the availability of light and the ability to see objects. They also investigate the effect on a beam of light when objects made of different materials are placed in its path. Throughout this unit, students will use their observations and data as evidence to determine cause-and-effect relationships in the natural world.

Students begin to develop an understanding of some basic properties of sound. Students can use a variety of objects and materials to observe that vibrating materials can make sound and that sound can make materials vibrate. Students need multiple opportunities to experiment with a variety of objects that will make sound. Some opportunities could include:

- Gently tapping various sizes of tuning forks on a hard surface.
- Plucking string or rubber bands stretched across an open box.
- Cutting and stretching a balloon over an open can to make a drum that can be tapped.
- Holding the end of a ruler on the edge of a table, leaving the opposite end of the ruler hanging over the edge, and then plucking the hanging end of the ruler.
- Touching a vibrating tuning fork to the surface of water in a bowl.
- Placing dry rice grains on a drum's surface and then touching the drum with a vibrating tuning fork or placing the drum near the speaker of a portable sound system.
- Holding a piece of paper near the speaker of a portable sound system.

As students conduct these simple investigations, they will notice that when objects vibrate (tuning forks that have been tapped and string, rubber bands, and rulers that have been plucked), sound is created. They will also notice that sound will cause objects to vibrate (sound from a speaker causes rice grains to vibrate on the surface of a drum, the vibrating tuning forks cause ripples on the surface of water, and sound from a speaker also causes paper to move). Students should use these types of observations as evidence when explaining the cause and effect relationship between sound and vibrating materials.

After investigating sound, students continue to observe objects with and without available light. They need opportunities to observe a variety of objects in both illuminated and non-illuminated settings. For example, observations could be made in a completely dark room, or students can use a pinhole bos to observe objects. Students can also watch videos of cave explorers deep in the earth, using light from a single flashlight. With experiences such as these, they will come to understand that objects can be seen only when illuminated, either from an external light source of by when they give off their own light.

Next, students plan and conduct simple investigations to determine what happens to a beam of light when objects made of various materials are placed in its path. Students need the opportunity to explore the interaction of light with a variety of materials, and they should record what they observe with each one. When selecting materials to use, teachers should choose some that allow all light to pass through (transparent), some that allow only a portion of the light to pass through (translucent), some that do not allow any light to pass through (opaque), and some that redirect the beam of light (reflective).

As students observe the interaction between light and various materials, they should notice that when some or all of the light is blocked, a shadow is created beyond the object. If only a portion of light is blocked (translucent materials), a dime shadow will form, and some light will pass through the object. If all the light is blocked (opaque materials), students will see only a dark shadow beyond the object. They will also observe that shiny materials reflect light, redirecting the beam of light in a different direction. Students should use their observations as evidence to support their explanations of how light interacts with various objects.

Suggested Activities: Video: Understanding Vibration and Pitch (nj.pbslearningmedia.org). Zoom/Pitch: Making Guitars (pbskids.org). Read aloud the book: *Listening Walk* by Paul Showers after reading partner students up and take a listening walk around the school or outside. Have students record the sounds they hear, when you get back to class have students share their answers and record them on chart paper. Read aloud the book: *Sounds All Around* by Wendy Pfeffer. Students could make and use Kazoo's. Shadow shapes or shadow puppets for light beam activity.

Connecting with English Language Arts/Literacy and Mathematics

English Language Arts/Literacy

To integrate the CCSS for English Language Arts to this unit, students need opportunities to read informational texts in order to gather information about light and sound. With adult guidance, they identify the main topic and retell key details from tests and aks and answer questions. Students should also participate in shared research and writing projects. They can gather information from a variety of pre-selected, grade-level appropriate texts and resources, and use that information to answer questions about light and sound. In pairs or small groups, students can use pictures and words to create simple books about vibration (sound) and illumination (light). The students' writing should include facts about the topic and have a sense of closure. Throughout the unit of study, students need multiple opportunities to share their experiences with light and sound in collaborative conversations with adults and peers, in small and large group settings.

Mathematics

Students need opportunities to use tools for a variety of purposes as they design and build devices for communicating with light or sound. They can use objects such as interlocking cubes or paper clips to measure length in nonstandard units, expressing their measurements as whole numbers. Students can also use indirect measurements to order three objects by length. Students can use graphs to organize data, such as the number of drumbeats, and then analyze the data to find patterns.

Express the length of an object as a whole number of length units, by layering multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size lengths units that span it with no gaps or overlaps.

Modifications:

- Provide students with multiple choices of how they can represent their understandings
- 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.

Resources

- District approved science textbook
- Websites
- Videos
- Nonfiction/fiction sources

Unit 2 - Communicating with Light and Sound

Scope and Sequence
Time: Approximately 25 days

In this unit of study, students continue to develop their understanding of the relationship between sound and vibrating materials as well as between the availability of light and the ability to see objects. Students apply their knowledge of light and sound to engage in engineering design to solve a simple problem involving communication with light and sound.

Corresponds to Unit 2 and 3 in textbook

Stage 1: Desired Results

Content Standards
1-PS4-2: Make observations to construct an evidence-based account that objects can be seen only when illuminated.
1-PS4-3: Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.
1-PS4-4: Use tools and materials to design and build a device that uses light to solve the problem of communicating over a distance.
K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Essential Questions
How would we communicate over a distance without the use of any of the devices that people currently use?

Enduring Understandings
- The shape and stability of structures of natural and designed objects are related to their function (s).
- People depend on various technologies in their lives; human life would be very different without technology.
- People also use a variety of devices to communicate (send and receive information) over long distances.
- A situation that people want to change or create can be approached as a problem to be solved through engineering.
- Asking questions, making observation, 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 problem's solutions to other people.

Knowledge and Skills (SWBAT embedded course proficiencies)
Students who understand the concepts are able to:
- Describe how the shape and stability of structures are related to their function.

- Ask questions based on observations to find more information about the natural and/or designed world.
- Define a simple problem that can be solved through the development of a new or improved object or tool.
- Ask questions, make observations, and gather information about a situation people want to change in order to define a simple problem that can be solved through the development of a new or improved object o tool.
- Develop a simple model based on evidence to represent a proposed object or tool.
- Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- Use tools and materials provided to design a device that solves a specific problem.
- Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. Examples of devices could include:
    - A light source to send signals
    - Paper cup and string telephones
    - A pattern of drum beats

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)

Assessment Methods (formative, summative, other evidence and/or student self- assessment)

Stage 3: Learning Plan

In this unit of study, students continue to develop their understanding of the relationship between sound and vibrating materials as well as between the availability of light and the ability to see objects. Students will apply their knowledge of light and sound to solve a simple problem involving communication with light and sound.

During this unit, students learn that people depend on various technologies in their lives, and that life would be very different without technology. Technology plays an important role in the development of devices that allow us to communicate (send and receive information) over long distances. Engineers design and build many kinds of devices, such as those used for communication. Like engineers, students engage in the engineering design process in order to design and build a device that uses light or sound to communicate over a distance.

This process should include the following steps:

- Students brainstorm a list of ways that people communicate over a distance. Some examples include telephones, cellular phones, email, and video conferencing (by computer).
- Ask students "How would we communicate over a distance without the use of any of the devices that people currently use?"
- Use that question to guide the class to define the problem: Design and build a device that allows us to communicate over a distance.
- As a class, determine the criteria that will be used to evaluate the design solutions. One criterion MUST be that the device uses either light or sound.
- Also as a class, determine possible constraints, such as available materials and amount of time allotted for designing and building the device.
- Small groups conduct research, looking for examples of devices that use light or sound to communicate over a distance.
- Small groups can then use tools and materials to design and build their devices. Examples could include a light source that sends a signal, paper cup and string telephones, or a pattern of drumbeats.
- Groups should prepare a sketch or drawing of their device. They should label the components and describe, in writing, how each component relates to the function of the device.
- Groups should present their devices to the class, demonstrating how they work.
- Students then determine which devices work as intended based on the criteria, using data as evidence to support their thinking.

Students should ask questions, make observations, gather information, and communicate with peers throughout the design process. Guidance and support from the teacher is also a critical part of the design process.

Suggested Activities: Communicating with Light and Sound: Exploration - the wave crest (betterlesson.com). Waves of Sound: (1) How far can a whisper travel?; (2) What would happen if you screamed in outer space; (3) Why are some sounds high and some sounds low? (mysteryscience.com). **Project Learning Tree:** Sounds Around, activity 4.

Connecting with English Language Arts/Literacy and Mathematics

English Language Arts/Literacy

Students will participate in shared research and writing projects as they engage in engineering design. Students can use text and media resources to first gather information about devices that use light or sound to communicate over a distance. They can demonstrate understanding of key details in a text by asking and answering questions during class and small-group discussions. In addition, students recall information from experiences or gather information from provided sources to support their thinking as they design and build their device. As students complete their devices, they prepare a sketch or drawing of their device, label the components, and describe, in writing, how each component relates to the function of the device and how their communication devices work. Students can also write a "how-to" book describing how to use tools and materials to build their design. Students can also use drawings or other visual displays to accompany their writing in order to describe their thought process and clarify their ideas.

Mathematics

Students need opportunities to use tools for a variety of purposes as they design and build devices for communicating with light or sound. They can use objects such as interlocking cubes or paper clips to measure length in nonstandard units, expressing their measurements as whole numbers. Students can also use indirect measurement (i.e., compare the lengths of two objects indirectly by using a third object) to order three objects by length. For example, they might compare the lengths of string used for paper-cup telephones and observe and describe the relative effectiveness of each length of string.

Students can also use graphs to organize data, such as the number of drumbeats, and then analyze the data to find a pattern. Students will reason abstractly and quantitatively as they organize data into graphs, analyze the data, and use it to solve simple put-together, take-apart, and compare problems.

Modifications:

- Provide students with multiple choices of how they can represent their understandings
- 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.

Resources

- District approved science textbook
- Websites
- Videos
- Nonfiction/fiction sources

Unit 3 - Characteristics of Living Things

Scope and Sequence

Time: Approximately 42 days

In this unit of study, students develop an understanding of how plants and animals use their external parts to help them survive, grow, and meet their needs, as well as how the behaviors of parents and offspring help offspring survive. The understanding that young plants and animals are alike, but not exactly the same as, their parents is developed.

Corresponds to Unit 4 in textbook

Stage 1: Desired Results

Content Standards

1-LS1-1: Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.
1-LS1-2: Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.
1-LS3-1: Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

Essential Questions

How are young plants and animals alike and different from their parents?
What types (patterns) of behavior can be observed among parents that help offspring survive?

Enduring Understandings

Knowledge and Skills (SWBAT embedded course proficiencies)
Students who understand the concepts are able to:

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)
Assessment Methods (formative, summative, other evidence and/or student self- assessment)

Stage 3: Learning Plan

In this unit of study, students observe organisms in order to recognize that many types of young plants and animals are alike, but not exactly the same as, their parents. Students also observe how organisms use their external parts to help them survive, grow, and meet their needs, and how the behaviors of parents and offspring help offspring survive. Throughout the unit, students will look for patterns; obtain, evaluate, and communicate information; and construct explanations.
People look for patterns in the natural world and use these patterns as evidence to describe phenomena. Students begin this unit by observing and comparing external features of organisms, looking for patterns in what they observe. They will need opportunities to observe a variety of plants and animals in order to look for similarities and differences in their features. For example, when comparing the shape, size, color, or number of leaves on plants, students begin to notice that plants of the same kind have leaves that are the same shape and color, but the leaves of one plant may differ from another in size or number. When comparing body coverings; numbers, size,

and type of external features (legs, tail, eyes, mouth parts); body size, body coloring, or eye color of animals, students learn that animals of the same kind have the same type of body covering and the same number and types of external features, but the size of the body, the size of external features, body color, and/or eye color of individuals might differ. Making observations like these helps students recognize that young plants and animals look very much, but not exactly, like their parents, and that even though individuals of the same kind of plant or animal are recognizable as similar, they can vary in many ways.

In addition to observing and documenting similarities and differences in the external features of organisms, students also need opportunities to make direct observations, read texts, or use multimedia resources to determine patterns in the behaviors of parents and offspring that helps offspring survive. While both plants and animals can have young, it is the parents of young animals who might engage in behaviors that help their young survive. Some examples of these patterns of behaviors could includes that offspring make, such as crying, cheeping, and other vocalizations, and the responses of parents, such as feeding, comforting, and protecting their young.

Suggested Activities: Growing up Wild: Ants on Parade, pg. 12; Oh Deer!, pg. 48. **Project Learning Tree:** The Forest of S.T. Shrew, activity 8. **Earth Systems Module:** All about Earth Our World on Stage (globe.gov).

Connecting with English Language Arts/Literacy and Mathematics

English Language Arts/Literacy

Students need opportunities to read informational texts to gather information about traits and behaviors of organisms. With adult guidance, they identify the main topic, retell key details from texts, and ask and answer questions about key details. Students should also participate in shared research and writing projects. They can gather information from a variety of preselected, grade-level-appropriate texts and resources and use that information to answer questions about traits and behaviors of organisms. In pairs or small groups, students can use pictures and words to create simple books that describe features that parents and offspring share or behaviors that parents and offspring exhibit that help offspring survive.

Mathematics

Students reason abstractly and quantitatively and use appropriate tools strategically as they collect and organize data, and use it to solve problems. For example, when students gather information about the shape, size, color, and number of leaves on plants, they can:

- Use grade-level-appropriate tools and strategies to measure, compare, and order leaves by length.
- Organize data (e.g. number of leaves) into simple graphs or tables, and then use strategies based on place value, properties of operations, and/or the relationship between addition and subtraction to make comparisons.
- Use drawings and equations as they solve problems (e.g. more or less, how many in each).

Modifications:

- Provide students with multiple choices of how they can represent their understandings
- 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.

Resources

- District approved science textbook
- Websites
- Videos
- Nonfiction/fiction sources

Unit 4 - Mimicking Organisms to Solve Problems

Scope and Sequence
Time: Approximately 35 days

In this unit of study, students develop an understanding of how plants and animals use their parts to help them survive, grow, and meet their needs. Students also need opportunities to develop possible solutions. As students develop possible solutions, one challenge will be to keep them from immediately implementing the first solution they think of and to instead think through the problem carefully before acting. Having students sketch their ideas or make a physical model is a good way to engage them in shaping their ideas to meet the requirements of the problem.

Corresponds to Unit 5 in textbook

Stage 1: Desired Results

Content Standards
1-LS1-1: Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.
1-LS1-2: Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.
1-LS3-1: Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.
K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Essential Questions
What are some ways plants and animals meet their needs so that they can grow and survive?

Enduring Understandings
- Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world.
- The shape and stability of structures of natural and designed objects are related to their function (s).
- All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.
- Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs.
- Designs can be conveyed through sketches, drawing, or physical models. These representations are useful in communicating ideas for a problem's solution to other people.

Knowledge and Skills (SWBAT embedded course proficiencies)
Students who understand the concepts are able to:
- Observe and describe how that shape and stability of structures of natural and designed objects are related to their functions.

- Use materials to design a device that solves a specific problem or (design) a solution to a specific problem.
- Use materials to design a solution to a human problem that mimics how plants and/or animals use their external parts to help them survive, grow, and meet their needs: Examples of human problems that can be solved by mimicking plant or animal solutions could include:
    - Designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales.
    - Stabilizing structures by mimicking animal tails and roots on plants.
    - Keeping out intruders by mimicking thorns on branches and animal quills.
    - Detecting intruders by mimicking eyes and ears.
- Develop a simple model based on evidence to represent a proposed object or tool.
- Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)

Assessment Methods (formative, summative, other evidence and/or student self- assessment)

Stage 3: Learning Plan

In this unit of study, students investigate how plants and animals use their external structures to help them survive, grow, and meet their needs. Then students are challenged to apply their learning to design a solution to a human problem that mimics how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

In order to recognize ways in which animals and plants use their external structures, students need opportunities to observe and describe how the shape and stability of organisms' structures are related to their functions. Students can make direct observations and use media resources to find relevant examples for both plants and animals. They should observe that different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air. In addition, animals have body parts that capture and convey different kinds of information from the environment, enabling them to respond to these inputs in ways that aid in survival. Plants, like animals, have different parts (roots, stems, leaves, flowers, fruits) that each serve specific functions in survival and growth, and plants also respond to external inputs. For each structure that students observe, they should describe how the shape and stability of that structure is related to its function.

The next step in this unit is to engage in engineering design. Students need opportunities to use materials to design a device that solves a specific human problem. Designs should mimic how plants and/or animals use their external parts to help them survive and grow. In the engineering design process students engage in and should include the following steps:

- As a class or in small groups, students participate in shared research to find examples of human-made products that have been designed and built by applying knowledge of the natural world. For each example, students identify the human problem (s) that the product solves and how that solution was designed using an understanding of the natural world.
- Students brainstorm possible human problem that can be solved by mimicking how plants and/or animals use their external parts to help them survive, grow and meet their needs. Examples should include:
    - Designing clothing or equipment to protect bicyclists that mimics turtle shells, acorn shells, and animal scales.
    - Stabilizing structures that mimic animal tails and plant roots.
    - Keeping out intruders by mimicking thorns on branches and animal quills.
    - Detecting intruders by mimicking eyes and ears.
- In small groups, students used sketches, drawing, or physical models to convey a design that solves a problem by mimicking one or more external structures of plants and/or animals.
- Use materials to create the design solution.

- Share the design solution with others in the class.

Suggested Activity: Growing Up Wild: Bird Beak Buffet, pg. 42. Show Me the Energy! pg 52.

Connecting with English Language Arts/Literacy and Mathematics

English Language Arts/Literacy

Students participate in shared research and writing projects. Engaging in engineering design provides a perfect opportunity for students to conduct shared research and complete writing projects. Students can use text and media resources to gather information about how the shape and stability of external structures of organisms are related to their functions. In addition, students can conduct simple research to find examples of how humans solve problems using an understanding of the natural world. Examples of writing projects could include creating a book that includes examples of how humans mimic the characteristics of organisms to design solutions to human problems. Students can also use drawings or other visual displays to accompany their sign solutions. Students will need support from teachers to conduct shared research and complete writing projects.

Mathematics

Use appropriate tools strategically. Order three objects by length; compare the lengths of two objects indirectly by using a third object.

Modifications:

- Provide students with multiple choices of how they can represent their understandings
- 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.

Resources

- District approved science textbook
- Websites
- Videos
- Nonfiction/fiction sources

Unit 5 - Patterns of Changes in the Night Sky

Scope and Sequence
Time: Approximately 27 days

In this unit of study, students observe, describe, and predict some patterns in the movement of objects in the sky.

Corresponds to Unit 6 in textbook

Stage 1: Desired Results

Content Standards
1-ESS1-1: Use observations of the sun, moon, and stars to describe patterns that can be predicted.
1-ESS1-2: Make observations at different times of the year to relate the amount of daylight to the time of year.

Essential Questions
Can we predict how the sky will change over time?

Enduring Understandings
- Science assumes that natural events happen today as they happened in the past.
- Many events are repeated.
- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.
- Patterns in the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.
- Seasonal patterns of sunrise and sunset can be observed, described, and predicted.

Knowledge and Skills (SWBAT embedded course proficiencies)
Students who understand the concepts are able to:
- Observe and use patterns in the natural world as evidence and to describe phenomena.
- Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions.
- Use observations of the sun, moon, and stars to describe patterns that can be predicted: Examples of patterns could include:
    - The sun and moon appear to rise in one part of the sky, move across the sky, and set.
    - Stars other than our sun are visible at night but not during the day.
- Make observations (firsthand or from media) to collect data that can be used to make comparisons.
- Make observations at different times of the year to relate the amount of daylight to the time of year.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)
Assessment Methods (formative, summative, other evidence and/or student self- assessment)

Stage 3: Learning Plan

In this unit of study, students observe, describe, and predict some patterns of the movement of objects in the sky. Throughout the unit students look for patterns as they plan and carry out investigations and analyze and interpret data.
In this unit's progression of learning, students develop the understanding that natural events happen today as they happened in the past, and that many events are repeated. In additions, they observe and use patterns in the natural world as evidence and to describe phenomena. First graders ask questions and use observations of the sun, moon,

and stars to describe apparent patterns of change in each. These patterns are then used to answer questions and make predictions. Some examples of patterns include:

- The sun and moon appear to rise in one part of the sky, move across the sky, and set
- The shape of the moon appears to change over a period of time in a predictable pattern.
- Starts, other than our sun, are visible at night but not during the day.

After students observe and document these types of patterns over a period of time, they need opportunities to describe the patterns and to make predictions about the changes that occur in the objects in the sky. It is important that they use observed patterns as evidence to support predictions they might make about the sun, moon, and stars. In this unit, students also learn that seasonal patterns of sunrise and sunset can be observed, described, and predicted. They relate the amount of daylight to the time of year by making observations at different times of the year. Over time, they collect and use data in order to identify the relationship between the amount of sunlight and the season. Grade 1 students are expected to make relative comparisons of the amount of daylight from one season to the next, and assessment should be limited to relative amounts of daylight, not quantifying the hours or time of daylight.

Suggested Activity: Shadows (sciencenetlinks.com) ; Sun activities (educators.brainpop.com).

Connecting with English Language Arts/Literacy and Mathematics

English Language Arts/Literacy

In this unit of study, students need opportunities to participate in shared research and writing projects about patterns of change in the sky. For example, students can use online resources or books to research the patterns of change that are visible over time when we observe the objects in the sky. With guidance from adults, students could create books that describe and illustrate the different patterns of change observed in objects in the sky. They could also describe and illustrate the relative amount of daylight in relation to the season using a sequenced set of journal entries or in a sequence-of-events foldable.

Mathematics

Students need opportunities to represent and interpret data and to use addition and subtraction. The following examples could provide guidance for instruction and should be done with teacher support:

- Example 1: There were 16 hours of daylight yesterday. On December 21, there were 8 hours of daylight. How many more hours of daylight were there yesterday than December 21?
- Example 2: Based on the data collected and posted on the bulletin board so far, which day has been the longest of the year so far? Which day has been the shortest?

Modifications:

- Provide students with multiple choices of how they can represent their understandings
- 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.

Resources

- District approved science textbook
- Websites
- Videos
- Nonfiction/fiction sources

Unit 6 - Engineering and Technology

Scope and Sequence
Time: Approximately 27 days

In this unit of study, students will define and identify problems. Students will describe how people understand problems and how to use technology to solve and problem. In doing so, students will explore and apply the design process.

Corresponds to Unit 1 in textbook

Stage 1: Desired Results

Content Standards
K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Essential Questions
How do engineers use technology to solve a problem?

Enduring Understandings
- The shape and stability of structures of natural and designed objects are related to their function.

Knowledge and Skills (SWBAT embedded course proficiencies)
Students who understand the concepts are able to:
- Explore how engineers make and use technology to solve problems.
- Develop and test simple models to solve problem through a design process and communicate those solutions.

Stage 2: Evidence of Understanding, Learning Objectives and Expectations

Benchmarks (embedded student proficiencies)
Assessment Methods (formative, summative, other evidence and/or student self- assessment)

Stage 3: Learning Plan

This unit of study enables students to create, design, and evaluate different structures. Students will evaluate the various steps involved in creating structures and think about possible alternative steps for building their structures. The unit begins with children exploring, identifying, and naming simple problems and continues with children

exploring how engineers make and use technology to solve everyday problems. Students will use what they have learned to define a problem, gather information about it, and build something to solve the problem.
The evaluation process is an important concept for early education because students do not appear to understand what evaluation of design is or why it is important.
Suggested Activity: Youtube video (s): 1 Build a house to specifications.wmv; First Grade Build Something Bigger on the Top than on Bottom.wmv. Putting it All Together (sciencenetlinks.com). Create a Lego/Brick Lab for building, use different materials and types of objects.

Connecting with English Language Arts/Literacy and Mathematics

English Language Arts/Literacy

With some guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. Write informative/explanatory texts in which students name a topic, supply some facts about the topic, and provide some sense of closure.

Mathematics
Organize, represent and interpret data with up to three categories; ask and answer questions about the total number of data points, how many each category, and how many more or less are in one category than in another.

Modifications:

- Provide students with multiple choices of how they can represent their understandings
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
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New Jersey Core Curriculum and Common Core Content 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/Chromebooks**
- **Technology Lab**
- **Voice amplification device**
- **Other software programs**

Website Resources Grade 1 Science

- **https://www.state.nj.us/education/modelcurriculum/sci/videos**
- **https://nstahosted.org/pdfs/ngss/resources/MatrixForK-12ProgressionOfScienceAndEngineeringPracticsInNGSS.8.14.14.pdf**
- **https://www.state.nj.us/education/aps/cccs/science/resources/QR68.pdf**

Curriculum Modifications

Special Education and 504 Students

Modification are available to children who receive services under IDEA or Section 504 of the Rehabilitation Act.

GENERAL MODIFICATION:

- Larger Font
- Less content on each page
- Accept student pointing to answer rather than verbal or written
- Reduce difficulty
- Lower reading level
- Portfolio assessment rather than written
- Read aloud to student on worksheet, quiz, tests
- Science word wall with pictures for each word
- Scientific Method posters for young learners
- Record predictions together "I wonder" and "I think"
- Sequence work
- Cut and paste instead of writing
- Reward student for on task behavior
- Snap Type - for students who have difficulty writing, can take a picture from I-pad so that they are able to type in answers and other information

BEHAVIOR MODIFICATIONS:

- Breaks between tasks
- Cue expected behavior - discuss with student what cue will be
- Daily feedback to student using a behavior chart (have parents sign off daily)
- Positive reinforcement
- Use of proximity
- Chart progress and maintain data
- Use peer supports and mentoring

STUDENTS AT RISK OF SCHOOL FAILURE:

Students who are considered to have a higher probability of failing academically or dropping out of school.

- Appropriate and discrete sensory stimulation
- Placement in small groups
- Additional support
- Alernative assignment with same outcomes
- Insert meaning of vocabulary several times throughout the lesson
- Use of headphones during certain times to block out noises, ie tests, quizzes, projects
- Use of closed strategies - makes question and answering easier. Closed strategies narrow the depth of the curriculum and help the student understand the focus. Also, allows students to practice answering questions in a systematic format. Helps alleviate anxiety.

ENGLISH LANGUAGE LEARNER STUDENTS (ELL)

ELL students are students who are unable to communicate fluently or learn effectively in English, wo oftem come from non-English speaking homes and backgrounds, and who typically require specialized or modified instruciton in both the English language and in their academic courses.

- Alternate Responses
- Extended Time
- Simplified Instruction (written and verbal)
- Use lots of visuals
- Repeat/Rephrase often
- Use lower level materials when appropriate
- Provide extra practice in English
- If possible translate some things into the fluent language

GIFTED AND TALENTED STUDENTS:
Inclusion, infusion, and differential instruction across the curriculum meets the individual needs of gifted and talented students.

- Differentialed curriculum for the gifted learner
- Educational opportunities consisting of a continuum of differentiated curricula options, instructional approaches and materials
- Flexible groupings of students to facilitate differntiated instruction and curriculum
- Groups students to work on a higher level activity or book together

LEARNING ENVIRONMENTS:

- Extensive outside reading
- Active classroom discussion
- Innovative oral and written presentations
- Interactive, independent and interdiciplinary activities

ADDITIONAL ASSESSMENT METHODS (formative, summative, other evidence and/or student self-assessment):

- Ask questions
- Define Problems
- Deveope and use models
- Plan and carry out investigations
- Analyze and interpret data
- Teacher observations
- Class discussion
- Portfolios
- Venn diagram
- 3-D Foramtive Assessment - integrated perspective, engaging in science and engineering practice (SEP's) as part of sustained and meaningful investigations while applying disciplinary core ideas (DCIs) and cross-cutting concepts (CCCs).