Verona Public School District
Curriculum Overview

2nd Grade Science

Supervisor:
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Curriculum Developed:
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Verona Public Schools
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Verona Public Schools Mission Statement:

The mission of the Verona Public Schools, the center of an engaged and supportive community, is to empower students to achieve their potential as active learners and productive citizens through rigorous curricula and meaningful, enriching experiences.

Course Description:

Developing their knowledge of states of matter, students learn to describe the properties of solids, liquids, and gases and categorize them by their identifiable properties in Changes. Students investigate the freezing, melting, evaporation, and condensation of water as an introduction to phase change. Rusting, dissolving, crystallization, gases created by effervescent tablets, and ink separated through chromatography are other phase changes students create and observe in the lab.

The Life Cycle of Butterflies unit introduces students to the concepts of life cycles by inviting them to investigate one organism-the painted lady butterfly (Vanessa cardui) for 8 weeks. As students care for the caterpillars and butterflies, they observe, record, and describe in words and drawings the metamorphosis from caterpillar to chrysalis and from chrysalis to butterfly.

Energy is one of the most important topics in science; however, because it is a complex and somewhat abstract topic, students need lots of concrete experiences and need to recognize many ways of applying the ideas to themselves and their daily lives. Thus, students begin Energy Works! by tracing the flow of energy that comes into their bodies and giving examples of how they use that energy to grow, live, and function. As a pre-unit assessment activity, students hunt for different types of energy in the classroom. Students then classify energy into 2 broad categories: kinetic (moving) energy and potential (stored) energy. They participate in interactive demonstrations that help them better understand the difference between the 2.

Prerequisite(s):

Grade 1 Science

Verona Elementary Schools 2nd Grade Science

Standard 8: Technology Standards	
8.1: Educational Technology: *All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.*	**8.2: Technology Education, Engineering, Design, and Computational Thinking - Programming:** *All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.*
A. Technology Operations and Concepts B. Creativity and Innovation **X** C. Communication and Collaboration D. Digital Citizenship **X** E. Research and Information Fluency **X** F. Critical thinking, problem solving, and decision making	A. The Nature of Technology: Creativity and Innovation **X** B. Technology and Society C. Design D. Abilities for a Technological World E. Computational Thinking: Programming

SEL Competencies and Career Ready Practices	
Social and Emotional Learning Core Competencies: *These competencies are identified as five interrelated sets of cognitive, affective, and behavioral capabilities*	**Career Ready Practices:** *These practices outline the skills that all individuals need to have to truly be adaptable, reflective, and proactive in life and careers. These are researched practices that are essential to career readiness.*
Self-awareness: The ability to accurately recognize one's emotions and thoughts and their influence on behavior. This includes accurately assessing one's strengths and limitations and possessing a well-grounded sense of confidence and optimism.	**X** CRP2. Apply appropriate academic and technical skills. CRP9. Model integrity, ethical leadership, and effective management. CRP10. Plan education and career paths aligned to personal goals.
Self-management: The ability to regulate one's emotions, thoughts, and behaviors effectively in different situations. This includes managing stress, controlling impulses, motivating oneself, and setting and working toward achieving personal and academic goals.	CRP3. Attend to personal health and financial well-being. CRP6. Demonstrate creativity and innovation. **X** CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity.
Social awareness: The ability to take the perspective of and empathize with others from diverse backgrounds and cultures, to understand social and ethical norms for behavior, and to recognize family, school, and community resources and supports.	**X** CRP1. Act as a responsible and contributing citizen and employee. CRP9. Model integrity, ethical leadership, and effective management.
Relationship skills: The ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups. This includes communicating clearly, listening actively, cooperating, resisting inappropriate social pressure, negotiating conflict constructively, and seeking and offering help when needed.	**X** CRP4. Communicate clearly and effectively and with reason. CRP9. Model integrity, ethical leadership, and effective management. CRP12. Work productively in teams while using cultural global competence.
Responsible decision making: The ability to make constructive and respectful choices about personal behavior and social interactions based on consideration of ethical standards, safety concerns, social norms, the realistic evaluation of consequences of various actions, and the well-being of self and others.	CRP5. Consider the environmental, social, and economic impact of decisions. CRP7. Employ valid and reliable research strategies. **X** CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Model integrity, ethical leadership, and effective management.

Standard 9: 21st Century Life and Careers		
9.1: Personal Financial Literacy: *This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.*	**9.2: Career Awareness, Exploration & Preparation:** *This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.*	**9.3: Career and Technical Education:** *This standard outlines what students should know and be able to do upon completion of a CTE Program of Study.*
X A. Income and Careers B. Money Management C. Credit and Debt Management D. Planning, Saving, and Investing E. Becoming a Critical Consumer F. Civic Financial Responsibility G. Insuring and Protecting	**X** A. Career Awareness (K-4) B. Career Exploration (5-8) C. Career Preparation (9-12)	A. Agriculture, Food & Natural Res. B. Architecture & Construction C. Arts, A/V Technology & Comm. D. Business Management & Admin. E. Education & Training F. Finance G. Government & Public Admin. H. Health Science I. Hospital & Tourism J. Human Services K. Information Technology L. Law, Public, Safety, Corrections & Security M. Manufacturing N. Marketing **X** O. Science, Technology, Engineering & Math P. Transportation, Distribution & Log.

Course Materials	
Core Instructional Materials: *These are the board adopted and approved materials to support the curriculum, instruction, and assessment of this course.*	**Differentiated Resources**: *These are teacher and department found materials, and also approved support materials that facilitate differentiation of curriculum, instruction, and assessment of this course.*

● STC Kits:
  o Changes
  o Lifecycle of Butterflies
● Building Blocks of Science Kit:
  o Energy Works
	● Trade Books

Verona Elementary Schools — 2nd Grade Science

Unit Title / Topic: Changes	Unit Duration: 60 days

Stage 1: Desired Results

Established Goals:

2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.* [Clarification Statement: Examples of properties could include, strength, flexibility, hardness, texture, and absorbency.] [Assessment Boundary: Assessment of quantitative measurements is limited to length.]

2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object. [Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.]

2-PS1-4 Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. [Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.]

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations ● Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-PS1-1) **Analyzing and Interpreting Data** ● Analyze data from tests of an object or tool to determine if it works as intended. (2-PS1-2) **Engaging in Argument from Evidence** ● Construct an argument with evidence to support a claim. (2-PS1-4)	**PS1.A: Structure and Properties of Matter** ● Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1) ● Different properties are suited to different purposes. (2-PS1-2) **PS1.B: Chemical Reactions** ● Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)	**Patterns** ● Patterns in the natural and human designed world can be observed. (2-PS1-1) **Cause and Effect** ● Events have causes that generate observable patterns. (2-PS1-4) ● Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2-PS1-2)

Common Core State Standards Connections:
ELA/Literacy –
RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-PS1-4)
RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-PS1-4)
RI.2.8 Describe how reasons support specific points the author makes in a text. (2-PS1-2),(2-PS1-4)
W.2.1 Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, use linking words (e.g., because, and, also) to connect opinion and reasons, and provide a concluding statement or section. (2-PS1-4)
W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-PS1-2),(2-PS1-3)
W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-PS1-2),(2-PS1-3)
Mathematics –
MP.2 Reason abstractly and quantitatively. (2-PS1-2)
MP.4 Model with mathematics. (2-PS1-1),(2-PS1-2)
MP.5 Use appropriate tools strategically. (2-PS1-2)
2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (2-PS1-2)

Transfer Goal:

Students will be able to <u>independently</u> apply information learned in the second half of the unit to a new situation and new substances, students demonstrate their knowledge that solids and liquids can interact in a variety of ways.

Students will understand that:

- Materials may react with each other and change to form new substances.
- Some substances may be changed from one state to another by heating and cooling.
- Different mixtures of materials may change their properties by chemical or physical processes
- Change is a characteristic of chemical reactions and of phase changes

Essential Questions:

- What makes a liquid a liquid?
- What makes a solid a solid?
- How are solids and liquids the same? Different?
- In what ways can liquids interact?

Students will know:

- Changes occur all the time in the world around us.
- Some changes happen quickly, and others take place over a period of time.
- Substances can be classified as solids, liquids, or gases.
- Solids, liquids, and gases can be described by their properties. These properties include color, size, shape, odor, texture, and weight.
- Water can freeze into a solid and then melt into a liquid again.
- Water can evaporate into a gas and then condense into a liquid again.
- Mixtures can be made by combining solids, liquids, or gases, or a combination of these.
- A substance can change in appearance yet remain the same substance.
- Some mixtures can be separated using a sieve, a filter, or the processes of evaporation and chromatography.
- When some solids—such as salt and sugar—are added to water, they dissolve and seem to disappear.
- Some dissolved solids can be recovered as crystals through evaporation.
- When a solid is dissolving in a liquid, the size of the solid particles, the temperature of the liquid, and stirring can affect the speed at which the solid dissolves.
- When two or more substances are mixed, a chemical reaction may occur. Indicators of a chemical reaction can include a change in color, a change in temperature, or the production of a new substance, such as rust or gas.

- matter, solid, liquid, gas, freeze, melt, evaporate, condense, gravel, salt, mixture, dissolve, dissolving, solution, separating, filter, dissolve, mixture, temperature, chromatography, filter paper, separate, fizz, bubbles, gas, chemical reaction, color change, temperature change

Students will be able to:

- Conduct an investigation into the melting and freezing of water.
- Conduct an investigation of evaporation and condensation.
- Make observations of a mechanical mixture and record data collected.
- Conduct an investigation of a mechanical mixture.
- Conduct an investigation into the dissolution of different types of table sugar
- Analyze data to determine the effect of temperature on the rate dissolution.
- Conduct an investigation of filtration.
- Develop a model explaining evaporation of salt water.
- Conduct an investigation using chromatography.
- Design a procedure to separate the components of a mixture.
- Conduct an investigation of a chemical reaction.
- Conduct an investigation of a gas released from a chemical reaction.
- Conduct an investigation of oxidation.
- Design and conduct an investigation for a particular change.

Stage 2: Acceptable Evidence

Transfer Task -

Writing Our Recipes for Change
Presenting Our Recipes for Change
Unit Post Assessment

Verona Elementary Schools — 2nd Grade Science

Unit Title / Topic: Lifecycle of Butterflies	Unit Duration: 60 days

Stage 1: Desired Results

Established Goals:

3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. [Clarification Statement: Changes organisms go through during their life form a pattern.] [Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.]

3-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. [Clarification Statement: Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans.] [Assessment Boundary: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.]

3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment. [Clarification Statement: Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight.]

3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. [Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.]

Science and Engineering Practices

Developing and Using Models
- Develop models to describe phenomena. (3-LS1-1)

Analyzing and Interpreting Data
- Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1)

Constructing Explanations and Designing Solutions
- Use evidence (e.g., observations, patterns) to support an explanation. (3-LS3-2)
- Use evidence (e.g., observations, patterns) to construct an explanation. (3-LS4-2)

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence
- Science findings are based on recognizing patterns. (3-LS1-1)

Disciplinary Core Ideas

LS1.B: Growth and Development of Organisms
- Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)

LS3.A: Inheritance of Traits
- Many characteristics of organisms are inherited from their parents. (3-LS3-1)
- Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3- LS3-2)

LS3.B: Variation of Traits
- Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)
- The environment also affects the traits that an organism develops. (3-LS3-2)

LS4.B: Natural Selection
- Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)

Crosscutting Concepts

Patterns
- Patterns of change can be used to make predictions. (3-LS1-1)
- Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1)

Cause and Effect
- Cause and effect relationships are routinely identified and used to explain change. (3-LS3-2)
- Cause and effect relationships are routinely identified and used to explain change. (3-LS4-2)
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Common Core State Standards Connections:

ELA/Literacy –

RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS4-2),(3-LS3-1),(3-LS3-2)
RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS4-2) ,(3-LS3-1),(3-LS3-2)
RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS4-2)
RI.3.7 Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). (3-LS1-1)
W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS4-2) ,(3-LS3-1),(3-LS3-2)
SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3-LS4-2) ,(3-LS3-1),(3-LS3-2)
SL.3.5 Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details. (3-LS1-1)

Mathematics –

MP.2 Reason abstractly and quantitatively. (3-LS4-2) ,(3-LS3-1),(3-LS3-2)
MP.4 Model with mathematics. (3-LS4-2) ,(3-LS3-1),(3-LS3-2), (3-LS1-1)
3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. (3-LS4-2)
3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. (3-LS3-1),(3-LS3-2)
3.NBT Number and Operations in Base Ten (3-LS**1-1)**
3.NF Number and Operations—Fractions (3-LS1-1)
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Transfer Goal:

Students will be able to <u>independently</u> apply concepts they have learned in this unit to new situations.

Students will understand that:
- Organisms change their forms and behaviors as part of their life cycles.
- Organisms can survive only in environments where their basic needs are met.
- Butterflies undergo a series of metamorphoses that define their life cycles.
- Like all other organisms, butterflies have basic needs.
- Cycles are regenerative: life begets life.

Essential Questions:
- What do living things need for survival?
- What is metamorphosis?
- How can I model a life cycle?

Students will know:
- The different stages of a butterfly's life cycle are egg, larva, caterpillar, chrysalis, and adult.
- Caterpillars need food, air, and space to live and grow.
- The caterpillar forms a chrysalis, and a butterfly emerges from the chrysalis.
- A butterfly needs food to live, but it does not grow after emerging from the chrysalis.
- A butterfly lays eggs, which hatch into larvae.

- butterfly, caterpillar, hand lens, food, observation, Mallow plant, eat, reproduce, move, air, space, water, shelter, silk, head, bristles, spiracle, prolegs, true legs, false legs, eyes, molt, change, Head capsule, frass, skin, exoskeleton, spinneret, chrysalis, pupa, larva, silk button, J-shape, abdomen, antenna, wing, proboscis, eye, life cycle, metamorphosis, meconium, lifecycle, metamorphosis, meconium, straight, zig-zag, camouflage, survival, data, compare, antennae, thorax, jointed, lifecycle, plant, animal, bird, mammal, reptile, fish, egg

Students will be able to:
- Ask questions based on observations to find more information about caterpillars.
- Record data about the needs of caterpillars
- Use and share diagrams, drawings and writing about the body structure of caterpillars.
- Record observations of molting and growth of caterpillars.
- Record observations of silk and silk spinning
- Use and share diagrams, drawings and writing about the formation of a chrysalis.
- Use and share diagrams, drawings and writing about the metamorphosis and the emergence of the butterfly.
- Record observations of the body parts of the butterfly.
- Record observations of how the butterfly uses its proboscis
- Construct an argument for how the butterflies will survive in their environment.
- Use observations to describe the life cycle of the butterflies.
- Use observations to describe the characteristics of all insects.
- Develop a model of the butterfly life cycle and revise the model to reflect the life cycle of other living things.

Stage 2: Acceptable Evidence

Transfer Task -

Other Life Cycles
Post-Unit Assessment

Verona Elementary Schools — 2nd Grade Science

Unit Title / Topic: Energy Works	Unit Duration: 60 days

Stage 1: Desired Results

Established Goals:

4-PS3-1: Use evidence to construct an explanation relating the speed of an object to the energy of that object. [Assessment Boundary: Assessment does not include quantitative measures of changes in the speed of an object or on any precise or quantitative definition of energy.]

4-PS3-2: Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. [Assessment Boundary: Assessment does not include quantitative measurements of energy.]

4-PS3-4: Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. [Clarification Statement: Examples of devices could include electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound; and, a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device.] [Assessment Boundary: Devices should be limited to those that convert motion energy to electric energy or use stored energy to cause motion or produce light or sound.]

4-PS4-3: Generate and compare multiple solutions that use patterns to transfer information. [Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.]

4-ESS3-1: Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. [Clarification Statement: Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and, a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.] [Assessment Boundary: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.]

Science and Engineering Practices

Planning and Carrying Out Investigations
- Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2)

Constructing Explanations and Designing Solutions
- Use evidence (e.g., measurements, observations, patterns) to construct an explanation. (4-PS3-1)
- Apply scientific ideas to solve design problems. (4-PS3-4)
- Identify the evidence that supports particular points in an explanation. (4-ESS1-1)

Connections to Nature of Science
Scientific Knowledge is Based on Empirical Evidence
§ Science findings are based on recognizing patterns. (4-PS4-1)

Disciplinary Core Ideas

PS3.A: Definitions of Energy
- The faster a given object is moving, the more energy it possesses. (4-PS3-1)
- Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2)

PS3.B: Conservation of Energy and Energy Transfer
- 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. (4-PS3-2)
- Light also transfers energy from place to place. (4-PS3-2)
- 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. (4-PS3-2),(4-PS3-4)

PS3.D: Energy in Chemical Processes and Everyday Life
- The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)

PS4.C: Information Technologies and Instrumentation
- 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 vice versa. (4-PS4-3)

ESS1.C: The History of Planet Earth
- 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. (4-ESS1-1)

Crosscutting Concepts

Energy and Matter
- Energy can be transferred in various ways and between objects. (4-PS3-1),(4-PS3-2),(4-PS3-3),(4-PS3-4)

Patterns
- Similarities and differences in patterns can be used to sort and classify designed products. (4-PS4-3)
- Patterns can be used as evidence to support an explanation. (4-ESS1-1)

Connections to Engineering, Technology, and Applications of Science
Influence of Science, Engineering and Technology on Society and the Natural World
- Engineers improve existing technologies or develop new ones. (4-PS3-4)

Connections to Nature of Science
Science is a Human Endeavor
- Most scientists and engineers work in teams. (4-PS3-4)
- Science affects everyday life. (4-PS3-4)

Scientific Knowledge Assumes an Order and Consistency in Natural Systems
- Science assumes consistent patterns in natural systems. (4-ESS1-1)

Common Core State Standards Connections:

ELA/Literacy –

RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-PS3-1)
RI.4.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text. (4-PS3-1)
RI.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-PS3-1)
W.4.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (4-PS3-1)
W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-2),(4-PS3-3),(4-PS3-4) (4-ESS1-1)
W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-PS3-1),(4-PS3-2),(4-PS3-3),(4-PS3-4) (4-ESS1-1)
W.4.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-PS3-1) (4-ESS1-1)

Mathematics –

MP.2 Reason abstractly and quantitatively. (4-ESS1-1)
MP.4 Model with mathematics. (4-ESS1-1)
4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. (4-ESS1-1)
4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (4-PS3-4))

Transfer Goal:

Students will be able to <u>independently</u> use their learning to design and conduct an experiment or demonstration to answer a student-generated question about energy

Students will understand that:
- All energy fits in two broad categories: kinetic (moving) energy and potential (stored) energy.
- Energy can be converted from one form to another.
- Energy can travel in waves.

Essential Questions:
- Where do you get your energy?
- What are potential and kinetic energy?
- How can we show energy is transferred and converted?
- How does energy move in water waves?
- What are alternative forms of energy?

Students will know:
- The sun is the source of most energy on earth.
- Energy an object has is related to the speed it is moving
- Basic forms of energy including light, heat, sound, electrical, chemical, and mechanical.
- When objects collide, energy is transferred between them.

- Energy, Photosynthesis, kinetic energy, Potential energy, Chemical energy, Electrical energy, Mechanical energy, Radiant energy, Sound energy, Thermal energy, Amplitude, Frequency, Wave, Wavelength, Alternative energy, Biomass energy, Fossil fuels, Geothermal energy, Hydroelectric energy, Solar energy, Turbine, Water energy, Wind energy

Students will be able to:
- Create a working definition/model of the term "energy."
- Ask questions about potential and kinetic energy to guide investigations.
- Conduct an investigation exploring various forms of energy and how they are converted to other forms.
- Conduct an investigation of waves and energy transfer
- Construct a model wind turbine to experience wind energy.
- Construct a model waterwheel to experience water energy.
- Design and conduct an experiment or demonstration to answer a student-generated question about energy.

Stage 2: Acceptable Evidence

Transfer Task -

Design, conduct, and communicate the results of an experiment investigating a student question about energy.