****



**SUGGESTED**

**INSTRUCTIONAL PLANNING GUIDE**

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

**q SCIENCE**

|  |
| --- |
| **GRADE 7** |

The Mississippi State Board of Education, the Mississippi Department of Education, the Mississippi School for the Arts, the Mississippi School for the Blind, the Mississippi School for the Deaf, and the Mississippi School for Mathematics and Science do not discriminate on the basis of race, sex, color, religion, national origin, age, or disability in the provision of educational programs and services or employment opportunities and benefits. The following office has been designated to handle inquiries and complaints regarding the non‑discrimination policies of the above mentioned entities: Director, Office of Human Resources, Mississippi Department of Education, 359 North West Street, P.O. Box 771, Suite 203, Jackson, MS  39205‑0771,  (601)359-3513.

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

P. O. Box 771

Jackson, Mississippi 39205-0771

(601) 359-3513

[www.mdek12.org](http://www.mdek12.org)

|  |
| --- |
| **MISSISSIPPI DEPARTMENT OF EDUCATION**  |
| **Carey M. Wright, Ed.D.**State Superintendent of Education |
| **Nathan Oakley, Ph.D.** Chief Academic Officer |
| **Wendy Clemons** Executive Director, Office of Secondary Education/Dropout Prevention & Professional Development | **Tenette Smith, Ed. D.**Executive Director, Office of Elementary Education and Reading |
| **Marla Davis, Ph.D.**State Director of Curriculum and Instruction | **Jackie Sampsell, Ed.D.**State Assessment Director |
| **Kevin L. Gaylor, Ed. D.**K-12 Science Content Director | **Tanjanikia McKinney**  Professional Development Coordinator, Science |
|  |  |
|  |  |
| **SPECIAL ACKNOWLEDGEMENTS**Bailey Education GroupThe Kirkland Group |

**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.

|  |  |  |  |
| --- | --- | --- | --- |
| **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 7 SCIENCE****THEME: Systems and Cycles** |
| --- |
| **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**Grade 7 students relate systems and cycles through analyzing various small scale and large-scale phenomena. Using scientific methods, students can connect Earth’s systems with the flow of energy in supporting living and nonliving organisms and specific interactions of matter. Students use multiple investigative methods todiscover evidence, make claims, and generate explanations about systems and cycles that take place on Earth. A focus on organization and cycles of matter requires students to apply skills and make connections across genres of science since most complex cycles have multiple interactions. | **FOUNDATION STANDARDS*** 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
* Construct Explanations and Design Solutions
* 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 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** |
| **ORGANIZATION OF MATTER and CHEMICAL INTERACTIONS:****Properties of Matter****REAL-WORLD CONNECTIONS and PHENOMENA*** Research and discuss fire-resistant materials (Kevlar) and their properties and uses.
* Investigate the use of rust and corrosion resistant materials and what factors contribute to those properties.
 | **P.7.5A Students will demonstrate an understanding of the physical and chemical properties of matter.** **P.7.5A.1** Collect and evaluate qualitative data to describe substances using physical properties (state, boiling/melting point, density, heat/electrical conductivity, color, and magnetic properties). **P.7.5A.2** Analyze and interpret qualitative data to describe substances using chemical properties (the ability to burn or rust). **P.7.5A.3** Compare and contrast chemical and physical properties (e.g., combustion, oxidation, pH, solubility, reaction with water).**P.7.5C.3** Collect, organize, and interpret data from investigations to identify and analyze the relationships between the physical and chemical properties of elements, atoms, molecules, compounds, solutions, and mixtures. | **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)
* Structure and Function
* Stability and Change
 | Boiling PointChemical ChangeChemical PropertyConductivityDensityMatterMelting PointPhysical ChangePhysical PropertySolubilitySubstance |
| **ORGANIZATION OF MATTER and CHEMICAL INTERACTIONS:****Atomic Structure****REAL-WORLD CONNECTIONS AND PHENOMENA*** Research and discuss atomic structure and weapons development (Atomic Bombs).
* Explore the use of particle accelerators in the medical field.
 | **P.7.5C Students will demonstrate an understanding of the proper use of the periodic table to predict and identify elemental properties and how elements interact.** **P.7.5C.1** Develop and use models that explain the structure of an atom. **P.7.5C.2** Use informational text to sequence the major discoveries leading to the current atomic model.  | **EMBEDDED SCIENCE and ENGINEERING PRACTICES** * Ask Question and Define Problems
* Develop and Use Models
* Engage in Scientific Argument from Evidence
* Construct Explanations and Design Solutions
* Obtain, Evaluate, and Communicate Information

**EMBEDDED CROSSCUTTING CONCEPTS*** Patterns
* Scale, Proportion, and Quantity
* Systems and System Models
* Structure and Function
* Stability and Change
 | AtomBohr ModelElectron CloudElectronsNeutronsNuclear Atomic ModelNucleusOrbitals*Planetary Atomic Model**Plum Pudding Atomic Model*Protons*Solid Sphere Atomic Model* |
| **ORGANIZATION of MATTER and CHEMICAL INTERACTIONS:****States and Behaviors of Matter****REAL-WORLD CONNECTIONS and PHENOMENA*** Identify and discuss elements that are important to sustaining human life (carbon, oxygen, nitrogen, etc.).
* Research automobile manufacturing and how various elements have advanced this process.
 | **P.7.5B Students will demonstrate an understanding about the effects of temperature and pressure on physical state, molecular motion, and molecular interactions.****P.7.5B.1** Make predictions about the effect of temperature and pressure on the relative motion of atoms and molecules (speed, expansion, and condensation) relative to recent breakthroughs in polymer and materials science (e.g. self-healing protective films, silicone computer processors,pervious/porous concrete).**P.7.5B.2** Use evidence from multiple scientific investigations to communicate the relationships among pressure, volume, density, and temperature of a gas.**P.7.5B.3** Ask questions to explain how density of matter (observable in various objects) is affected by a change in heat and/or pressure. | **EMBEDDED SCIENCE and ENGINEERING PRACTICES** * Analyze and Interpret Data
* Plan and Conduct Investigations
* Engage in Scientific Argument from Evidence
* Construct Explanations and Design Solutions
* Obtain, Evaluate, and Communicate Information

**EMBEDDED CROSSCUTTING CONCEPTS*** Cause and Effect *(Mechanism and Explanation)*
* Structure and Function
* Stability and Change
 | CondensationDensityExpansionGasLiquidPressureSolidSpeedStates of MatterTemperatureVolume |
| **ORGANIZATION of MATTER and CHEMICAL INTERACTIONS:****Periodic Trends and Properties****REAL-WORLD CONNECTIONS and PHENOMENA*** Investigate how elements are combined to produce goods for human use.
 | **P.7.5C Students will demonstrate an understanding of the proper use of the periodic table to predict and identify elemental properties and how elements interact.****P.7.5C.4** Predict the properties and interactions of elements using the periodic table (metals, non-metals, reactivity, and conductors).**P.7.5C.3** Collect, organize, and interpret data from investigations to identify and analyze the relationships between the physical and chemical properties of elements, atoms, molecules, compounds, solutions, and mixtures. | **EMBEDDED SCIENCE and ENGINEERING PRACTICES*** Analyze and Interpret Data
* Plan and Conduct Investigations
* Construct Explanations and Design Solutions

**EMBEDDED CROSSCUTTING CONCEPTS*** Patterns
* Structure and Function
* Stability and Change
 | Atomic NumberGroupsMetalsNon-MetalsPeriodPeriodic PropertyPeriodic TableReactivity |

| **TERM 2** |
| --- |
| **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** |
| **ORGANIZATION of MATTER and CHEMICAL INTERACTIONS:****Chemical Bonding****REAL-WORLD CONNECTIONS and PHENOMENA*** Investigate protein synthesis in living organisms (bonds with amino acids).
* Research polymers and how they formed and their uses in daily life.
 | **P.7.5C Students will demonstrate an understanding of the proper use of the periodic table to predict and identify elemental properties and how elements interact.****P.7.5C.6** Using the periodic table, make predictions to explain how bonds (ionic and covalent) form between groups of elements (e.g., oxygen gas, ozone, water, table salt, and methane).**P.7.5C.5** Describe concepts used to construct chemical formulas (e.g. CH4, H20) to determine the number of atoms in a chemical formula.  | **EMBEDDED SCIENCE and ENGINEERING PRACTICES** * Ask Questions and Define Problems
* 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
 | Chemical BondMetallic BondIonic BondCovalent BondMetalNon-MetalValence ElectronsIons (Cation, Anion) |
| **ORGANIZATION of MATTER and CHEMICAL INTERACTIONS:****Chemical Reactions****REAL-WORLD CONNECTIONS and PHENOMENA*** Investigating and discuss the result of copper reacting with oxygen. Why did the MS coliseum turn green?
* Review and study the chemical reactions behind photosynthesis and cellular respiration and their importance.
 | **P.7.5D Students will demonstrate an understanding of chemical formulas and common chemical substances to predict the types of reactions and possible outcomes of the reactions.****P.7.5D.1** Analyze evidence from scientific investigations to predict likely outcomes of chemical reactions. **P.7.5D.2** Design and conduct scientific investigations to support evidence that chemical reactions (e.g., cooking, combustion, rusting, decomposition, photosynthesis, and cellular respiration) have occurred. **P.7.5D.3** Collect, organize, and interpret data using various tools (e.g., litmus paper, pH paper, cabbage juice) regarding neutralization of acids and bases using common substances. **P.7.5D.4** Build a model to explain that chemical reactions can store (formation of bonds) or release energy (breaking of bonds). | **EMBEDDED SCIENCE and ENGINEERING PRACTICES*** Ask Questions and Define Problems
* Develop and Use Models
* Analyze and Interpret Data
* Plan and Conduct Investigations
* Engage in Scientific Argument from Evidence

**EMBEDDED CROSSCUTTING CONCEPTS*** Cause and Effect (Mechanism and Explanation)
* Systems and System Models
* Energy and Matter (Flows, Cycles, Conservation)
* Stability and Change
 | AcidBaseCombustionDecomposition*Double Replacement*NeutralizationOxidationPrecipitateProducts ReactantsSingle ReplacementSynthesis ReactionYield |
| **ORGANIZATION of MATTER and CHEMICAL INTERACTIONS:****Conservation of Matter and Mass****REAL-WORLD CONNECTIONS and PHENOMENA*** Observe reaction (baking soda and vinegar with balloon and flask) to demonstrate conservation of mass.
* Observe the same reaction without the balloon covering flask. Compare total masses of each system.
 | **P.7.5E Students will demonstrate an understanding of the law of conservation of mass.****P.7.5E.1** Conduct simple scientific investigations to show that total mass is not altered during a chemical reaction in a closed system. Compare results of investigations to Antoine-Laurent Lavoisier’s discovery of the law of conservation of mass.**P.7.5E.2** Analyze data from investigations to explain why the total mass of the product in an open system appears to be less than the mass of reactants.**P.7.5E.3** Compare and contrast balanced and unbalanced chemical equations to demonstrate the number of atoms does not change in the reaction. | **EMBEDDED SCIENCE and ENGINEERING PRACTICES*** Ask Questions and Define Problems
* Analyze and Interpret Data
* Plan and Conduct Investigations
* Use Mathematical and Computational Thinking

**EMBEDDED CROSSCUTTING CONCEPTS*** Cause and Effect *(Mechanism and Explanation)*
* Systems and System Models
* Energy and Matter *(Flows, Cycles, Conservation)*
* Stability and Change
 | Coefficient*Law of Conservation of Mass**Law of Conservation of Matter*ProductReactantYield |

| **TERM 3** |
| --- |
| **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** |
|  **ECOLOGY and INTERDEPENDENCE:****Matter Cycles****REAL-WORLD CONNECTIONS and PHENOMENA*** Examine what possible impacts deforestation may have on the water cycle.
* Research and discuss how nitrogen-based fertilizers affect coastal oxygen levels.
 | **L.7.3 Students will demonstrate an understanding of the importance that matter cycles between living and nonliving parts of the ecosystem to sustain life on Earth.****L.7.3.1** Analyze diagrams to provide evidence of the importance of the cycling of water, oxygen, carbon, and nitrogen through ecosystems to organisms.**L.7.3.4** Explain how disruptions in cycles (e.g., water, oxygen, carbon, and nitrogen) affect biodiversity and ecosystem services (e.g., water, food, and medications) which are needed to sustain human life on Earth. | **EMBEDDED SCIENCE and ENGINEERING PRACTICES*** Ask Question and Define Problems
* Develop and Use Models
* Plan and Conduct Investigations
* Analyze and Interpret Data

Construct Explanations and Design Solutions* Engage in Scientific Argument from Evidence

**EMBEDDED CROSSCUTTING CONCEPTS*** Patterns
* Cause and Effect
* System and System Models
* Energy and Matter (Flows, Cycles, Conservation)
* Stability and Change
 | AtmosphereBiodiversityBiosphereCarbon CycleCarbon Dioxide*Carbon Dioxide - Oxygen Cycle*Cellular RespirationCycle of MatterGeosphereLithosphereNitrogen CycleWater Cycle |
| **ECOLOGY and INTERDEPENDECE:****Aerobic and Anaerobic Processes****REAL-WORLD CONNECTIONS and PHENOMENA*** Research and examine how game-day meals are prepared for athletes.
* Research the idea of photosynthesis and artificial photosynthesis as means or renewable energy source.
 | **L.7.3 Students will demonstrate an understanding of the importance that matter cycles between living and nonliving parts of the ecosystem to sustain life on Earth.** **L.7.3.2** Analyze and interpret data to explain how the processes of photosynthesis, and cellular respiration (aerobic and anaerobic) work together to meet the needs of plants and animals. **L.7.3.3** Use models to describe how food molecules (carbohydrates, lipids, proteins) are processed through chemical reactions using oxygen (aerobic) to form new molecules. | **EMBEDDED SCIENCE and ENGINEERING PRACTICES*** Ask Question and Define Problems
* Develop and Use Models
* Plan and Conduct Investigations
* Analyze and Interpret Data

**EMBEDDED CROSSCUTTING CONCEPTS*** Cause and Effect (Mechanism and Explanation)
* Systems and System Models
* Energy and Matter (Flows, Cycles, Conservation)
* Stability and Change
 | Aerobic AnaerobicCarbohydratesCellular RespirationLipidsMetabolismPhotosynthesisProteins |
| **ECOLOGY and INTERDEPENDECE:****Ecosystem Sustainability****REAL-WORLD CONNECTIONS and PHENOMENA*** Research and discuss efforts to protect water systems in Mississippi. What programs are in place and their approaches?
* Discuss the importance of healthy ecosystems in the recovery process from natural disasters such as Hurricane Katrina, strong and devastating tornados, and great floods.
 | **L.7.3 Students will demonstrate an understanding of the importance that matter cycles between living and nonliving parts of the ecosystem to sustain life on Earth.****L.7.3.5** Design solutions for sustaining the health of ecosystems to maintain biodiversity and the resources needed by humans for survival (e.g., water purification, nutrient recycling, prevention of soil erosion, and prevention or management of invasive species). \***All SEPs and CCCs are applicable.** | **EMBEDDED SCIENCE and ENGINEERING PRACTICES*** Ask Question and Define Problems
* Plan and Conduct Investigations
* Analyze and Interpret Data
* Construct Explanations and Design Solutions
* Engage in Scientific Argument from Evidence

**EMBEDDED CROSSCUTTING CONCEPTS*** Patterns
* Cause and Effect (Mechanism and Explanation)
* Systems and System Models
* Energy and Matter (Flows, Cycles, Conservation)
* Stability and Change
 | BiodiversityEcosystemsSustainabilityRecyclePreventionNatural Resources |
| **EARTH’S SYSTEMS and CYCLES:****Weather Patterns and Conditions****REAL-WORLD CONNECTIONS and PHENOMENA*** Research the impact of global warming on current weather patterns and trends.
* Investigate the impacts of meteo-tsunamis on local communities commercially and ecologically.
 | **E.7.9A Students will demonstrate an understanding of how complex changes in the movement and patterns of air and water molecules caused by the sun, winds, landforms, ocean temperatures, and currents in the atmosphere are major determinants of local and global weather patterns.****E.7.9A.2** Analyze evidence to explain the weather conditions that result from the relationship between the movement of water and air masses.**E.7.9A.3** Interpret atmospheric data from satellites, radar, and weather maps to predict weather patterns and conditions.**E.7.9A.6** Research and use models to explain what type of weather (thunderstorms, hurricanes, and tornadoes) results from the movement and interactions of air masses, high- and low-pressure systems, and frontal boundaries.**E.7.9A.7** Interpret topographic maps to predict how local and regional geography affect weather patterns and make them difficult to predict. | **EMBEDDED SCIENCE and ENGINEERING PRACTICES*** Ask Question and Define Problems
* Develop and Use Models
* Plan and Conduct Investigations
* Analyze and Interpret Data
* Construct Explanations and Design Solutions

**EMBEDDED CROSSCUTTING CONCEPTS*** Patterns
* Cause and Effect (Mechanism and Explanation)
* Scale, Proportion, and Quantity
* System and System Models
* Energy and Matter (Flows, Cycles, Conservation)
* Structure and Function
* Stability and Change
 | *Air Mass* *(Low /High Pressure)*BarometerCondensationDeterminantsDew PointEvaporationExosphereFront (Warm, Cold)Frontal BoundaryGlobal Wind SystemJet StreamOzone LayerPrecipitationStratosphereTopographyTroposphereWeather System |

| **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** |
| **EARTH’S SYSTEMS and CYCLES:****Climate Changes****REAL-WORLD CONNECTIONS and PHENOMENA*** Discuss the impact of climate change on local agriculture and local economies.
* How does climate affect local construction and architectural designs?
 | **E.7.9A Students will demonstrate an understanding of how complex changes in the movement and patterns of air and water molecules caused by the sun, winds, landforms, ocean temperatures, and currents in the atmosphere are major determinants of local and global weather patterns.****E.7.9A.1** Analyze and interpret weather patterns from various regions to differentiate between weather and climate.**E.7.9A.4** Construct an explanation for how climate is determined in an area using global and surface features (e.g. latitude, elevation, shape of the land, distance from water, global winds, and ocean currents).**E.7.9A.5** Analyze models to explain the cause and effect relationship between solar energy and convection and the resulting weather patterns and climate conditions. | **EMBEDDED SCIENCE and ENGINEERING PRACTICES*** Ask Question and Define Problems
* Develop and Use Models
* Analyze and Interpret Data
* Construct Explanations and Design Solutions
* Engage in Scientific Argument from Evidence

**EMBEDDED CROSSCUTTING CONCEPTS*** Patterns
* Cause and Effect (Mechanism and Explanation)
* Scale, Proportion, and Quantity
* System and System Models
* Energy and Matter (Flows, Cycles, Conservation)
* Stability and Change
 | *Air Mass* *(Low /High Pressure)*BarometerCondensationDeterminantsDew PointEvaporationExosphereFront (Warm, Cold)Frontal BoundaryGlobal Wind SystemJet StreamOzone LayerPrecipitationStratosphereTopographyTroposphereWeather System |
| **EARTH’S SYSTEMS and CYCLES:****Human Contributions to Climate Change****REAL-WORLD CONNECTIONS and PHENOMENA*** Discuss the contribution of burning fossil fuels to notable atmospheric stress and climate changes.
* Research how to determine your carbon footprint and what you can change to help combat human contributions to climate change.
 | **E.7.9B Students will demonstrate an understanding of the relationship between natural phenomena, human activity, and global climate change.****E.7.9B.1** Read and evaluate scientific or technical information assessing the evidence and bias of each source to explain the causes and effects of climate change.**E.7.9B.2** Interpret data about the relationship between the release of carbon dioxide from burning fossil fuels into the atmosphere and the presence of greenhouse gases.**E.7.9B.3** Engage in scientific argument based on current evidence to determine whether climate change happens naturally or is being accelerated through the influence of man. | **EMBEDDED SCIENCE and ENGINEERING PRACTICES*** Ask Question and Define Problems
* Analyze and Interpret Data
* Construct Explanations and Design Solutions
* Engage in Scientific Argument from Evidence

**EMBEDDED CROSSCUTTING CONCEPTS*** Patterns
* Cause and Effect (Mechanism and Explanation)
* System and System Models
* Energy and Matter (Flows, Cycles, Conservation)

Stability and Change | ClimateExosphereGlobal ClimateGreenhouse EffectMesosphereOzone LayerStratosphereThermosphereTroposphere |
| **EARTH’S SYSTEMS and CYCLES:****Earth Motion and Seasons****REAL-WORLD CONNECTIONS and PHENOMENA*** Research and discuss the length of seasons in polar regions.
* Investigate changes in seasonal temperatures due to global warming.
 | **E.7.9C Students will demonstrate an understanding that the seasons are the direct result of the Earth’s tilt and the intensity of sunlight on the Earth’s hemispheres.** **E.7.9C.1** Construct models and diagrams to illustrate how the tilt of Earth’s axis results in differences in intensity of sunlight on the Earth’s hemispheres throughout the course of one full revolution around the Sun. **E.7.9C.2** Investigate how variations of sunlight intensity experienced by each hemisphere (to include the equator and poles) create the four seasons. | **EMBEDDED SCIENCE and ENGINEERING PRACTICES*** Ask Question and Define Problems
* Develop and Use Models
* Plan and Conduct Investigations
* Analyze and Interpret Data

**EMBEDDED CROSSCUTTING CONCEPTS*** Patterns
* Cause and Effect (Mechanism and Explanation)
* Scale, Proportion, and Quantity
* System and System Models
* Stability and Change
 | AxisAxis Points (Poles)EquatorEquinoxHemisphereOrbitRevolutionRotationSeasonTilt |

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