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**SUGGESTED**

**INSTRUCTIONAL PLANNING GUIDE**

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

**q SCIENCE**

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| **GRADE 2** |

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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)
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| **GRADE 2 SCIENCE****THEME: System, Order, and Organization** |
| --- |
| **UNIT OF STUDY**(REAL-WORLD CONNECTIONS and PHENOMENA)**q** | **SCIENCE FOUNDATION STANDARDSq** | **SCIENCE AND ENGINEERING PRACTICES SCIENCE CROSSCUTTING CONCEPTS** **q** | **VOCABULARY TERMS**CORE ACADEMIC **q** |
| **COURSE INTRODUCTION**In Grade 2, students organize plants and animals according to their physical characteristics and recognize that living things are part of a larger system. Students construct models showing the characteristics of animals that help them survive in their environments, and construct scientific arguments explaining how animals can make major and minor changes in the environment. Students conduct investigations to find and report evidence where plants and animals compete or cooperate with other plants in a system before identifying the adaptations that help them survive in that environment. Students investigate the relationship between friction and the motion of an object by changing the strength, direction, and speed of pushes and pulls. Students use an engineering design process to construct a ramp that will reduce or increase friction to solve a problem, such as rolling a baby carriage safely down a steep ramp. | **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 EMBEDDED 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
* Construct Explanations and Design Solutions
* Obtain, Evaluate, and Communicate Information

**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 ChangeConcepts DataDependent Variable Engineering Evaluate Evidence Gram Independent Variable InterpretInvestigationLiter Meter Observation Patterns QuantityScience  SI Units of Measurement Stability  |

| **TERM 1** |
| --- |
| **UNIT OF STUDY**(REAL-WORLD CONNECTIONS and PHENOMENA)**q** | **MS CCR STANDARDSq** | **SCIENCE AND ENGINEERING PRACTICES SCIENCE CROSSCUTTING CONCEPTS** **q** | **VOCABULARY TERMS**CORE ACADEMIC **q** |
| **HEIRARCHAL ORGANIZATION:****Classifying Animals****REAL-WORLD CONNECTIONS and PHENOMENA*** Observe various types of saltwater fish paying specific attention to their physical features like the lionfish.
* Research and discuss physical features of native frog species to MS and compare them to other native animals of similar kind.
 | **L.2.1 Students will demonstrate an understanding of the classification of animals based on physical characteristics.****L.2.1.1** Compare and sort groups of animals with backbones (vertebrates) from groups of animals without backbones (invertebrates).**L.2.1.2** Classify vertebrates (mammals, fish, birds, amphibians, and reptiles) based on their physical characteristics.**L.2.1.3** Compare and contrast physical characteristics that distinguish classes of vertebrates (i.e., reptiles compared to amphibians).**L.2.1.4** Construct a scientific argument for classifying vertebrates that have unusual characteristics, such as bats, penguins, snakes, salamanders, dolphins, and duck-billed platypuses (i.e., bats have wings, yet they are mammals). | **EMBEDDED SCIENCE and ENGINEERING PRACTICES*** Ask Question and Define Problems
* Develop and Use Models
* Analyze and Interpret Data
* Engage in Scientific Argument from Evidence
* Obtain, Evaluate, and Communicate Information

**EMBEDDED CROSSCUTTING CONCEPTS*** Patterns
* Cause and Effect *(Mechanism and Explanation)*
* Structure and Function
 | AmphibianBirdCharacteristicsClassifyCompareInvertebrateMammalPhysical CharacteristicsReptilesSort |
| **REPRODUCTION and HEREDITY:****Life Cycles****REAL-WORLD CONNECTIONS and PHENOMENA*** Research and examine the life cycle of native amphibians.
* Research and examine the life cycle of various kinds of trees and determine how to provide evidence of growth and determine the age of trees.
 | **L.2.2 Students will demonstrate an understanding of how living things change in form as they go through the general stages of a life cycle.****L.2.2.1** Use observations through informational texts and other media to observe the different stages of the life cycle of trees (i.e., pines, oaks) to construct explanations and compare how trees change and grow over time.**L.2.2.2** Construct explanations using first-hand observations or other media to describe the life cycle of an amphibian (birth, growth/development, reproduction, and death). Communicate findings. | **EMBEDDED SCIENCE and ENGINEERING PRACTICES*** Ask Question and Define Problems
* Develop and Use Models
* 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)*
* Structure and Function
* Stability and Change
 | AmphibianCommunicationCompareDescribeFormGrowGrowthLife CyclesLivingObserveReproduce |
| **ECOLOGY and INTERDEPENDENCE:****Living Things and the Environment****REAL-WORLD CONNECTIONS and PHENOMENA*** Discuss what happens to deer in MS when humans remove the natural living spaces like forest and other wooded areas.
* Research and discuss how a beaver’s dam impacts the local ecosystem.
 | **L.2.3A Students will demonstrate an understanding of the interdependence of living things and the environment in which they live.****L.2.3A.1** Evaluate and communicate findings from informational text or other media to describe how animals change and respond to rapid or slow changes in their environment (fire, pollution, changes in tide, availability of food/water).**L.2.3A.2** Construct scientific arguments to explain how animals can make major changes (e.g., beaver dams obstruct streams, or large deer populations destroying crops) and minor changes to their environments (e.g., ant hills, crawfish burrows, mole tunnels). Communicate findings. | **EMBEDDED SCIENCE and ENGINEERING PRACTICES*** Ask Question and Define Problems
* Develop and Use Models
* 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
 | AnimalEnvironmentFoodInterdependencyLiving OrganismPlantSpace |

| **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** |
| **ECOLOGY and INTERDEPENDENCE:****Interactions of Living Things****REAL-WORLD CONNECTIONS and PHENOMENA*** Watch videos of various predator-prey relationships, i.e. lions hunting, large birds feeding on smaller birds.
* Examine and discuss the mating habits of various herds of animals paying attention to the behaviors of males and how animals protect their space against other species of animals. (Lions, Dogs, Cats, etc.)
 | **L.2.3B Students will demonstrate an understanding of the interdependence of living things.****L.2.3B.1** Evaluate and communicate findings from informational text or other media to describe and to compare how animals interact with other animals and plants in the environment (i.e., predator-prey relationships, herbivore, carnivore, omnivore).**L.2.3B.2** Conduct an investigation to find evidence where plants and animals compete or cooperate with other plants and animals for food or space. Present findings (i.e., using technology or models). | **EMBEDDED SCIENCE and ENGINEERING PRACTICES*** Ask Question and Define Problems
* Plan and Conduct Investigations
* Engage in Scientific Argument from Evidence
* Obtain, Evaluate, and Communicate Information

**EMBEDDED CROSSCUTTING CONCEPTS*** Patterns
* Energy and Matter *(Flows, Cycles, Conservation)*
* Structure and Function
* Stability and Change
 | AnimalCarnivoreEnvironmentFoodHerbivoreInterdependencyLiving OrganismOmnivorePlantPredatorPreySpace |
| **ADAPTATIONAS and DIVERSITY:****Plant and Animal Adaptations****REAL-WORLD CONNECTIONS and PHENOMENA*** Discuss how a polar bear is adapted to survive in the cold polar regions. Discuss how desert plants can survive very hot conditions.
* Explain how using wax on cars can make parts of the car virtually waterproof and how this compares to some plants and animals.
 | **L.2.4 Students will demonstrate an understanding of the ways animals adapt to their environment in order to survive.****L.2.4.1** Evaluate and communicate findings from informational text or other media to describe how plants and animals use adaptations to survive (e.g., ducks use webbed feet to swim in lakes and ponds, cacti have waxy coatings and spines to grow in the desert) in distinct environments (e.g., polar lands, saltwater and freshwater, desert, rainforest, woodlands).**L.2.4.2** Create a solution exemplified by animal adaptations to solve a human problem in a specific environment (e.g., snowshoes are like hare’s feet or flippers are like duck's feet). Use an engineering design process to define the problem, design, construct, evaluate, and improve the solution. \* **All SEPs and CCCs are applicable.** | **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)*
* Structure and Function
* Stability and Change
 | AdaptationChangeCharacteristicsEnvironmentPlantProblemSurvive |

| **TERM 3** |
| --- |
| **UNIT OF STUDY**(REAL-WORLD CONNECTIONS and PHENOMENA)**q** | **MS CCR STANDARDSq** | **SCIENCE AND ENGINEERING PRACTICES SCIENCE CROSSCUTTING CONCEPTS** **q** | CORE ACADEMIC **VOCABULARY TERMSq** |
| **EARTH and the UNIVERSE:****The Sun, The Moon, and The Stars****REAL-WORLD CONNECTIONS and PHENOMENA*** Use various instruments and media to create star maps and compare to patterns of historical and archived data.
* With various media and personal observations, describe different kinds of sunsets and sunrises.
* Journal the phases of the moon to determine possible patterns.
 | **E.2.8 Students will demonstrate an understanding of the appearance, movements, and patterns of the sun, moon, and stars.****E.2.8.1** Develop evidence-based arguments claiming that stars can be observed in the night sky and the Sun is the Earth’s closest star.**E.2.8.2** With teacher guidance, observe, describe, and predict the seasonal patterns of sunrise and sunset. Collect, represent, and interpret data from internet sources to communicate findings.**E.2.8.3** Observe and compare the details in images of the moon and planets using the perspective of the naked eye, telescopes, and data from space exploration.**E.2.8.5** Use informational text and other media to observe, describe and predict the visual patterns of motion of the Sun (sunrise, sunset) and Moon (phases). | **EMBEDDED SCIENCE and ENGINEERING PRACTICES*** Ask Question and Define Problems
* Develop and Use Models
* 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
 | AppearanceEarthEyesMoonMotionObservePatternSeasonSkySpaceStarSunSunriseSunset |
| **EARTH and the UNIVERSE:****Exploring Space****REAL-WORLD CONNECTIONS and PHENOMENA*** Examine media, past and present, from space exploration devices and NASA missions.
* Research and discuss information on the results from work done at observatories across the country.
 | **E.2.8 Students will demonstrate an understanding of the appearance, movements, and patterns of the sun, moon, and stars.****E.2.8.4** With teacher support, gain an understanding that scientists are humans who use observations and experiments to learn about space. Obtain information from informational text or other media about scientists who have made important discoveries about objects in space (e.g., Galileo Galilei, Johannes Kepler, George Ellery Hale, Jill Tarter) or the development of technologies (e.g., various telescopes and detection devices, computer modeling, and space exploration).**E.2.8.6** Create a model that will demonstrate the observable pattern of motion of the Sun or Moon. Use an engineering design process to define the problem, design, construct, evaluate, and improvethe model. \* **All SEPs and CCCs are applicable.** | **EMBEDDED SCIENCE and ENGINEERING PRACTICES*** Ask Question and Define Problems
* Develop and Use Models
* Analyze and Interpret Data
* Engage in Scientific Argument from Evidence
* Obtain, Evaluate, and Communicate Information

**EMBEDDED CROSSCUTTING CONCEPTS*** Patterns
* Cause and Effect *(Mechanism and Explanation)*
* Scale, Proportion, and Quantity
* Systems and System Models
* Stability and Change
 | AppearanceEarthEyesMoonMotionPatternSeasonSkySpaceStarSunSunriseSunset |
| **EARTH’S RESOURCES:****Humans and Earth’s Resources****REAL-WORLD CONNECTIONS and PHENOMENA*** Discuss with local experts the importance of properly caring for soils in farmlands and how to keep soil healthy.
* Observe the process of making gasoline for human consumption paying attention to locating crude oil to the refinery process.
* Locate local banks, hills, ditches as areas where soil erosion takes place. Capture images and discuss the impact of continued erosion on the local community.
 | **E.2.10 Students will demonstrate an understanding of how humans use Earth’s resources.****E.2.10.1** Use informational text, other media, and first-hand observations to investigate, analyze and compare the properties of Earth materials (including rocks, soils, sand, and water).**E.2.10.2** Conduct an investigation to identify and classify everyday objects that are resources from the Earth (e.g., drinking water, granite countertops, clay dishes, wood furniture, or gas grill).Classify these objects as renewable and nonrenewable resources.**E.2.10.3** Use informational text and other media to summarize and communicate how Earth materials are used (e.g., soil and water to grow plants; rocks to make roads, walls or building; or sand to make glass).**E.2.10.4** Use informational text, other media, and first-hand observations to investigate and communicate the process and consequences of soil erosion.**E.2.10.5** With teacher guidance, investigate possible solutions to prevent or repair soil erosion. | **EMBEDDED SCIENCE and ENGINEERING PRACTICES*** Ask Question and Define Problems
* Plan and Conduct Investigations
* Obtain, Evaluate, and Communicate Information

**EMBEDDED CROSSCUTTING CONCEPTS** * Cause and Effect *(Mechanism and Explanation)*
* Energy and Matter *(Flows, Cycles, Conservation)*
* Structure and Function
* Stability and Change
 | EarthErosionHumansMaterialNonrenewable ResourcesObjectPropertyResourcesRockSandSoilWater |

| **TERM 4** |
| --- |
| **UNIT OF STUDY**(REAL-WORLD CONNECTIONS and PHENOMENA)**q** | **MS CCR STANDARDSq** | **SCIENCE AND ENGINEERING PRACTICES SCIENCE CROSSCUTTING CONCEPTS** **q** | **VOCABULARY TERMS**CORE ACADEMIC **q** |
| **ORGANIZAION of MATTER and****CHEMICAL INTERACTIONA:** **Properties of Matter****REAL-WORLD CONNECTIONS and PHENOMENA*** Observe dry ice and discuss the phase changes. Discuss possible properties that may cause this phenomenon.
* Research and discuss the importance of precious metals based on their physical properties. Discuss the various industries and services where these metals may be most useful.
 | **P.2.5 Students will demonstrate an understanding of the properties of matter.****P.2.5.1** Conduct a structured investigation to collect, represent, and analyze categorical data to classify matter as solid, liquid, or gas. Report findings and describe a variety of materials according to observable physical properties (e.g., size, color, texture, opacity, solubility).**P.2.5.2** Compare and measure the length of solid objects using technology and mathematical representations. Analyze and communicate findings.**P.2.5.3** Compare the weight of solid objects and the volume of liquid objects. Analyze and communicate findings.**P.2.5.4** Construct scientific arguments to support claims that some changes to matter caused by heating can be reversed, and some changes cannot be reversed. | **EMBEDDED 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

**EMBEDDED CROSSCUTTING CONCEPTS*** Cause and Effect *(Mechanism and Explanation)*
* Systems and System Models
* Structure and Function
* Stability and Change
 | ClassifyColorDataGasHeatLengthLiquidMatterPropertySizeSolidTextureVolumeWeight |
| **MOTION FORCE ENERGY:** **Forces and Motion****REAL-WORLD CONNECTIONS and PHENOMENA*** Observe how fires can be started using friction as in rubbing two sticks together.
* Observe people playing the game, Tug-of-War and discuss the role of the pulling force on the outcome of the game.
 | **P.2.6 Students will demonstrate an understanding of how the motion of objects is affected by pushes, pulls, and friction on an object.****P.2.6.1** Conduct a structured investigation to collect, represent, and analyze data from observations and measurements to demonstrate the effects of pushes and pulls with different strengths and directions. Communicate findings (e.g., models or technology).**P.2.6.2** Generate and answer questions about the relationship between (1) friction and the motion of objects and (2) friction and the production of heat.**P.2.6.3** Develop a plan to change the force (push or pull) of friction to solve a human problem (e.g., improve the ride on a playground slide or make a toy car or truck go faster). Use an engineering design process to define the problem, design, construct, evaluate, and improve the plan. \* **All SEPs and CCCs are applicable.** | **EMBEDDED 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
* 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
 | DataForceFrictionHeatMeasureMotionObjectProblemPullPush |

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