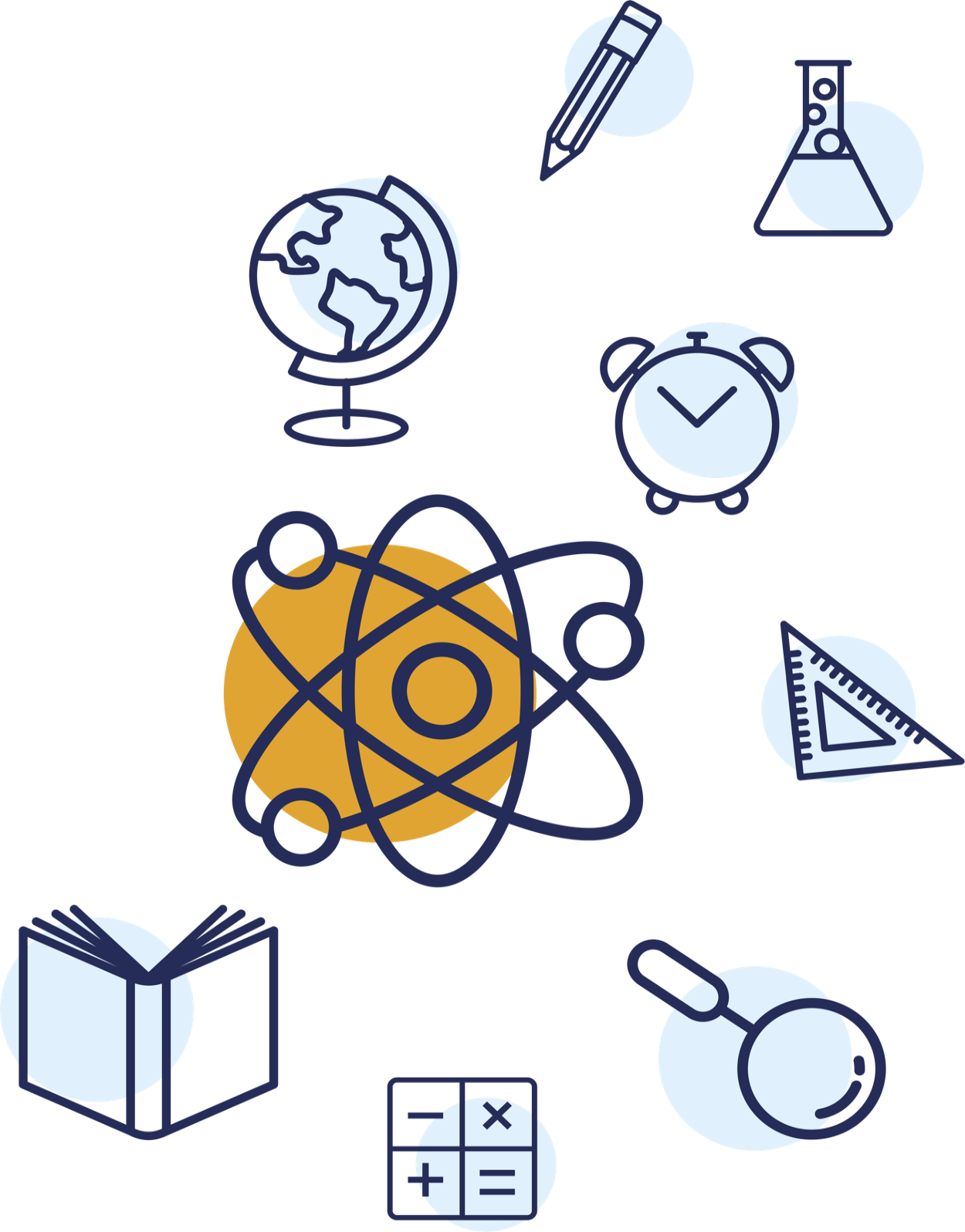
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**SUGGESTED**

**INSTRUCTIONAL PLANNING GUIDE**

*for the Mississippi College- and Career-Readiness Standards*

**q SCIENCE**

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| **GRADE 4** |

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**Mississippi Department of Education**359 North West Street

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| **Nathan Oakley, Ph.D.**  Chief Academic Officer | | |
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**INTRODUCTION**

The unprecedented, nationwide school closures in the spring of 2020 due to the COVID-19 pandemic have created a shift in how districts plan for school re-entry. Instead of the traditional brick-and-mortar planning, administrators are now identifying models that will support a variety of instructional delivery scenarios as they plan for school reopening. The traditional methods of planning and delivery are nearly impossible to implement as a stand-alone model; instead, innovative educators are developing and identifying strategies and resources to support a variety of distance learning scenarios as part of their plans. When using new models of delivery, it is important to recognize that the traditional approach to remediation—providing work better suited for earlier grades—may be insufficient. Instead, the conventional approach to remediation will likely compound the problem educators are trying to correct. According to a 2018 study, ***The Opportunity Myth***[[1]](#footnote-2), the approach of “meeting students where they are”, while often well-intended, only widens the achievement gap. Instead of remediation, teachers and administrators are encouraged to look toward acceleration methods to support student growth and close the gaps.

**PURPOSE**

The purpose of the Suggested Mississippi College- and Career-Readiness Standards Instructional Planning Guide is to provide teachers with an assistive tool for planning units of instruction. This tool will provide suggested standards grouping that should facilitate a coherent and logical delivery of related science concepts. Suggested planning sources and tools are included to assist teachers with curating instructional materials, designing and implementing effective lessons and activities, and building content knowledge and pedagogical practices. This tool encourages instructors to maintain a focus on preparing students to master skills and acquire knowledge at their current grade level.

**DEVELOPMENT**

The following suggested Instructional Planning Guide was developed with a focus on the subsequent key areas, Conceptual Connections, Real-World Connections and Phenomena, Embedded Science and Engineering Practices and Crosscutting Concepts, and Core Vocabulary. The standards are grouped into suggested units based on their underlying conceptual relationships. A list of real-world connections and/or phenomena is associated with each unit group. Their purpose is to give teachers and students researchable opportunities that lead to an in-depth and authentic quest for conceptual understanding. The embedded Science and Engineering Practices (SEPs) and Crosscutting Concepts (CCCs) are extracted from the grouped performance objectives and should encourage students to act and think like scientists. The included list of SEPs and CCCs does not indicate that other SEPs and CCCs are not relevant to the respective standard and performance objectives. Core vocabulary terms are included to emphasize terminology that is essential to the conceptual understandings captured in the standards and performance objectives. It is suggested that instructors pace themselves based on student assessment performance and demonstration of skills mastery and knowledge comprehension.

**RESOURCES for CONSIDERATION**

The resources listed below may be referenced to support classroom teachers in the development of lesson plans and instruction at the local level.   This list is not meant to be exhaustive, rather it represents consultative resources that align with the Units/Themes provided in the Instructional Planning Guides.   Educators are encouraged to use these resources in addition to those curriculum materials that meet the needs of the students they serve.

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| **High-Quality**  **Instructional Material**  **(HQIM)** | **Planning and Instruction Resources** | **Assessment**  **Resources** | **Professional Development**  **Resources** |
| * [Adopted Science Texts](https://mdek12.org/OEER/Caravan) * [STEM Teaching Tools](http://stemteachingtools.org/) | * [5 E Science Instructional Model](http://nextgenerationscience.weebly.com/5-es-of-science-instruction.html) * [The Concord Consortium](https://concord.org/ngss/) * [PBS Learning Media](https://mpb.pbslearningmedia.org/standards/0/) * [Teacher Tube](https://www.teachertube.com/) * [Next Generation Science Standards](https://www.nextgenscience.org/) * [Phenomena for Next Generation Science](https://www.ngssphenomena.com/) * [Khan Academy](https://www.khanacademy.org/) * [OpenSciEd](https://www.openscied.org/) * [Science Buddies](https://www.sciencebuddies.org/) * [PhET Interactive Simulations](https://phet.colorado.edu/) * [Phenomenal GRC Lessons](https://sites.google.com/3d-grcscience.org/going3d/home?authuser=0) | * [MS MAAP Program](https://mdek12.org/OSA/MAAP) * [MS MAAP-A Program](https://mdek12.org/OSA/SP/MAAP-A) * [Access for All Guidance](https://mdek12.org/sites/default/files/documents/OAE/OAE/2019-access-for-all-guide.pdf) * [Problem-Attic](https://www.problem-attic.com/) * [EDInformatics](https://www.edinformatics.com/testing/testing.htm) * [STEM Teaching Tools for Assessments](http://stemteachingtools.org/tgs/Assessment) * [Next Generation Science Assessment](http://nextgenscienceassessment.org/) (Middle Focus) | * [MDE Professional Development](https://www.mdek12.org/OPD/home) * [The Teaching Channel](https://www.teachingchannel.com/) * [California Academy of Sciences](https://www.calacademy.org/) * [Teacher Tube](https://www.teachertube.com/) * [Knowles Teacher Short Courses](https://knowlesteachers.org/knowles-academy/short-courses) * [STEM Teaching Tools OER PD](http://stemteachingtools.org/pd) |

| **GRADE 4 SCIENCE**  **THEME: Energy and Systems** | | | |
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| **UNIT OF STUDY**  (REAL-WORLD CONNECTIONS and PHENOMENA)  **q** | **SCIENCE FOUNDATION STANDARDS q** | **SCIENCE AND ENGINEERING PRACTICES  SCIENCE CROSSCUTTING CONCEPTS**  **q** | CORE ACADEMIC **VOCABULARY TERMS q** |
| **COURSE INTRODUCTION**  In Grade 4, students will observe, research, and conduct investigations to discover patterns related to energy and change in the world around them. The crosscutting concept can be seen in life science through the study of human body systems, including their functions, interactions, and reliance upon other systems within the body. In physical science, the concept is developed through a study of energy in the forms of heat, light, sound, and electricity, as well as the conservation and transfer of energy from one form to another. The study of Earth science in fourth grade investigates the driving force of energy as it relates to the water cycle and changes in patterns of weather and climate. Students are expected to engage in engineering design practices, conduct research, and communicate their understanding of each standard in a variety of ways. Because of this yearlong study, students will gain research and process skills to build content knowledge that will support arguments about the ways energy and change relate to the world around us. | **FOUNDATION STATNDARDS**   * Identify and select appropriate science and engineering tools to collect, analyze, and communicate science and engineering data and information. * Demonstrate effective questioning and observation skills * Communicate science and engineering data using appropriate SI units of measurement * Identify and discuss science and engineering practices * Identify and discuss Crosscutting Concepts | **SCIENCE and ENGINEERING PRACTICES**   * Ask Question and Define Problems * Develop and Use Models * Analyze and Interpret Data * Plan and Conduct Investigations * Use Mathematical and Computational Thinking * Engage in Scientific Argument from Evidence * Obtain, Evaluate, and Communicate Information   **SCIENCE CROSSCUTTING CONCEPTS**   * Patterns * Cause and Effect *(Mechanism and Explanation)* * Scale, Proportion, and Quantity * Systems and System Models * Energy and Matter *(Flows, Cycles, Conservation)* * Structure and Function * Stability and Change | Argument  Change  Concepts  Data  Dependent Variable  Engineering  Evaluate  Evidence  Gram  Independent Variable  Interpret  Investigation  Liter  Meter  Observation  Patterns  Quantity  Science  SI Units of Measurement  Stability |

| **TERM 1** | | | |
| --- | --- | --- | --- |
| **UNIT OF STUDY**  (REAL-WORLD CONNECTIONS and PHENOMENA)  **q** | **MS CCR STANDARDS q** | **SCIENCE AND ENGINEERING PRACTICES  SCIENCE CROSSCUTTING CONCEPTS**  **q** | **VOCABULARY TERMS** CORE ACADEMIC  **q** |
| **MOTIONS FORCES AND ENERGY:**  **Heat Energy**  **REAL-WORLD CONNECTIONS and PHENOMENA**   * Examine how certain types of rock can be used to start fire. * Examine how heat is used to move hot air balloons and other objects. | **P.4.6A Students will demonstrate an understanding of the common sources and uses of heat and electric energy and the materials used to transfer heat and electricity.**  **P.4.6A.1** Obtain and communicate information to compare how different processes (including burning, friction, and electricity) serve as sources of heat energy.  **P.4.6A.3** Develop models demonstrating how heat and electrical energy can be transformed into other forms of energy (e.g., motion, sound, heat, or light).*Focus on heat energy in this grouping* | **EMBEDDED SCIENCE and ENGINEERING PRACTICES**   * Ask Question and Define Problems * Develop and Use Models * Obtain, Evaluate, and Communicate Information   **EMBEDDED CROSSCUTTING CONCEPTS**   * Cause and Effect *(Mechanism and Explanation)* * Systems and System Models * Energy and Matter *(Flows, Cycles, Conservation)* * Stability and Change | Conductor  Conversion  Energy Transfer  Friction  Heat Energy  Insulator  Motion  Solar Energy  Sound  Vibrations |
| **MOTIONS FORCES AND ENERGY:**  **Electrical Energy**  **REAL-WORLD CONNECTIONS and PHENOMENA**   * Construct a scientifically valid explanation that explains why a breaker “trips” in the home or why a fuse is blown in a car. * Discuss causes of power outages during storms. * Observe various media showing causes of power outages and discuss how the flow of electrical energy is disturbed. | **P.4.6A Students will demonstrate an understanding of the common sources and uses of heat and electric energy and the materials used to transfer heat and electricity.**  **P.4.6A.3** Develop models demonstrating how heat and electrical energy can be transformed into other forms of energy (e.g., motion, sound, heat, or light). *Focus on electrical in this grouping*  **P.4.6A.4** Develop models that demonstrate the path of an electric current in a complete, simple circuit (e.g., lighting a light bulb or making a sound). | **EMBEDDED SCIENCE and ENGINEERING PRACTICES**   * Ask Question and Define Problems * Develop and Use Models * Plan and Conduct Investigations * Obtain, Evaluate, and Communicate Information   **EMBEDDED CROSSCUTTING CONCEPTS**   * Cause and Effect *(Mechanism and Explanation)* * Systems and System Models * Energy and Matter *(Flows, Cycles, Conservation)* * Stability and Change | Circuit  Conductor  Conversion  Electrical Energy  Electricity  Electric Circuit  Energy Transfer  Insulator  Motion  Solar Energy  Sound  Vibrations |
| **MOTIONS FORCES AND ENERGY:**  **Advances in Energy Studies**  **REAL-WORLD CONNECTIONS and PHENOMENA**   * Explore what happens when tree limbs meet power lines and discuss the science behind this as wood should be an insulator * Comparatively assess different kinds of light bulbs to determine what variables affect electrical flow and longevity. | **P.4.6A Students will demonstrate an understanding of the common sources and uses of heat and electric energy and the materials used to transfer heat and electricity.**  **P.4.6A.2** Plan and conduct scientific investigations to classify different materials as either an insulator or conductor of electricity.  **P.4.6A.5** Evaluate informational text and technology resources to communicate technological breakthroughs made by historical figures in electricity (e.g. Alessandro Volta, Michael Faraday, Nicola Tesla, Thomas Edison, incandescent light bulbs, batteries, Light Emitting Diodes).  **P.4.6A.6** Design a device that converts any form of energy to another form (e.g., construct a musical instrument that will convert vibrations to sound by controlling varying pitches, a solar oven that will convert energy from the sun to heat energy, or a simple circuit that can be used to complete a task). Use and incorporate all applicable SEPs and CCCs. \* **All SEPs and CCCs are applicable.** | **EMBEDDED SCIENCE and ENGINEERING PRACTICES**   * Ask Question and Define Problems * Plan and Conduct Investigations * Obtain, Evaluate, and Communicate Information   **EMBEDDED CROSSCUTTING CONCEPTS**   * Patterns * Cause and Effect *(Mechanism and Explanation)* * Systems and System Models * Energy and Matter *(Flows, Cycles, Conservation)* * Stability and Change | Conductor  Conversion  Electrical Circuit  Electrical Energy  Electrical Energy  Electricity  Energy  Energy Transfer  Heat Energy  Insulator  Motion  Solar Energy  Sound  Vibrations |
| **MOTIONS FORCES AND ENERGY:**  **Sound Energy**  **REAL-WORLD CONNECTIONS and PHENOMENA**   * Research and discuss how sound energy is being used in the medical field. * Explore the science behind hearing aid devices. | **P.4.6C Students will demonstrate an understanding of the properties of sound as a form of energy.**  **P.4.6C.1** Plan and conduct scientific investigations to test how different variables affect the properties of sound (i.e., pitch and volume).  **P.4.6C.2** In relation to how sound is perceived by humans, analyze and interpret data from observations and measurements to report how changes in vibration affect the pitch and volume of sound.  **P.4.6C.3** Obtain and communicate information about scientists who pioneered in the science of sound, (e.g., Alexander Graham Bell, Robert Boyle, Daniel Bernoulli, and Guglielmo Marconi). | **EMBEDDED SCIENCE and ENGINEERING PRACTICES**   * Ask Question and Define Problems * Develop and Use Models * Analyze and Interpret Data * Plan and Conduct Investigations * Obtain, Evaluate, and Communicate Information   **EMBEDDED CROSSCUTTING CONCEPTS**   * Patterns * Cause and Effect *(Mechanism and Explanation)* * Systems and System Models * Energy and Matter *(Flows, Cycles, Conservation)* * Stability and Change | Interpret  Measurement  Observe  Pitch  Sound Energy  Vibrations |
| **MOTIONS FORCES AND ENERGY:**  **Light Energy**    **REAL-WORLD CONNECTIONS and PHENOMENA**   * Explain the formation of a rainbow using scientific thinking. * Research and discuss the possibility and evolution of a cloaking mechanism and how such technology could impact the global society. | **P.4.6B Students will demonstrate an understanding of the properties of light as forms of energy.**  **P.4.6B.1** Construct scientific evidence to support the claim that white light is made up of different colors. Include the work of Sir Isaac Newton to communicate results.  **P.4.6B.2** Obtain and communicate information to explain how the visibility of an object is related to light.  **P.4.6B.3** Develop and use models to communicate how light travels and behaves when it strikes an object, including reflection, refraction, and absorption.  **P.4.6B.4** Plan and conduct scientific investigations to explain how light behaves when it strikes transparent, translucent, and opaque materials. | **EMBEDDED SCIENCE and ENGINEERING PRACTICES**   * Ask Question and Define Problems * Develop and Use Models * Plan and Conduct Investigations * Engage in Scientific Argument from Evidence * Obtain, Evaluate, and Communicate Information   **EMBEDDED CROSSCUTTING CONCEPTS**   * Patterns * Cause and Effect *(Mechanism and Explanation)* * Energy and Matter *(Flows, Cycles, Conservation)* * Stability and Change | Absorption  Light Energy  Material  Model  Object  Opaque  Reflection  Refraction  Transparent  Translucent |

| **TERM 2** | | | |
| --- | --- | --- | --- |
| **UNIT OF STUDY**  (REAL-WORLD CONNECTIONS and PHENOMENA)  **q** | **MS CCR STANDARDS q** | **SCIENCE AND ENGINEERING PRACTICES  SCIENCE CROSSCUTTING CONCEPTS**  **q** | **VOCABULARY TERMS** CORE ACADEMIC  **q** |
| **HEIRARCHAL ORGANIZATION:**  **Human Organ Systems**    **REAL-WORLD CONNECTIONS and PHENOMENA**   * Research and discuss the condition where organs are outside of the body and how does this affect organ function. * Observe examples of artificial organs and compare how they function to how real organs function. | **L.4.1 Students will demonstrate an understanding of the organization, functions, and interconnections of the major human body systems.**  **L.4.1.1** Use technology or other resources to research and discover general system function (e.g., machines, water cycle) as they relate to human organ systems and identify organs that work together to create organ systems.  **L 4.1.2** Obtain and communicate data to describe patterns that indicate the nature of relationships between human organ systems, which interact with one another to control digestion, respiration, circulation, excretion, movement, coordination, and protection from infection.  **L.4.1.3** Construct models of organ systems (e.g. circulatory, digestive, respiratory, muscular, skeletal, nervous) to demonstrate both the unique function of the system and how multiple organs and organ systems work together to accomplish more complex functions. | **EMBEDDED SCIENCE and ENGINEERING PRACTICES**   * Ask Question and Define Problems * Develop and Use Models * Analyze and Interpret Data * Obtain, Evaluate, and Communicate Information   **EMBEDDED CROSSCUTTING CONCEPTS**   * Patterns * Systems and System Models * Structure and Function | Circulatory System  Diet  Digestive System  Function  Interactions  Mechanical Energy  Movement  Muscular System  Nervous System  Organs  Respiration  Respiratory System |
| **HEIRARCHAL ORGANIZATION:**  **Maintaining Human Organ Systems**  **REAL-WORLD CONNECTIONS and PHENOMENA**   * Discuss infections such as Influenza and Covid-19, SARS, MRSA and their impacts on organ systems. * Research the impact of and issues surrounding the use of vaccines to fight diseases and infections. | **L.4.1 Students will demonstrate an understanding of the organization, functions, and interconnections of the major human body systems.**  **L.4.1.4** Research and communicate how noninfectious diseases (e.g. diabetes, heart disease) and infectious diseases (e.g. cold, flu) serve to disrupt the function of the body systems.  **L.4.1.5** Using informational text, investigate how scientific fields, medical specialties, and research methods help us find new ways to maintain a healthy body and lifestyle (e.g. diet, exercise, vaccines, and mental health). | **EMBEDDED SCIENCE and ENGINEERING PRACTICES**   * Ask Question and Define Problems * Obtain, Evaluate, and Communicate Information   **EMBEDDED CROSSCUTTING CONCEPTS**   * Patterns * Cause and Effect *(Mechanism and Explanation)* * Structure and Function * Stability and Change | Diet  Exercise  Function  Interactions  Movement  Nervous System  Organs  Respiration |
| **REPRODUCTION and HEREDITY:**  **Life Cycles**  **REAL-WORLD CONNECTIONS and PHENOMENA**   * Explore the differences between annual, perennials, and biennial flowers. * Research the life cycle of gastric brooding frogs. | **L.4.2 Students will demonstrate an understanding of life cycles, including familiar plants and animals (e.g., reptiles, amphibians, or birds).**  **L.4.2.1** Compare and contrast life cycles of familiar plants and animals.  **L.4.2.2** Develop and use models to explain the unique and diverse life cycles of organisms other than humans (e.g., flowering plants, frogs, or butterflies) including commonalities (e.g., birth, growth, reproduction, or death). | **EMBEDDED SCIENCE and ENGINEERING PRACTICES**   * Develop and Use Models * Obtain, Evaluate, and Communicate Information   **EMBEDDED CROSSCUTTING CONCEPTS**   * Patterns * Cause and Effect *(Mechanism and Explanation)* * Energy and Matter *(Flows, Cycles, Conservation)* * Stability and Change | Amphibian  Diversity  Flowering Plants  Growth  Life Cycles  Plant  Reproduction  Reptile |

| **TERM 3** | | | |
| --- | --- | --- | --- |
| **UNIT OF STUDY**  (REAL-WORLD CONNECTIONS and PHENOMENA)  **q** | **MS CCR STANDARDS q** | **SCIENCE AND ENGINEERING PRACTICES  SCIENCE CROSSCUTTING CONCEPTS**  **q** | **VOCABULARY TERMS** CORE ACADEMIC  **q** |
| **EARTH’S SYSTEMS and CYCLES:**  **The Water Cycle**  **REAL-WORLD CONNECTIONS AND PHENOMENA**   * Discuss and examine conditions that result in areas of drought. * Examine flooding that results from stormwater runoff and how this affects various areas in our state. | **E.4.9A Students will demonstrate an understanding of how the water cycle is propelled by the sun’s energy.**  **E.4.9A.1** Develop and use models to explain how the sun’s energy drives the water cycle. (e.g., evaporation, condensation, precipitation, transpiration, runoff, and groundwater). | **EMBEDDED SCIENCE and ENGINEERING PRACTICES**   * Ask Question and Define Problems * Develop and Use Models   **EMBEDDED CROSSCUTTING CONCEPTS**   * Patterns * Cause and Effect *(Mechanism and Explanation)* * Systems and System Models * Energy and Matter *(Flows, Cycles, Conservation)* * Stability and Change | Condensation  Energy  Evaporation  Precipitation  Runoff  Sun  Water Cycle |
| **EARTH’S SYSTEMS and CYCLES:**  **Weather and Climate Patterns**  **REAL-WORLD CONNECTIONS AND PHENOMENA**   * Research the relationship between humidity and rain making daily recordings * Explore factors that affect climate and make a graphical representation of the local climate. * Predict weather and climate based on observed cloud formations and compare predictions to local weather reports. | **E.4.9B Students will demonstrate an understanding of weather and climate patterns.**  **E.4.9B.1** Analyze and interpret data (e.g., temperature, precipitation, wind speed/direction, relative humidity, or cloud types) to predict changes in weather over time.  **E.4.9B.2** Construct explanations about regional climate differences by analyzing maps and long-term data from various regions.  **E.4.9B.3** Design weather instruments utilized to measure weather conditions (e.g., barometer, hygrometer, rain gauge, anemometer, or wind vane). \* **All SEPs and CCCs are applicable**  Use an engineering design process to define the problem, design, construct, evaluate, and improve the weather instrument. | **EMBEDDED SCIENCE and ENGINEERING PRACTICES**   * Ask Question and Define Problems * Analyze and Interpret Data * Obtain, Evaluate, and Communicate Information   **EMBEDDED CROSSCUTTING CONCEPTS**   * Patterns * Cause and Effect *(Mechanism and Explanation)* * Energy and Matter *(Flows, Cycles, Conservation)* * Stability and Change | Anemometer  Barometer  Climate  Map  Measure  Precipitation  Rain Gauge  Regional  Temperature  Weather instruments  Weather Patterns  Wind Vane |
| **EARTH’S SYSTEMS and CYCLES:**  **Natural Processes and Features**  **REAL-WORLD CONNECTIONS AND PHENOMENA**   * Research the occurrence and the impacts of earthquakes in Mississippi. * Research the impact of deteriorating estuaries along the MS coastal areas on local economies. | **E.4.9C Students will demonstrate an understanding of how natural processes and human activities affect the features of Earth’s landforms and oceans.**  **E.4.9C.1** Analyze and interpret data to describe and predict how natural processes (e.g., weathering, erosion, deposition, earthquakes, tsunamis, hurricanes, or storms) affect Earth’s surface.  **E.4.9C.2** Develop and use models of natural processes to explain the effect of the movement of water on the ocean shore zone, including beaches, barrier islands, estuaries, and inlets (e.g., marshes, bays, lagoons, fjord, or sound). | **EMBEDDED SCIENCE and ENGINEERING PRACTICES**   * Ask Question and Define Problems * Develop and Use Models * Analyze and Interpret Data   **EMBEDDED CROSSCUTTING CONCEPTS**   * Patterns * Cause and Effect *(Mechanism and Explanation)* * Systems and System Models * Energy and Matter *(Flows, Cycles, Conservation)* * Stability and Change | Deposition  Earthquake  Erosion  Hurricane  Landform  Marsh/Swamp  Tsunami  Weathering |

| **TERM 4** | | | |
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| **UNIT OF STUDY**  (REAL-WORLD CONNECTIONS and PHENOMENA)  **q** | **MS CCR STANDARDS q** | **SCIENCE AND ENGINEERING PRACTICES  SCIENCE CROSSCUTTING CONCEPTS**  **q** | **VOCABULARY TERMS** CORE ACADEMIC  **q** |
| **EARTH’S SYSTEMS and CYCLES:**  **Natural Processes and Features**  **REAL-WORLD CONNECTIONS AND PHENOMENA**   * Examine the lasting impact of the BP Oil spill in the MS Gulf Coast and resulting restoration efforts. * Research storm chasing and discuss how knowledge of a storm’s behavior shapes how humans respond to storms. | **E.4.9C Students will demonstrate an understanding of how natural processes and human activities affect the features of Earth’s landforms and oceans.**  **E.4.9C.3** Construct scientific arguments from evidence to support claims that human activities, such as conservation efforts or pollution affect the land, oceans, and atmosphere of Earth.  **E.4.9C.4** Research and explain how systems (i.e., the atmosphere, geosphere, and/or hydrosphere), interact and support life in the biosphere.  **E.4.9C.5** Obtain and communicate information about severe weather phenomena (e.g., thunderstorms, hurricanes, or tornadoes) to explain steps humans can take to reduce the impact of severe weather events. | **EMBEDDED SCIENCE and ENGINEERING PRACTICES**   * Ask Question and Define Problems * Analyze and Interpret Data * Plan and Conduct Investigations * Engage in Scientific Argument from Evidence * Obtain, Evaluate, and Communicate Information   **EMBEDDED CROSSCUTTING CONCEPTS**   * Patterns * Cause and Effect *(Mechanism and Explanation)* * Systems and System Models * Energy and Matter *(Flows, Cycles, Conservation)* * Stability and Change | Atmosphere  Biosphere  Conservation  Geosphere  Hurricane  Hydrosphere  Pollution  Severe Weather  Tornado  Weather |
| **EARTH’S SYSTEMS and CYCLES:**  **Energy Source and Human Impacts**  **REAL-WORLD CONNECTIONS AND PHENOMENA**   * Explore the economic impact of using solar panels vs. traditional forms of generated energy. * Research sources of hydroelectric power generation in United States. Investigate the possibility of this clean energy being implemented in Mississippi. | **E.4.10 Students will demonstrate an understanding of the various sources of energy used for human needs along with their effectiveness and possible impacts.**  **E.4.10.1** Organize simple data sets to compare energy and pollution output of various traditional, non-renewable resources (e.g. coal, crude oil, wood).  **E.4.10.2** Use technology or informational text to investigate, evaluate, and communicate various forms of clean energy generation. | **EMBEDDED SCIENCE and ENGINEERING PRACTICES**   * Ask Question and Define Problems * Analyze and Interpret Data * Plan and Conduct Investigations * Obtain, Evaluate, and Communicate Information   **EMBEDDED CROSSCUTTING CONCEPTS**   * Patterns * Cause and Effect *(Mechanism and Explanation)* * Systems and System Models * Energy and Matter *(Flows, Cycles, Conservation)* * Stability and Change | Coal  Energy  Nonrenewable Resources  Impact  Needs |

1. https://tntp.org/assets/documents/TNTP\_The-Opportunity-Myth\_Web.pdf [↑](#footnote-ref-2)