

## Standards Curriculum Map Bourbon County Schools

**Level: 4th Grade**

**Grade and/or Course: Science**

**Updated/Created: 05/12/2020**

Physical Science Life Science Earth & Space Science **Engineering**

**Unit 1: Review Weather and Climate; Engineering Design (from third grade, due to 2020 NTI days)**

Days:	KAS:	Skills/Targets:	Vocabulary:	Activities/ Strategies:	Resources Used for Implementation of Science/Engineering Practices, Core Ideas and Crosscutting Concepts
1- 20	<p><b>3-ESS2-1</b> Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.</p> <p><b>3-ESS2-2</b> Obtain and combine information to describe climates in different regions of the world.</p> <p><b>3-ESS3-1</b> Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.*</p>	<p>I can use a table and/or make a graph to represent weather data.</p> <p>I can use a model to observe how clouds form.</p> <p>I can observe patterns in weather and make predictions based on these patterns.</p> <p>I can use maps to determine climate patterns in different regions of the world.</p> <p>I can design multiple solutions to make a paper model house windproof.</p>	<p>Weather Climate Natural Disaster Tornado Lightning thunder Earthquake Landslide Tsunami Wildfire</p>	<p><a href="#">Mystery Science, Grade 3: Stormy Skies</a></p> <p>Generation Genius: <a href="#">Extreme Weather Solutions</a>,</p> <p>Generation Genius: <a href="#">Weather vs. Climate</a></p>	<p><a href="#">Mystery Science: Stormy Skies; Mystery #4</a></p> <p>Generation Genius: <a href="#">Extreme Weather Solutions</a>,</p>

**HOT questions: How can you use weather patterns to make predictions? How can you explain climate patterns?**

How can you make a house windproof? How can you make a house waterproof?

Evidence of Literacy and Writing in Science: [Assessment](#) from [The Wonder of Science](#) (You will need to make your own copy before using it with students.)

## Unit 2: Structure, Function, and Information Processing

Days:	KAS:	Skills/Targets:	Vocabulary:	Strategies/ Activities:	Resources Used for Implementation of Science/Engineering Practices, Core Ideas and Crosscutting Concepts
21-56	<p><b>4-PS4-2</b> Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. [Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.]</p> <p><b>4-LS1-1</b> Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]</p> <p><b>4-LS1-2</b> 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</p>	<p>I can compare different structures of plants and animals and explain how they grow, survive, and reproduce.</p> <p>I can infer and draw conclusions about how different structures on animals help them fulfill their basic needs.</p> <p>I can identify the basic building blocks for all living organisms is the cell.</p> <p>I can classify organisms as living, nonliving, and once living.</p> <p>I can describe different instincts plants and animals have for survival.</p> <p>I can describe some learned behaviors of organisms</p> <p>I can connect food chains to make a food web.</p>	<p>cornea pupil, iris, lens, retina, optic nerve, reflection, Refraction, organism, life cycle, instinct, learned behavior, absorption, adaptations, nervous system, Camouflage, heredity, Hibernate, Migrate, Mimicry, Compare, Contrast, internal, external, brain, Structure, Function, Reproduction, organism, Habitat, Population, Skeletal system, Muscular system, Cardiovascular system, respiratory system, Digestive system,</p>	<p><a href="#">Brain Processing of Senses</a></p> <p><a href="#">Human Body Systems:</a> <a href="#">Structure of Living Things:</a></p> <p><a href="#">Adaptations and the Environment:</a></p> <p><a href="#">Mystery Science,</a> <a href="#">Human Machine</a></p>	<p><b>Core Ideas</b> LS1.A: Structure and Function Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1) LS1.D: Information Processing 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. (4-LS1-2)</p> <p><b>Science and Engineering Practices</b> Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. Use a model to test interactions concerning the functioning of a natural system. (4-LS1-2) Engaging in Argument from Evidence Engaging in</p>

<p>different ways. [Clarification Statement: Emphasis is on systems of information transfer.] [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]</p> <p><b>3-5-ETS1-2</b></p> <p>Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and and constraints of the problem.</p>	<p>I can demonstrate how energy is passed along in a food chain/food web.</p> <p>I can identify how plants make their own food.</p> <p>I can identify different biomes of the world.</p> <p>I can describe the stages of the life cycle of a flowering plant.</p> <p>I can use models to compare and classify the life cycles of a variety of animals.</p> <p>I can create a model of a plant and animal cell.</p> <p>I can describe how scientists classify all of the world's organisms into kingdoms, classes, and species.</p> <p>I can compare the life cycle of a plant and the life cycle of an animal.</p> <p>I can describe the anatomy of the human body into different systems.</p>	<p><u>Vertebrates,</u> <u>invertebrates,</u> <u>Reptiles, birds,</u> <u>mammals, fish,</u> <u>amphibians</u></p>	<p>argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). Construct an argument with evidence, data, and/or a model. (4-LS1-1).</p> <p><b><u>Crosscutting</u></b> Systems and System Models A system can be described in terms of its components and their interactions. (4- LS1-1),(4-LS1-2)</p> <p><b><u>Common Core State Standards Connections:</u></b> <u>ELA/Literacy</u> – W.4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (4-LS1-1) SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-LS1-2) <u>Mathematics</u> – 4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line symmetric figures and draw lines of symmetry. (4-LS1-1)</p> <p><b><u>Mystery Science</u></b></p>
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					<a href="#">Details on Engineering Practices and Crosscutting Concepts</a>
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HOT questions: How can you investigate what causes your bones and muscles to move? How can your eye model help you construct an explanation that explains how people see? How do the parts of the eye work as a system, and how do changes in each part affect the system as a whole? What are the main differences between a plant and animal life cycle? How can you investigate how food travels through your digestive system from beginning to end? How can you explain the complete life cycle of a plant from the beginning of life to death?

Evidence of Literacy and Writing in Science: [Unit Assessment from Mystery Science: Human Machine](#)

**Standards**

RI.4.1- Refer to details and examples in a text when explaining what the text says explicitly and when drawing inference from the text.

W.4.2- Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

W.4.7- Conduct short research projects that build knowledge through investigation of different aspects of a topic.

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

W.4.9- Draw evidence from literary or informational texts to support analysis, reflection, and research.

### Unit 3: Earth's Systems: Processes that Shape the Earth

Days:	KAS:	Skills/Targets:	Vocabulary:	Strategie/ Activities:	Resources Used for Implementation of Science/Engineering Practices, Core Ideas and Crosscutting Concepts
57-92	<p><b>4-ESS1-1</b> Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. [Clarification Statement: Examples of evidence from patterns could include rock layers with shell fossils above rock layers with plant fossils and no shells, indicating a change from water to land 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</p>	<p>I can use fossil evidence to support an explanation of how landscapes change over time.</p> <p>I can make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.</p>	<p>erosion, physical weathering, chemical weathering, fossils, mold fossil, cast fossil, imprint, amber, fossil record, observe, igneous, sedimentary, metamorphic,</p>	<p><a href="#">Renewable vs. Nonrenewable Resources; Extreme Weather Solutions; Natural Disasters; What Is Science?:-</a></p> <p><a href="#">Earth's Landscapes</a></p>	<p><a href="#">Mystery Science: The Birth of Rocks, Rock Cycle and Earth's Processes</a></p> <p><a href="#">Details on Engineering Practices and Crosscutting Concepts</a></p>

	<p>include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.</p> <p><b>4-ESS2-1</b> Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. [Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [Assessment Boundary: Assessment is limited to a single form of weathering or erosion.]</p> <p><b>4-ESS2-2</b> Analyze and interpret data from maps to describe patterns of Earth's features. [Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]</p> <p><b>4-ESS3-1</b> 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 renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.]</p> <p><b>4-ESS3-2</b> Generate and compare multiple solutions to reduce the impacts</p>	<p>I can analyze and interpret data from maps to describe patterns of Earth's features.</p> <p>I can obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.</p> <p>I can generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.*</p> <p>I can contain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.</p> <p>I can generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.</p>	<p>lava, volcano, earthquake, deposition, landslide, abrasion, landforms (various) contract, expand, sediment, fault, soil, minerals, changes over time, Mohs scale, Tsunami, canyon, rock layers, vegetation, gravity, sediments, particles, topographic maps, plate tectonics, boundaries</p>	<p><a href="#">Weathering &amp; Erosion: Interactions of Earth's Spheres</a></p> <p><a href="#">Natural Disasters</a></p>	
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of natural Earth processes on humans.\*  
[Clarification Statement: Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.] [Assessment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.]

HOT questions: How can patterns of volcano eruptions help me support an argument about whether a volcano can pop up in my backyard? How does the type of lava affect a volcanic eruption eruption? What causes rocks to break down over time? How can I design a home that will be safe from landslides?

Evidence of Literacy and Writing in Science: [Unit Assessment from Mystery Science, The Birth of Rocks](#)

## Unit 4: Energy

Days:	KAS:	Skills/Targets:	Vocabulary:	Strategies/ Activities:	Resources Used for Implementation of Science/Engineering Practices, Core Ideas and Crosscutting Concepts
93-128	<p><b>4-PS3-1</b> -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.]</p> <p><b>4-PS3-2</b> -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.]</p> <p><b>4-PS3-3</b> - Ask questions and predict outcomes about the changes in energy that occur when objects collide. [Clarification Statement:</p>	<p>I can identify some forms and examples of energy. (Sound, light, heat and electric currents).</p> <p>I can use evidence to construct an explanation relating the speed of an object to the energy of that object. (The amount of potential energy determines the amount of kinetic energy in an object).</p> <p>I can infer what will happen if more energy is applied to an object.</p> <p>I can explain how speed is affected by different amounts of force.</p> <p>I can make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.</p> <p>I can model how sound generates enough energy to</p>	<p>collide, transfer, motion, acceleration, force, speed, mass, sound, light, thermal, electrical, mechanical, fossil fuels, alternative energy, renewable, non-renewable, biomass, biofuels, geothermal energy, hydroelectric energy, solar energy, wind energy, kinetic, potential, chemical energy, temperature, convection, conduction, radiation, circuits, conductors, insulators, closed circuit, open circuit, parallel</p>	<p>Mystery Science 4th “Energizing Everything” 4 mysteries (no engineering)</p> <p>Generation Genius</p> <p><a href="#">Energy Transfer;</a> <a href="#">Wave Properties;</a></p> <p><a href="#">Renewable vs. Non-renewable Resources;</a></p> <p><a href="#">Renewable vs. Non-renewable Resources;Energy Transfer;</a></p> <p><a href="#">Collisions;</a></p> <p><a href="#">Collisions;</a></p> <p>Unit 2 Science Alive</p> <p><a href="#">Energy Transfer</a></p>	<p><b>Core Ideas</b></p> <p><b>PS3.A: Definitions of Energy</b> The faster a given object is moving, the more energy it possesses. (4-PS3-1)</p> <p>Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4- PS3-2),(4-PS3-3)</p> <p><b>PS3.B: Conservation of Energy and Energy Transfer</b> 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), (4-PS3-3)</p> <p>Light also transfers energy from place to place. (4-PS3- 2)</p>

	<p>Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.]          [Assessment Boundary: Assessment does not include quantitative measurements of energy.]</p> <p><b>4-PS3-4</b> - 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.]</p>	<p>make an object move from the vibrations.</p> <p>I can model how light energy can be transferred along ecosystems in food chains. (radiation).</p> <p>I can infer that heat flows from a warmer object to a cooler one.</p> <p>I can model how heat energy can be transferred through objects that are touching (conduction).</p> <p>I can infer how someone can stay warm next to a fire.          I can model how heat energy can be transferred to objects through the particles in the air (convection).</p> <p>I can construct a model showing how electrical energy can be produced. (Static and Current in circuits).</p> <p>I can predict the outcomes about the changes in energy when objects collide.</p> <p>I can design, test, and refine a device that converts energy from one form to another such as an electrical circuit converting electrical energy into light, heat, sound, and motion.</p>	<p>circuit, series circuit, inertia, friction, gravity, Newton’s Laws of Motion</p>	<p><a href="#">Collisions</a></p> <p><a href="#">Fossil Fuel Electricity and Coal Experiments</a></p> <p><a href="#">Energy Word Search with Answer Key</a></p> <p><a href="#">Energy for Kids Website</a></p> <p><a href="#">Supplement site for energy, lessons, experiments, and so on</a></p> <p><b>TCT Examples:</b>  <a href="#">What an Impact?</a>  <a href="#">Energy Causes Change</a></p> <p><a href="#">Tennis Ball Bounce: Height Changes Under Different Conditions</a></p>	<p>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)</p> <p><b>PS3.C: Relationship Between Energy and Forces</b>          When objects collide, the contact forces transfer energy so as to change the objects’ motions. (4-PS3- 3)</p> <p><b>PS3.D: Energy in Chemical Processes and Everyday Life</b>          The expression “produce energy” typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)</p> <p><b>ESS3.A: Natural Resources</b>          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. (4-ESS3-1)</p> <p><b>ETS1.A: Defining Engineering Problems</b>          Possible solutions to a problem are limited by available materials</p>
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					<p>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. (secondary to 4-PS3-4)</p> <p><b>ETS1.A: Defining and Delimiting Engineering Problems</b></p> <p>Possible solutions to a 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. (3-5-ETS1-1)</p> <p><b>Crosscutting Concepts</b></p> <p><b>Energy and Matter</b></p> <p>Energy can be transferred in various ways and between objects. (4-PS3-1), (4-PS3-2), (4-PS3-3), (4-PS3-4)</p>
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					<p><b>Cause and Effect</b> Cause and effect relationships are routinely identified and used to explain change. (4-ESS3-1)</p> <p>Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS3-2)</p> <p><b>Interdependence of Science, Engineering, and Technology</b> Knowledge of relevant scientific concepts and research findings is important in engineering. (4-ESS3-1)</p> <p><b>Influence of Engineering, Technology, and Science on Society and the Natural World</b> Over time, people's needs and wants change, as do their demands for new and improved technologies. (4-ESS3- 1)</p> <p>Engineers improve existing technologies or develop new ones. (4- PS3-4)</p> <p><b>Science is a Human Endeavor</b> Most scientists and engineers work in teams. (4-PS3-4)</p> <p>Science affects everyday life. (4-PS3-4)</p>
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### **HOT questions:**

What is energy and how does it affect the speed of objects? (4-PS3-1)

Energy can move around, but how does energy do this in all its forms? (4-PS3-2)

Where does energy go after a collision of objects? (4-PS3-3)

Can man test the conversion of energy? How? (4-PS3-4)

Fuels and energy move our world, where do they come from and what are the Environmental consequences? (4-ESS3-1)

How can society solve its energy problems? (3-5-ETS1-1)

### **Evidence of Literacy and Writing in Science:**

RI.4.1- Refer to details and examples in a text when explaining what the text says explicitly and when drawing inference from the text.

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.

RI.4.9- Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.

W.4.2- Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

W.4.7- Conduct short research projects that build knowledge through investigation of different aspects of a topic.

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

W.4.9- Draw evidence from literary or informational texts to support analysis, reflection, and research.

## Unit 5: Waves and Formation

Days:	KAS:	Skills/Targets:	Vocabulary:	Strategies/ Activities:	Resources Used for Implementation of Science/Engineering Practices, Core Ideas and Crosscutting Concepts
129-175	<p><b>4-PS4-1</b> Develop a model of waves that describe patterns in terms of amplitude and wavelength and that waves can carry energy from one object to another. [Clarification Statement: Examples of models could include diagrams, analogies, and physical models using wire to illustrate wavelength and amplitude of waves.] [Assessment Boundary: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.]</p> <p><b>4-PS4-2</b> Develop a model to describe that light reflecting from objects allows objects to be seen. [Clarification Statement: Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.] [Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen.]</p>	<p>I can create a model to show amplitude and wavelength.</p> <p>I can describe how amplitude and wavelength affect the motion of an object.</p> <p>I can describe how light reflects.</p> <p>I can describe how light reflecting allows objects to be seen.</p> <p>I can describe how information is transferred.</p> <p>I can transfer information using patterns.</p>	<p>Diagrams, model, Morse Code, frequency, amplitude, wavelength, longitudinal, transverse, crest, trough, pitch, loudness, tides, moon, medium, vibration</p>	<p><a href="#">Amplitude and Wavelength</a></p> <p><a href="#">Light Reflection &amp; Vision</a></p> <p><a href="#">Information Transfer</a></p>	<p><u>Amplitude and Wavelength:</u></p> <ul style="list-style-type: none"> <li>• <a href="#">Brain Pop Wave and Amplitude Simulation</a></li> <li>• Mystery Science 4th grade “Waves of Sound” 8 mysteries (engineering in #2, 4, 5)</li> <li>• Generation Genius: <a href="#">Wave Properties</a></li> </ul> <p><u>Light Reflection &amp; Vision:</u></p> <ul style="list-style-type: none"> <li>• Generation Genius: <a href="#">Light Reflection and Vision</a></li> <li>• <a href="#">Light Reflection Simulator</a></li> </ul> <p><u>Information Transfer:</u></p> <ul style="list-style-type: none"> <li>• <a href="#">Coding Guided Practice</a></li> <li>• Generation Genius: <a href="#">Information Transfer</a></li> </ul>

	<p>cellular mechanisms of vision, or the retina works.]</p> <p><b>4-PS4-3</b>Generate and compare multiple solutions that use pattern 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 pixels to send information about a picture, using Morse code to send text.]</p>				
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HOT questions: How are waves created? How do waves move objects? How are our eyes able to see objects? How do we get information from one place to another?

Evidence of Literacy and Writing in Science: Assessment from The Wonder of Science: [Wave Model](#), [Light and Vision](#), [Information Transfer](#)