Archdiocese of Omaha

K-12 Science Curriculum Standards Guide 2025

Archdiocese of Omaha Catholic Schools

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Purpose and Use of This Guide

This guide is designed to support educators in providing rigorous, faith-filled science instruction. It serves as a **planning companion** rather than simply a compliance document. Educators will find clearly defined science standards, Catholic Identity connections, learning targets, proficiency scales, and grade-specific glossaries to support instruction and assessment.
The guide is intended to:

- Provide clarity on **what students are expected to know and do**
- Support lesson planning and assessment design
- Integrate Catholic Identity into science learning experiences
- Encourage collaboration and consistency across classrooms and schools

This document is a **working draft** of the Archdiocese of Omaha Science Standards Guide. Throughout the first year of use, the team will continue to:

- Add resources and tools to support implementation,
- Refine Catholic Identity connections, and
- Make revisions based on educator feedback.

Full implementation will occur after this initial year of review and refinement. Educators are invited to share feedback and suggestions throughout the process to help strengthen the guide. LINK TO FEEDBACK FORM

Essential Standards Expectation

All standards included in this guide are considered essential. They reflect critical knowledge and skills that students must master to build a strong scientific foundation. These standards are not optional or supplementary—they represent the core content for each grade level and discipline. Teachers are expected to provide instruction, assessment, and support to ensure all students reach mastery of these standards.

How to Use This Guide

This guide is organized to provide clarity and usability for teachers. Each grade-level section follows a consistent format so educators can quickly locate the information needed to plan instruction, design assessments, and integrate Catholic Identity into science learning.

- **Standards and Indicators** – Each standard includes specific indicators describing what students should know and be able to do.

- **Clarification Statements** – **Clarification Statement**s offer additional explanations to help teachers understand the intent of each indicator and its application in classroom instruction.

- **Assessment Boundaries** – Assessment boundaries define the limits of assessment for an indicator, ensuring expectations remain grade-appropriate and instructionally focused.

- **Vocabulary** – Each section includes tiered vocabulary lists identifying words and concepts essential to student understanding.

- **Learning Targets** – Indicators are translated into student-friendly "I can" statements to help students take ownership of their learning.

- **Depth of Knowledge (DOK) Levels** – Each indicator is tagged with a DOK level to guide lesson planning and assessment design.

- **Catholic Identity Connections** – Catholic principles and teachings are intentionally woven throughout the standards.

- Suggested resources are listed to support classroom instruction. Paid resources are marked with an asterisk (*) to help teachers plan appropriately.

Directions for Using the Content Standards

The grade-level content standards in this guide are designed to complement the essential standards and support cohesive, high-quality instruction across classrooms. Faculty discussion is encouraged to ensure consistent implementation and shared expectations for student learning. Administrators are encouraged to reproduce and distribute the standards to all teachers for use throughout the year.

Teachers should use this guide as the foundation for planning lessons, designing assessments, and aligning instruction. Following these standards ensures all students have equitable access to rigorous, faith-filled science instruction. Teachers are expected to devote **approximately 80% of instructional time** to the required curriculum outlined in this guide, reserving **20% of time** for extending and enriching learning experiences beyond the core content.

Archdiocese of Omaha Catholic Schools
Mission Statement

The mission of the Catholic Schools in the Archdiocese of Omaha, Nebraska, in cooperation with families, fosters in all students a personal relationship with Jesus Christ, educating them to become academically successful, responsible, community-minded adults who will be active and loyal members of their Church and society. This mission is an extension of the four-fold educational mission of the Catholic Church:

• To proclaim the message of faith and morals

• To foster community

• To encourage worship and prayer

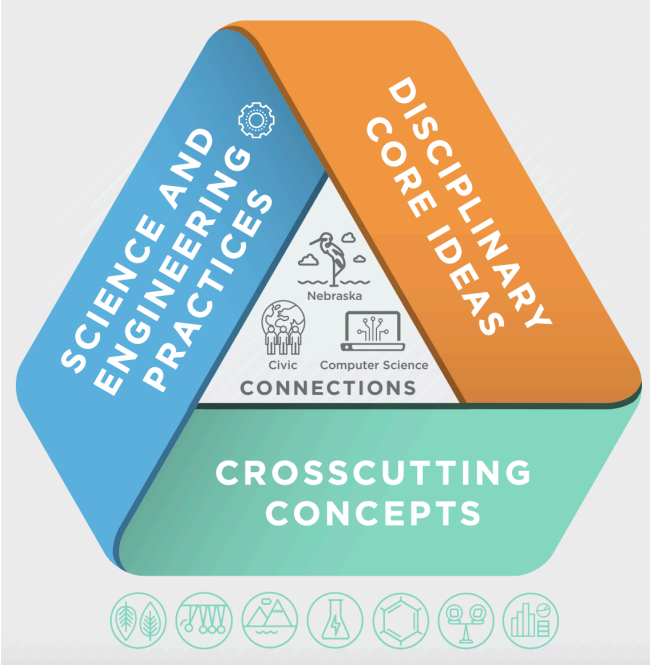
• To serve others

Archdiocese of Omaha's Mission & Vision for Science Education

Vision
Our vision is to form generations of scientifically literate, ethically responsible students who integrate faith and reason to explore, understand, and interpret the natural world as engaged citizens and faithful stewards of God's creation.

Mission
Our mission is to provide a science education rooted in the Catholic intellectual tradition. In partnership with families, we nurture critical thinking and problem-solving through authentic, hands-on, inquiry-based learning, promoting curiosity and a deep respect for God's creation.

Introduction to the Nebraska Science Standards and the Formation of a Catholic Identity in the Archdiocese of Omaha Standards



College and Career Readiness

College and career readiness for Nebraska's K-12 students requires science standards that are clearly defined and increasingly rigorous across grade levels. The standards are designed to ensure all students have access to grade-level science content centered on deep learning of concepts while actively building new knowledge through exploration and inquiry. The revised science standards encompass essential skills across the domains of Life Science, Physical Science, Earth and Space Science, and Engineering and Technology. The standards, individually and collectively, describe expectations not only for college and career readiness but also for fostering 21st-century scientific literacy, critical thinking, innovation, and problem-solving. The progression of skills within each domain is research- and evidence-based, designed to prepare Nebraska's students for postsecondary education and workforce demands.

Structure of College and Career Ready Standards for Science (CCR-Science)

The overall structure of Nebraska's College and Career Ready Standards for Science (CCR-Science) reflects the two-tier structure common across all Nebraska content area standards, which include **standards** and **indicators**.

The standards are broad, overarching statements describing basic cognitive, affective, or psychomotor expectations of student learning. Across all grade levels, these standards represent long-term learning goals. Indicators further define what students must know and be able to do to meet the standards, providing clear performance-based expectations. Additionally, indicators offer guidance related to assessing student learning, including **Assessment Boundary** statements.

The CCR-Science standards describe the knowledge, and skills students should learn without prescribing specific curricula, lessons, teaching techniques, or activities. **Standards articulate what students are expected to know and be able to do, while local curricula determine how teachers facilitate student mastery.** School districts and teachers locally make curriculum and instructional decisions.

The structure of Nebraska's College and Career Ready Standards for Science includes:

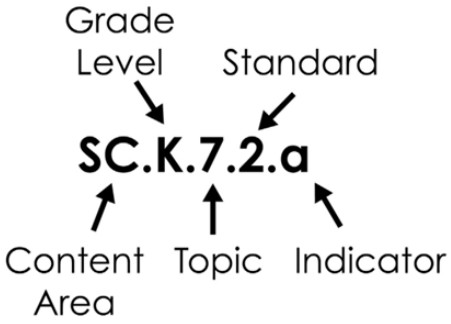
- Life Science
- Physical Science
- Earth and Space Science
- Engineering and Technology

Grade-Level Content Focus In addition to the standards and indicators, this document includes content focus summaries at the beginning of each grade level. Based on research and progression in the scientific disciplines, these summaries provide snapshots of the key areas of learning for the grade. This guidance emphasizes the structure and aims of college- and career-ready science standards. At every grade level, instruction should highlight scientific practices as essential methods for mastering content and developing scientific understanding.

Consistent Numbering System: A consistent numbering system is used for content area standards as illustrated below:

Organization and Fr[illegible]reer Ready Standards for Scienc[illegible]

Disciplinary Core Ideas



The disciplinary core ideas are the focused, limited set of science ideas identified in the Framework as essential for all students throughout their education and beyond K–12 to achieve scientific literacy. Limiting the number of core ideas provides more time for students and teachers to engage deeply in science and engineering practices. To support ongoing development, the disciplinary core ideas are organized into developmental learning progressions (see Appendix), allowing students to build and revise their knowledge and abilities over time.

Crosscutting Concepts (CCC)

Crosscutting concepts help organize and make sense of disciplinary core ideas. They serve as tools that bridge disciplinary boundaries and deepen students' understanding of science content. With grade-appropriate proficiency, students are expected to use concepts such as:

- Patterns
- Cause and effect
- Scale, proportion, and quantity
- Systems and system models
- Energy and matter
- Structure and function
- Stability and change

These concepts provide a framework for synthesizing knowledge from various fields into a coherent, scientifically grounded view of the world.

Science and Engineering Practices (SEP)

Science and engineering practices are the skills students use to demonstrate understanding of the disciplinary core ideas and crosscutting concepts. Engaging in these practices helps students understand the range of approaches used to investigate natural phenomena and develop solutions to real-world challenges. Students are expected to demonstrate grade-appropriate proficiency in:

- Asking questions and defining problems
- Developing and using models

- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations and designing solutions
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

Students should also incorporate additional crosscutting concepts and practices beyond those listed in the indicators to better reflect authentic science learning. Using the full range of SEPs and CCCs supports deeper learning and greater understanding of the DCIs.

The table below outlines the disciplinary core ideas, crosscutting concepts, and science and engineering practices.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
• Asking Questions and Defining Problems • Developing and Using Models • Planning and Carrying Out Investigations • Analyzing and Interpreting Data • Using Mathematics and Computational Thinking • Constructing Explanations and Designing Solutions • Engaging in Argument from Evidence • Obtaining, Evaluating, and Communicating Information	LS1: From Molecules to Organisms: Structures and Processes LS2: Ecosystems: Interactions, Energy, and Dynamics LS3: Heredity: Inheritance and Variation of Traits LS4: Biological Evolution: Unity & Diversity PS1: Matter and Its Interactions PS2: Motion and Stability: Forces and Interactions PS3: Energy PS4: Waves and Their Applications in Technologies for Information Transfer ESS1: Earth's Place in the Universe ESS2: Earth's Systems ESS3: Earth and Human Activity ETS1: Engineering Design	Patterns Cause and Effect Scale, Proportion, and Quantity Systems and System Models Energy and Matter Structure and Function Stability and Change

[1] *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, DC: The National Academies Press, 2012.

Catholic Identity in Science

Our science standards are aligned with the mission and vision of Catholic education, recognizing the created world as a reflection of God's goodness and design. Catholic Identity connections are provided for **selected indicators**, giving teachers the opportunity to integrate faith where it naturally aligns with the science content.

Some indicators in this guide include **embedded links to Catholic Identity resources**, giving educators direct access to scripture connections, lesson ideas, and activities that support faith integration. This ensures Catholic values are intentionally present in science instruction without altering the integrity of the scientific concepts being taught.

Educator Resources & Supports

Implementation

Effective science teaching, learning, and assessments should integrate the disciplinary core ideas, crosscutting concepts, and science and engineering practices. This integration empowers students to explain phenomena, engage in sensemaking, design solutions to problems, and build a lasting foundation for applying science knowledge and skills beyond the K–12 setting. While each indicator incorporates the three dimensions, **this alone does not drive student outcomes**. **Ultimately, student learning depends on how the standards are translated into instructional practice.**

To support educators in exploring and implementing content standards, the Nebraska Department of Education has developed the **Content Area Standards Implementation Framework**. This framework is based on **implementation science** and includes stages ranging from "Exploration" to "Deep Implementation," outlining the work and activities associated with each stage, as well as the roles of educators in ensuring successful implementation. **Its goal is to help align standards, instruction, materials, and assessment to create a coherent and effective learning system.**

Phenomenon-Based Instruction

Three-dimensional instruction offers authentic learning experiences when students describe and explain the natural world. This involves anchoring conceptual learning in real-world phenomena to deepen understanding. **Students use evidence in the sensemaking process to construct and internalize scientific concepts.** Phenomena are natural, observable events that can be explained or predicted using scientific knowledge (**note: "phenomenon" is the singular form**).

Teachers are encouraged to adopt phenomenon-based instruction to fully engage students in three-dimensional science learning. This method can be summarized in three steps:

1. **Introduce a new unit or concept with a phenomenon:** Start with a phenomenon that is relevant to students' lives. This encourages them to ask questions and fosters curiosity.

Many teachers already do this by using tangible examples such as photos, videos, demonstrations, or lab experiences.

2. **Engage in science and engineering practices:** Provide opportunities for students to gather information and reason through it to explain the phenomenon. **Sensemaking** involves a shift from simply delivering answers to facilitating exploration. Teachers should offer multiple opportunities—both individual and collaborative—for students to investigate the phenomenon while scaffolding their learning. This supports students in developing scientific understanding and constructing their own explanations.
3. **Communicate understanding:** Provide students with multiple opportunities to articulate their thinking about **why** the phenomenon occurs. To deepen understanding, guide students from simple observations toward more complex explanations and predictions based on evidence.

Nebraska Science Classroom Formative Task Repository

The Nebraska Science Classroom Formative Task Repository is a collection of K–12 formative tasks aligned to the indicator level of the standards. Developed by Nebraska educators, these tasks span the full breadth of the standards and provide students with opportunities to demonstrate what they know and are able to do in relation to each standard.
Access to the repository requires the password **ScienceFA**. This password is intended for educator use only and **should not be shared with students**.

NDE Science
education.ne.gov/science

STEM Teaching Tools
stemteachingtools.org

NSTA
ngss.nsta.org

Academic Language Development

Effective science instruction relies on students developing communication skills specific to the discipline. Students need opportunities to speak, listen, read, and write using language that reflects scientific thinking and practices. The resources in this guide support teachers in helping students acquire scientific discourse, including academic science vocabulary. Teaching vocabulary or concepts in isolation—before students have had meaningful experiences to build context—can limit sense-making and deeper conceptual understanding. Instead, the words provided are intended to be introduced **after** students have explored the concept and expressed it in their own words. This approach ensures vocabulary supports understanding rather than replacing it.

Learning Targets

Learning targets are **clear, student-friendly statements** that describe what students are expected to know and be able to do. They help focus instruction, provide clear success criteria, and encourage students to reflect on their own learning. In classrooms, these statements might be shared as learning intentions, objectives, "I can" statements, goals, performance expectations, or success criteria.

By making learning visible and understandable for students, learning targets help them see the purpose of their work and take greater ownership of their progress. For teachers, learning targets support intentional lesson design, formative assessment, and clear communication of expectations to students and families, ensuring that instruction stays focused on what matters most.

Depth of Knowledge (DOK)

Each learning target is labeled with a Depth of Knowledge (DOK) level, which indicates the type of thinking required:

- **Level 1 – Recall and Reproduction:** recalling facts, definitions, or simple procedures
- **Level 2 – Skills and Concepts:** applying information or concepts in routine situations
- **Level 3 – Strategic Thinking:** reasoning, planning, and using evidence for more complex tasks
- **Level 4 – Extended Thinking:** applying knowledge in new ways, often over extended time or across multiple concepts

DOK levels help teachers design instruction and assessments that balance foundational knowledge with deeper reasoning and problem-solving. This ensures students have opportunities to build essential skills and also engage in higher-level thinking that prepares them for future learning. *(Source: Webb, N. L. (1997). Criteria for Alignment of Expectations and Assessments in Mathematics and Science Education. Council of Chief State School Officers.)*

Embedded Resource Links

Many indicators include embedded links to instructional resources aligned to the standards. These links provide lesson ideas, instructional tasks, and strategies that connect directly to grade-level content. Each link is labeled using the Resource Key to indicate if it is a paid resource (*). If no asterisk is present, the resource is free to all. Some schools may already have subscriptions—check with your administrator.

These embedded resources save planning time, promote consistency, and give teachers direct access to high-quality support connected to the exact indicators they are teaching.

How These Features Work Together

Together, these features support teachers in creating lessons and assessments that are clear, focused, and rigorous while also saving time and promoting consistency across classrooms. By clarifying expectations (learning targets), balancing rigor (DOK), and providing direct instructional supports (embedded resources), this guide strengthens teaching and learning in every classroom.

Clarification and Assessment Boundaries

Clarification statements provide examples or additional context for performance expectations. These examples might include using the five senses, observing seasonal changes, or identifying living and non-living things. Assessment boundary statements define the limits of what may be included on large-scale assessments. Together, these statements help educators understand the intent of the standards and guide appropriate instructional and assessment practices.

Kindergarten Content Standards

Kindergarten science instruction should celebrate God's gift of curiosity and the senses He has given us to explore His creation. Students use observation, questioning, and problem-solving to gather and analyze evidence, make sense of patterns, and communicate what they learn about the world around them.

Focus areas include:

- **Pushes and Pulls:** Investigating how the strength and direction of pushes and pulls affect the motion of objects and applying this understanding to simple design solutions.
- **Plants, Animals, and Habitats:** Discovering what plants and animals (including humans) need to survive and how those needs influence where they live.
- **Weather and Patterns:** Observing daily and seasonal weather patterns and understanding how weather forecasting helps people prepare for and respond to severe weather.

Standard

Topic Code: SC.K.1 Forces and Interactions: Pushes and Pulls
Standard Code: SC.K.1.1 Gather, analyze, and communicate evidence of forces and their interactions.

Standard Learning Targets

- I can identify and describe different types of forces (e.g., push, pull, gravity, friction). DOK 1
- I can conduct investigations to observe how forces affect the motion of objects. DOK 3
- I can collect and record evidence about the effects of forces on objects. DOK 2
- I can analyze data to explain how forces cause changes in motion. DOK 3
- I can use models or drawings to show how forces interact with objects. DOK 2
- I can explain how multiple forces can act on an object at the same time. DOK 2
- I can communicate my findings about forces and motion using evidence. DOK 3

Indicator

SC.K.1.1.a Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

Clarification Statement: Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other. ***Assessment Boundary****: Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.*

Indicator Learning Targets	Academic Vocabulary

• I can plan an investigation to test how pushes and pulls affect how things move. DOK 3 • I can test how different strengths of a push or pull change the motion of an object. DOK 2 • I can test how different directions of a push or pull change the motion of an object. DOK 2 • I can record what happens when I push or pull objects in different ways. DOK 1 • I can compare the results of different pushes and pulls to see how they change motion. DOK 3 • I can explain how the strength and direction of a force affect the way something moves. DOK 2	• Push • Pull • Investigation • Cause • Effect • Motion • Direction • Change • Strength • Collide • Faster • Slower • Speed

Resources

Formative Task Repository Page
Walking Table
Amazing Slinky Tricks
GoldieBlox & Rube Goldberg "Princess Machine"
Stringless Yo-Yo

Indicator

SC.K.1.1.b Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

Clarification Statement: Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, and knock down other objects. Examples of solutions could include tools such as a ramp to increase the speed of the object and a structure that would cause an object such as a marble or ball to turn.
Assessment Boundary: *Assessment does not include friction as a mechanism for change in speed.*

Learning Targets	Academic Vocabulary
• I can look at data to see what happened when we used a push or pull on an object. DOK 1 • I can figure out if a design (like a ramp or a lever) changes how fast something moves or the direction it goes. DOK 2 • I can decide if a design worked the way it was supposed to. DOK 3 • I can explain how a push or pull changed the motion of an object using data. DOK 3 • I can suggest ways to improve a design if it doesn't work as expected. DOK 3	• Push • Pull • Investigation • Cause • Effect • Motion • Direction • Change • Strength • Collide • Faster • Slower • Speed • Problem • Solution • Analyze

	• Data • Test • Compare • Relationship

Resources

Formative Task Repository Page
Amazing Slinky Tricks
GoldieBlox & Rube Goldberg "Princess Machine"
Perplexus Demonstration
Caine's Arcade
Hotwheels Mega Track

Standard

Topic Code: SC.K.7 Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment
Standard Code: SC.K.7.2 Gather, analyze, and communicate evidence of interdependent relationships in ecosystems.

Living things, including plants, animals, and humans, depend on their environment for essential needs such as food, water, shelter, and suitable temperatures. The features of an environment determine where living things naturally live. In turn, plants and animals influence and adapt to the conditions around them.

Standard Learning Targets

- I can gather information about how plants and animals depend on each other in an ecosystem. DOK 2
- I can describe how animals depend on plants for food, shelter, or oxygen. DOK 1
- I can explain how plants depend on animals for things like pollination or seed spreading. DOK 2
- I can analyze data to understand what happens when one part of an ecosystem changes. DOK 3
- I can use evidence to explain how living things in an ecosystem are connected. DOK 3
- I can share what I've learned about interdependence in ecosystems through writing, speaking, or drawings. DOK 2

Indicator

SC.K.7.2.a Use observations to describe patterns of what plants and animals (including humans) need to survive.

Clarification Statement: Examples of patterns could include that animals need to take in food, but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and, that all living things need water.

Indicator Learning Targets	Academic Vocabulary
• I can observe plants and animals to learn what they need to live and grow. DOK 2 • I can describe patterns in the needs of living things (like water,	• Survival • Plants • Animals

food, air, and space). DOK 2 • I can explain that all animals, including humans, need food, water, air, and shelter to survive. DOK 1 • I can explain that plants need water, air, light, and space to grow. DOK 1 • I can use what I see and learn to talk or write about how living things survive. DOK 2	• Humans • Survival needs

Resources

Formative Task Repository Page
Microhabitats
Plant Your Socks
Corn Cob Sprouting in Water
Desert Beetle Harvests Water

Indicator

SC.K.7.2.b Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

Clarification Statement: Examples of plants and animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break concrete.

Indicator Learning Targets	Academic Vocabulary
• I can find examples of how plants and animals change their environment to get what they need. DOK 2 • I can describe how humans change the environment to meet their needs (like building houses or roads). DOK 1 • I can describe how animals change the environment (like beavers building dams or ants digging tunnels). DOK 1 • I can explain how plants can change the environment (like tree roots breaking rocks or changing the soil). DOK 2 • I can use evidence to support my ideas about how living things change their environment. DOK 3 • I can make an argument and explain my thinking using facts and examples. DOK 3	• Survival • Plants • Animals • Impact • Environment • Claim • Evidence

Resources

Formative Task Repository Page
Biological Weathering (tree roots)
Woodpecker Homes
Google Maps Timelapse

Indicator

SC.K.7.2.c Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.

Clarification Statement: Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas; and grasses need sunlight, so they often grow in meadows. Plants, animals, and their surroundings make up a system.

Indicator Learning Targets	Academic Vocabulary
• I can identify what different plants and animals need to live and grow. DOK 1 • I can describe how a habitat meets the needs of the living things that live there. DOK 2 • I can show how animals and plants live in places that give them what they need (like food, water, shelter, and space). DOK 2 • I can make or use a model (like a drawing, diagram, or 3D display) to show how living things depend on their environment. DOK 2 • I can explain my model and how it shows the connection between living things and their homes. DOK 3	• Plant needs • Animal needs • Human needs • Water • Air • Land • Resources

Resources

Formative Task Repository Page
Why Do Sunflowers Follow the Sun?
Microhabitats

Indicator

SC.K.7.2.d Communicate solutions that will increase the positive impact of humans on the land, water, air, and/or other living things in the local environment.

Clarification Statement: Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles

Indicator Learning Targets	Academic Vocabulary
• I can identify ways humans affect the land, water, air, and living things around them. DOK 1 • I can think of and describe ideas to help people take better care of the environment. DOK 2 • I can share ideas for how we can protect nature in our community (like recycling or planting trees). DOK 2 • I can explain how my solution would help people, animals, or the Earth. DOK 3 • I can use pictures, writing, or speaking to communicate my solution to others. DOK 2	• Survival • Human • Environment • Natural Resources • Solution • Sketch • Design • Model • Surrounding • Respond • Cause • Effect

Resources

Formative Task Repository Page
Precious Plastic

Standard

Topic Code: SC.K.12 Weather and Climate
Standard Code: SC.K.12.3 Gather, analyze, and communicate evidence of weather and climate.

Weather is the mix of sunlight, wind, precipitation, and temperature in a specific place at a specific time. People measure these conditions to describe and record weather and to identify patterns over time. Meteorologists forecast severe weather to help communities prepare for and respond to such events. Sunlight warms Earth's surface.

Standard Learning Targets

- I can observe and record daily weather conditions (like temperature, rain, snow, or wind). DOK 1
- I can describe patterns I see in weather over time. DOK 2
- I can explain the difference between weather (daily) and climate (long-term patterns). DOK 2
- I can collect and analyze data to learn about the climate in a certain place. DOK 3
- I can use charts, graphs, or pictures to show what I've learned about weather and climate. DOK 2
- I can share what I've learned about weather and climate with others using facts and evidence. DOK 2

Indicator

SC.K.12.3.a Use and share observations of local weather conditions to describe patterns over time.

Clarification Statement: Examples of qualitative observations could include descriptions of the weather (such as sunny, cloudy, rainy, and warm); examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month. Examples of patterns could include that it is usually cooler in the morning than in the afternoon and the number of sunny days versus cloudy days in different months.
***Assessment Boundary**: Assessment of quantitative observations limited to whole numbers and relative measures such as warmer/cooler.*

Indicator Learning Targets	Academic Vocabulary
• I can observe and record local weather conditions like temperature, rain, wind, and clouds. DOK 1 • I can keep track of the weather over several days or weeks. DOK 2 • I can look at my weather data to find patterns (like it rains more in spring or it's windy in the afternoon). DOK 2 • I can use my observations to describe how the weather changes over time. DOK 2 • I can share what I've learned about weather patterns using pictures, charts, or words. DOK 2	• Local • Observable • Patterns • Sunny • Cloudy • Windy • Rainy • Snowy • Cold • Warm • Sunlight • Temperature • Predict

Resources

Formative Task Repository Page
World Climographs
Homemade Thermometer
Snowman Melt Timelapse
Windcatcher

Indicator

SC.K.12.3.b Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.

Clarification Statement: Emphasis is on local forms of severe weather such as blizzards, tornadoes, drought, and floods.
***Assessment Boundary**: Assessment of quantitative observations limited to whole numbers and relative measures such as warmer/cooler.*

Indicator Learning Targets	Academic Vocabulary
• I can ask questions to learn why weather forecasting is important. DOK 2 • I can find out how weather forecasts help people get ready for severe weather like storms or floods. DOK 2 • I can explain why knowing about severe weather ahead of time helps keep people safe. DOK 2 • I can use questions to gather information about how communities respond to severe weather. DOK 3 • I can share what I learned about weather forecasting and safety. DOK 2	• Forecast • Patterns • Typical • Severe • Predictable • Prepare

Resources

Formative Task Repository Page
Blizzard Timelapse
Lightning Strikes Thrice

Indicator

SC.K.12.3.c Make observations to determine the effect of sunlight on Earth's surface.

Clarification Statement: Examples of Earth's surface could include sand, soil, rocks, and water.

***Assessment Boundary**: Assessment of temperature is limited to relative measures such as warmer/cooler.*

Indicator Learning Targets	Academic Vocabulary
• I can observe how sunlight warms different parts of Earth's surface. DOK 1	• Sunlight • Shade

• I can describe what happens when sunlight shines on things like soil, water, and plants. DOK 2 • I can compare how sunlight affects different surfaces (for example, dark vs. light colors or water vs. land). DOK 2 • I can record my observations about the effect of sunlight. DOK 1 • I can explain how sunlight changes the temperature or condition of Earth's surface. DOK 2	• Locations • Surfaces • Materials • Temperature • Observation • Data

Resources

Formative Task Repository Page
How the Sun Sees You
Snowman Melt Timelapse
Windcatcher

Indicator

SC.K.12.3.d Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.

Clarification Statement: Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun.

Indicator Learning Targets	Academic Vocabulary
• I can plan how to build a structure that blocks or reduces sunlight. DOK 3 • I can choose tools and materials to make my structure. DOK 2 • I can build a structure that helps keep an area cooler by reducing sunlight. DOK 2 • I can test my structure to see how well it reduces warming from sunlight. DOK 3 • I can explain how my structure works to keep an area cooler. DOK 3	• Reduce • Sunlight • Warm • Shade • Effect • Surface • Materials • Sketch • Design • Model • Test • Compare

Resources

Formative Task Repository Page
Windcatcher
How the Sun Sees You
Homemade Thermometer

Indicator

SC.K.12.3.e Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Indicator Learning Targets	Academic Vocabulary
• I can ask questions to learn more about a problem people want to solve. DOK 2 • I can make observations about the situation or problem. DOK 1 • I can gather information to understand what needs to be fixed or improved. DOK 2 • I can describe the problem clearly based on what I learned. DOK 2 • I can explain how a new or improved object or tool might help solve the problem. DOK 3	• Investigation • Problem • Solution • Situation
Resources	
Formative Task Repository Page	

First Grade Content Standards

Grade 1 science instruction invites students to explore the order and beauty of God's creation through hands-on investigations and observations. Students gather, analyze, and communicate evidence to explain how light, sound, plants, animals, and patterns in the sky work together in the world around them.
Focus areas include:

- **Sound and Vibrations:** Investigating the relationship between sound and vibrating materials and how these patterns support communication and daily life.
- **Light and Seeing:** Exploring how the availability of light affects the ability to see objects and how different materials affect the path of light, showing the importance of light in understanding and navigating the world.
- **Plant and Animal Survival:** Examining how plants and animals use their external parts to survive, grow, and meet their needs, as well as how parents and offspring support each other for survival—an example of care and interdependence in creation.
- **Similarity and Difference:** Observing how young plants and animals are like, but not identical to, their parents, illustrating both patterns and diversity in living things.
- **Patterns in the Sky:** Observing, describing, and predicting patterns in the movement of objects in the sky, cultivating wonder at the order built into the universe.

Standard

Topic Code: SC.1.2 Waves: Light and Sound Standard SC.1.2.1 Gather, analyze, and communicate evidence of light and sound waves.
Standard Code: SC.1.2.1 Gather, analyze, and communicate evidence of light and sound vibrations (waves).

Sound causes matter to vibrate, and vibrating matter produces sound. Objects are visible only when light shines on them, although some objects create their own light. Materials interact with light in different ways: some let light pass through completely, some let only part of the light through, and others block it, creating shadows where the light cannot reach. Mirrors can change the direction of light. People use many devices that rely on sound and light to communicate over long distances.

Standard Learning Targets

- I can gather data about light and sound waves by taking accurate notes.
- I can analyze data about light and sound waves to notice patterns.
- I can communicate information about light and sound waves using my notes.

Standard Academic Vocabulary

- Sound Waves
- Light Waves

Indicator

SC.1.2.1.a Plan and conduct an investigation to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.

Indicator Learning Targets

I can plan and conduct an investigation that proves sound is made by vibrations.

- I can define vibration and sound. (DOK 1)
  - *Vibration=movement*
- I can observe and distinguish what is vibrating and what occurs when an object vibrates. (DOK 2)
  - *Pluck a guitar string/rubber band; what vibrates? What happened when the string vibrated?*
- I can observe what happens when an object makes sound. (DOK 2)
  - *What happens to a drum when you hit it?*
- I can compare and contrast objects when they make sound and when they do not. (DOK 3)
  - *Compare rubber band to plucked versus not plucked*
- I can explain how sound is made. (DOK 3- phenomenon)
  - *Sound is made by vibrations*
- I can prove that sound is made by vibrations (by having an object make sound). (DOK 4)
  - *Give an object; student makes it vibrate to make sound*
- I can plan and conduct an investigation, collect data, and explain how sound is made. (DOK 4)

I can plan and conduct an investigation that proves sound can make things vibrate.

- I can define vibration and sound. (DOK 1)
- I can describe what happens to an object when a sound is made. (DOK 2)
  - *What happens to the rice, when a drum is hit?*
- I can explain how sound makes vibrations. (DOK 3- phenomenon)
  - *Sound makes things vibrate*
- I can plan and conduct an investigation, collect data, and explain how sound makes vibrations. (DOK 4)

Academic Vocabulary:

- Sound
- Vibration
- Matter
- Investigation
- Relationship
- Cause
- Effect
- Sound waves
- Light waves

Resources

Sounds & Vibrating Material Assessment
Generation Genius: Intro to Sound*
Mystery Science: Grade 1 Lesson 2 Sound & Vibrations*
SciShow: What is Sound?
K12 Alliance: Sound Vibrations

K12 Alliance: See Sounds
Tuning Fork Resonance Video
Visualize a Microphone
Shatter a Wine Glass

Suggested Read Alouds: Sounds All Around by Wendy Pfeffer

Formative Assessment Ideas:
- Sound is made by _____.
- Students choose 1-2 items to test/make sound. Then, write: (Object) makes sound when _____.
- STEAM: Build an instrument and tell how it makes sound. My instrument is a _____. It makes a sound when _____.

Possible Accommodations: Have vocabulary words accessible; perhaps require them to use it (vibration, sound, etc.); Have students tell you orally rather than writing

* Requires a paid subscription

Indicator

SC.1.2.1.b Make observations to construct an evidence-based explanation that objects can be seen only when illuminated.

Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.

Indicator Learning Targets

I can observe and explain why objects are visible when illuminated. (bioluminescence, or via light)
- I can identify sources of light. (DOK 1)
- I can define illuminate. (DOK 1)
- I can observe and describe what happens when an object is placed in light versus darkness. (DOK 2)
- I can explain when and why objects can be seen. (DOK 3- phenomenon)
- I can apply knowledge that objects are visible when illuminated to real life situations. (DOK 4)

Academic Vocabulary

- Illuminate
- Light beam
- Redirect
- Cause
- Effect
- Model
- Sound waves
- Light waves

Resources

Generation Genius: Introduction to Light*
Mystery Science: Grade 1 Lesson 4 Light & Illumination*
SciShow: Glowing Ocean Animals!
Pin Hole Box

Bioluminescence Read Aloud Texts: Glow: Animals with Their Own Night-Lights by W.H. Beck; Glow-in-the-Dark Animals by Janet Halfmann; The Very Lonely Firefly by Eric Carle

Light Read Aloud Texts: A Ray of Light by Walter Wick

** Requires a paid subscription*

Indicator

SC.1.2.1.c Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.

Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).
***Assessment Boundary**: Assessment does not include speed of light*

Indicator Learning Targets	Vocabulary:
I can plan and conduct an investigation to observe the effects of placing objects in the path of a beam light. ● I can name materials that light can or cannot pass through. (DOK 1) ● I can describe how different materials change a beam of light. (DOK 2) ○ *All light, some light, or no light passes through* ● I can compare how different materials affect a beam of light. (DOK 3) ● I can plan and conduct an investigation, collect data, and describe how different materials change a beam of light. (DOK 4)	● Shadow ● Reflected ● Light beam ● Redirect ● Mirror ● Transparent ● Translucent ● Opaque ● Sound waves ● Light waves

Resources

Generation Genius: Introduction to Light*
Mystery Science: Grade 1 Lesson 3 Light, Materials, Transparent & Opaque*
The Dr. Bionics Show: Light
Flashlight Investigation

** Requires a paid subscription*

Indicator

SC.1.2.1.d Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.
***Assessment Boundary**: Assessment does not include technological details for how communication devices work.*

Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string "telephones," and a pattern of drumbeats.
Assessment Boundary: Assessment does not include technological details for how communication devices work.

Indicator Learning Targets	Vocabulary:
I can design and create a device that uses light or sound to communicate over a distance. ● I can name ways people use light or sound to send messages. (DOK 1) ● I can use tools and materials to build something that sends a message with	● Communicate ● Device ● Send ● Receive

light or sound. (DOK 2) ● I can explain how my device uses light or sound to help people send a message far away. (DOK 3) ● I can design and create a device that uses light or sound to communicate over a distance and explain why my design works. (DOK 4) ○ *Device could be the same or new; device could be critiqued to make it more efficient for advanced students*	● Problem ● Solution ● Sketch ● Design ● Model ● Test ● Compare ● Distance ● Sound waves ● Light waves

Resources

Generation Genius: Communication Over Distances*
Mystery Science: Grade 1 Lesson 5 Light, Communication & Engineering*
K12 Alliance: Communicate with Sounds
Echolocation in Action
Tin Can Telephone

* *Requires a paid subscription*

Standard

Topic Code: SC.1.6 Structure, Function, and Information Processing

Standard Code: SC.1.6.2 Gather, analyze, and communicate evidence to show the relationship between structure and function in living things.

Living things, including plants, animals, and humans, rely on their environment to meet their needs for food, water, shelter, and suitable temperatures. Plants and animals have external features that help them survive in different environments. Young plants and animals resemble their parents but are not identical. In many species, parents and their young display behaviors that support the survival of the offspring.

Standard Learning Targets

- I can gather data about the structure and function of animal and plant parts by taking accurate notes.
- I can analyze data about the structure and function of animal and plant parts to notice patterns.
- I can communicate information discovered about the structure and function of animal and plant parts using my notes.

Standard Academic Vocabulary

- Survival
- Structure
- Function
- Plants
- Animals

Indicator

SC.1.6.2.a Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.

Indicator Learning Targets

I can create and design a solution to a problem by mimicking how plants and/or animals use their external parts.

- I can name how animals and plants use their body parts to live and grow. (DOK 1)
    - *Animal - Body Part - How it helps (a bird uses a beak to eat)*
- I can match and compare animal and plant parts and their purpose to human inventions. (DOK 2)
    - *Turtle shell protects it like a helmet protects head; cactus soaks up water like we drink when we are thirsty; kangaroo's pouch is like a baby carrier*
- I can construct a solution to a problem by mimicking plants and/or animals. (DOK 3)
- I can design and build a solution to solve a problem by mimicking plants and/or animals and explain how it compares to an animal and/or plant. (DOK 4)

Academic Vocabulary

- External Structures
- Function
- Growth
- Problem
- Solution
- Design
- Model
- Test
- Compare

Resources

Generation Genius: Biomimicry*
SciShow: Inventing with Plants
Biomimicry
Desert Beetles Harvest Water
Polar Bears are Actually Black
Biomimicry 4 Kids

** Requires a paid subscription*

Indicator

SC.1.6.2.b Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Clarification Statement: Although NGSS classifies this performance expectation (K-2-ETS1-2) under **Engineering Design**, Nebraska has placed it within the Structure, Function, and Information Processing standard to highlight the connection between an object's shape and its function. Students create a simple sketch, drawing, or physical model to show how the shape of an object supports its function to solve a specific problem. Examples may include designing tools, structures, or devices inspired by shapes and features found in living things (e.g., a spoon's shape to hold food, a boat's shape to float, or an animal feature inspiring a tool). The focus is on understanding that form is related to

function and applying that understanding to design a solution.

Indicator Learning Targets	Academic Vocabulary
I can design an illustration or model that solves a problem based on its shape. ● I can describe how an object's shape helps it do a job. (DOK 1) ○ *A spoon's shape helps it hold food* ● I can draw or model to show how an object's shape helps it work. (DOK 2) ○ *Draw a boat and explain that its shape helps it float* ● I can explain why a certain shape is better for solving a problem. (DOK 3) ○ *A round wheel is better than a square one on a car* ● I can design an illustration or model to solve a problem based on its shape. (DOK 4) ○ *Design a tool to pick up trash, etc.*	● Shape ● Structure ● Function ● Stability ● Sketch ● Physical Model ● Problem ● Solve

Resources
Design a tent to house a large family
Build a Bridge for a Toy

Problem: A toy needs to cross a "river" (e.g., a gap between two desks).
Design Task: Using blocks, paper, tape, straws, or craft sticks, build a bridge strong enough for a small toy (like a plastic animal or car).
Skills: Engineering basics, teamwork, spatial awareness.

Indicator

SC.1.6.2.c Read grade appropriate texts, use media, and/or personal experience to communicate patterns in a parent's behavior that help offspring survive.

Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).

Indicator Learning Targets	Academic Vocabulary
I can communicate how a parent's behavior helps their offspring using text, media, and/or personal experience. ● I can tell what some animals do to help their babies stay safe. (DOK 1) ○ *Penguin parents take turns keeping the baby warm.* ● I can explain how a parent animal helps its baby survive by using what I read or saw. (DOK 2) ○ *Bear teaches its cub to fish* ● I can compare how different animal parents help their babies live and grow. (DOK 3) ○ *A bird gives babies a worm, but a bear teaches their cub to fish* ● I can use books, videos, or what I know to create a story or drawing	● Parents ● Offspring ● Response ● Behaviors ● Vocalization ● Signals

that shows how parents help their young survive. (DOK 4) ○ *An animal character/name; parent action; how it helps the baby*	

Resources

Generation Genius: Animals Help Their Babies Survive*
Mystery Science: Grade 1 Lesson 3 Animal Behavior & Offspring Survival*
Parents and Behavior Worksheet
Parents and Behavior Worksheet Example

* Requires a paid subscription

Indicator

Indicator SC.1.6.2.d Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

Clarification Statement: Although NGSS places this performance expectation (1-LS3-1) under **Heredity: Inheritance and Variation of Traits**, Nebraska connects it to the Structure and Function standard to emphasize how traits help living things survive and grow. Students observe and compare young plants and animals with their parents to construct evidence-based accounts showing how offspring are like, but not exactly like, their parents. Examples of patterns include similar features (such as leaf shape, fur color, or body structure) with differences in size, markings, or other traits.
***Assessment Boundary**: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids*

Indicator Learning Targets	Academic Vocabulary
• I can prove that young plants and animals are like, but not exactly like, their parents. • I can match an offspring to its parent. (DOK 1) • I can describe how a young plant and/or animal are the same and different from their parents. (DOK 2) • I can compare and contrast a young plant and/or animal to its parent with evidence. (DOK 3) • I can create a drawing or model to show how young plants and animals grow to look like their parents. (DOK 4)	• Similarities • Differences • Parents • Young • Growth

Resources

Mystery Science: Grade 1 Lesson 1 Plant Traits & Offspring*
Mystery Science: Grade 1 Lesson 1 Parent & Offspring Traits (Animals)*
Why Are Babies So Cute?

Text: Are You My Mother? by P.D. Eastman

Field Trip Opportunity to compare an offspring to its parent through a Venn Diagram, like Lauritzen Gardens (plants) or the zoo (animals) or a virtual field trip (San Diego Zoo Live Cams or photos of offspring and their parents)

* Requires a paid subscription

Standard

Topic Code: SC.1.11. Space Systems and Cycles

Standard Code: SC.1.11.3 Gather, analyze, and communicate evidence of patterns and cycles of space systems.

Seasonal patterns of motion of the Sun, Moon, and stars can be observed, described, and predicted. These patterns may vary depending on the region, location, or time of year.

Standard Learning Targets

- I can gather data about space cycles by taking accurate notes.
- I can analyze data about space cycles to notice patterns.
- I can communicate information discovered about space cycles using my notes.

Standard Academic Vocabulary

- Patterns
- Predict

Indicator

SC.1.11.3.a Use observations of the sun, moon, and stars to describe patterns that can be predicted.

Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.
***Assessment Boundary**: Assessment of star patterns is limited to stars being seen at night and not during the day.*

Indicator Learning Targets	Academic Vocabulary
• I can describe patterns based on observations of the sun. • I can identify the sun, moon, and stars and describe what I see in the sky during the day and at night. (DOK 1) • I can observe and describe the sun's "movement". (DOK 2) ○ *Sun moves from east to west; shadow lengthens/shortens* • I can explain the sun's patterns. (DOK 3) • I can predict how my shadow will change based on the sun's patterns. (DOK 4) • I can describe patterns based on observations of the moon. • I can identify the sun, moon, and stars and describe what I see in the sky during the day and at night. (DOK 1) • I can observe and describe how the moon looks different over time. (DOK 2) • I can explain the moon's patterns. (DOK 3) • I can predict when the next full moon will be based on the moon's patterns.	• Movement • Visible • Sun • Moon • Stars • North Star • Rise • Set • Sunlight • Day • Night • Evidence • Data • East

(DOK 4) ● I can describe patterns based on observations of the stars. ● I can identify the sun, moon, and stars and describe what I see in the sky during the day and at night. (DOK 1) ● I can observe and locate the North Star. (DOK 2) ● I can explain how finding the North Star can be helpful. (DOK 3) ○ *Helps you find directions/locate things* ● I can solve a real-life problem using what I have learned about stars. (DOK 4) ○ *Use the North Star to find your way back "home"/"camp"*	● West ● Shadow

Resources

Generation Genius: Patterns in the Sky*
Mystery Science: Grade 1 Lesson 1 Sun, Shadows, & Daily Patterns (Sun)*
Mystery Science: Grade 1 Lesson 2 Sun, Shadows, & Daily Patterns (Sun)*
Mystery Science: Grade 1 Lesson 1 Moon Phases & Patterns*
Mystery Science: Grade 1 Lesson 2 Star & Daily Patterns*
Mystery Science: Grade 1 Lesson 3 Star & Seasonal Patterns*
SciShow: Why Does the Moon Change?
Seeing the Moon During the Day
Star Trails
Dubai 24 Hour Time Lapse

* Requires a paid subscription

Indicator

SC.1.11.3.b Make observations at different times of the year to relate the amount of daylight to the time of year.

Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall. Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.
***Assessment Boundary**: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.*

Indicator Learning Targets	Academic Vocabulary
I can relate daylight to the time of year. ● I can name the seasons and say if the days are longer or shorter. (DOK 1) ● I can observe and describe how the amount of daylight changes in different seasons. (DOK 2) ● I can make a chart or drawing to show how daylight changes across the year. (DOK 3) ● I can explain how changes in daylight affect what people and animals do in different seasons. (DOK 4)	● Patters ● Predict ● Daylight ● Sunrise ● Sunset ● Season ● Amount ● Observe ● Observations ● Year ● Day

	• Night • Location

Resources

Generation Genius: Four Seasons and Day Length*
Mystery Science: Grade 1 Lesson 4 Daylight & Seasonal Patterns*

Formative Assessment Options:
Seasonal Light Observation Sheet
Example of Seasonal Light Observation Sheet filled out for Albany, NY

* Requires a paid subscription

Second Grade Content Standards

Grade 2 science instruction encourages students to use their God-given curiosity and senses to explore His creation. Students observe, question, and analyze evidence to discover patterns, describe relationships, and communicate their understanding of the world. Through these studies, they gain a deeper appreciation for God's design and the call to care for creation.
Focus areas include:

- **Properties of Materials:** Observing and classifying materials based on their properties and exploring how these properties relate to their uses.
- **Plant Needs and Animal Support:** Investigating what plants need to grow and how animals help with pollination and seed dispersal.
- **Diversity of Life:** Comparing the variety of living things across different habitats.
- **Changes to the Land:** Exploring how wind and water shape the land and considering ways to reduce these changes.
- **Land and Water Features:** Identifying different kinds of landforms and bodies of water and where water is found on Earth.

Standard

Topic Code: SC.2.3 Structure and Properties of Matter

Standard Code: SC.2.3.1 Gather, analyze, and communicate evidence of the structure, properties, and interactions of matter.

All things are made of matter, which exists in different forms and has unique properties. Matter can be observed, described, and classified by these properties. Materials with certain properties are best suited for specific uses, and heating or cooling them may change those properties—sometimes temporarily, sometimes permanently.

Standard Learning Targets

- I can describe what matter is and give examples of solids, liquids, and gases. DOK 1
- I can use my senses and tools to observe and describe how matter looks, feels, and behaves. DOK 2
- I can sort and compare objects based on their properties, like size, shape, texture, and color. DOK 2
- I can investigate how matter changes when it is mixed, heated, or cooled. DOK 3
- I can gather and record information during science investigations. DOK 2
- I can explain what I learned about matter using pictures, writing, or talking. DOK 3

Standard Academic Vocabulary

- Matter
- Properties
- Solid
- Liquid
- Classify
- Function

Indicator

SC.2.3.1.a Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.

Indicator Learning Targets	Academic Vocabulary
• I can plan and do a science investigation to learn about different materials. DOK 2 • I can use my senses to observe and describe how materials look, feel, or act. DOK 2 • I can group (classify) materials by how they look or what they are made of. DOK 2 • I can use words like hard, soft, rough, smooth, shiny, or flexible to describe materials. DOK 1 • I can explain what I learned from my investigation using pictures, charts, or words. DOK 3	• Strength • Color • Flexibility • Hardness • Texture • Temperature • Matter • Properties • Solid • Liquid • Classify • Function

Resources

Next Generation Lessons and Units
Make It- Physical Properties
Formative Task Repository Page

Indicator

SC.2.3.1b Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.

Clarification Statement: Examples of properties could include strength, flexibility, hardness, texture, and absorbency.
***Assessment Boundary**: Assessment of quantitative measurements is limited to length and weight.*

Indicator Learning Targets	Academic Vocabulary
• I can test different materials to see how they work for a specific job. DOK 2 • I can describe the properties of materials, like strong, bendy, soft, or waterproof. DOK 2 • I can collect and use data to figure out which material works best for what I need. DOK 3 • I can explain why one material is better than another for a certain purpose. DOK 3	• Strength • Color • Flexibility • Hardness • Texture • Temperature • Structure • Purpose • Matter • Properties • Solid

	• Liquid • Classify • Function

Resources

Mystery Science- Mud City
Mystery Science- Materials

Indicator

SC.2.3.1.c Analyze data from tests of two objects, designed to solve the same problem, to compare the strengths and weaknesses based on the properties.

Clarification Statement: Although NGSS classifies this performance expectation (K-2-ETS1-3) under **Engineering Design**, Nebraska places it within the Structure and Properties of Matter standard to connect design testing with the study of material properties. Students analyze data from tests of two objects designed to solve the same problem to compare how well each performs. Emphasis is on identifying the strengths and weaknesses of each solution based on observable properties such as size, shape, material, and stability, and using evidence from these tests to explain why one object may work better than another.

Indicator Learning Targets	Academic Vocabulary
• I can test two objects that are made to solve the same problem. DOK 2 • I can collect and use data to compare how well each object works. DOK 3 • I can look at the strengths and weaknesses of each object. DOK 3 • I can describe how the properties (like size, shape, material) affect how well each object works. DOK 3 • I can explain which object I think works better and why, using evidence from my test. DOK 3	• Investigate • Color • Texture • Similarities • Compare • Design problem • Observable • Properties • Matter • Properties • Solid • Liquid • Classify • Function

Resources

Mystery Science Why Do We Wear Clothes
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.2.3.1d Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.

Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.

Indicator Learning Targets	Academic Vocabulary
• I can take apart an object and see what pieces it is made of. DOK 2 • I can use those pieces to make a new object. DOK 2 • I can make observations and describe how the parts can be used in different ways. DOK 2 • I can explain, using what I saw, how one object can be taken apart and made into something new. DOK 3 • I can record what I did and share my ideas with others. DOK 2	• Structure • Disassembled • Reshaped • Characteristics • Assembled • Matter • Properties • Solid • Liquid • Classify • Function

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator
SC.2.3.1.e Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.
Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.

Indicator Learning Targets	Academic Vocabulary
• I can observe what happens when I heat or cool different materials. DOK 1 • I can tell the difference between changes that can be undone (like melting ice) and changes that cannot be undone (like cooking an egg). DOK 2 • I can use what I see and learn to explain if a change is reversible or not. DOK 3 • I can give examples and evidence to support my ideas about heating and cooling. DOK 3 • I can share my thought process with others using words, pictures, or writing. DOK 2	• Heating • Cooling • Changes • Reversible • Irreversible • Matter • Properties • Solid • Liquid • Classify • Function

Resources
Mystery Science- Heating and Cooling Physical Science- Heating and Cooling https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Topic Code: SC.2.7 Interdependent Relationships in Ecosystems
Standard Code: SC.2.7.2 Gather, analyze, and communicate evidence of interdependent relationships in ecosystems

Standard Learning Targets

- I can describe how plants and animals depend on each other to live and grow. DOK 2
- I can observe how animals get food, water, and shelter from their environment. DOK 1
- I can explain how plants need animals for things like pollination or seed spreading. DOK 2
- I can collect and use information to show how living things in a habitat are connected. DOK 3
- I can share what I learned about how living things help each other using pictures, writing, or talking. DOK 2

Standard Academic Vocabulary

- Plant
- Animal
- Habitat
- Function
- Structure
- Investigate/Investigation
- Survival
- Environment

Indicator

SC.2.7.2a Plan and conduct an investigation to determine if plants need sunlight and water to grow.

***Assessment Boundary**: Assessment is limited to testing one variable at a time.*

Indicator Learning Targets	Academic Vocabulary
• I can plan and carry out an investigation to find out what plants need to grow. DOK 3 • I can test if plants grow better with or without sunlight and water. DOK 2 • I can observe and record how my plants grow during the investigation. DOK 1 • I can use my data to explain if plants need sunlight and water to live. DOK 3	• Growth • Cause • Effect • Variable

Resources

Mystery Science Water, Sunlight, Plant and Growth
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.2.7.2.b Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating

plants.

Indicator Learning Targets	Academic Vocabulary
• I can describe how animals help move seeds or pollinate plants. DOK 2 • I can build a simple model that shows how an animal can spread seeds or help flowers grow. DOK 3 • I can explain how my model works like a real animal in nature. DOK 3 • I can use pictures, words, or demonstrations to show how seeds move, or flowers get pollinated. DOK2	• Seeds • Reproduce • Pollinate • Disperse • Plant

Resources

NGSS Seeds and Habitats
Mystery Science Seed Dispersal

Indicator

SC.2.7.2c Make observations of plants and animals to compare the diversity of life in different habitats.

Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.
***Assessment Boundary**: Assessment does not include specific animal and plant names in specific habitats.*

Indicator Learning Targets	Academic Vocabulary
• I can observe and describe different plants and animals in a habitat. DOK 1 • I can explore more than one habitat and notice what kinds of living things are there. DOK 2 • I can compare the plants and animals I see in different places. DOK 2 • I can explain how the plants and animals in one habitat are different from those in another. DOK 3	• Plant • Animal • Habitat • Function • Structure • Investigate • Survival • Environment

Resources

Mystery Science Habitats
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Topic Code: SC.2.13 Earth's Systems: Processes That Shape the Earth

Standard Code: SC.2.13.3 Gather, analyze, and communicate evidence of the processes that shape the earth

Earth's surface has changed over time through slow, gradual processes and sudden, powerful events such as volcanic eruptions, floods, and earthquakes. Wind and water are key forces that shape the land, causing both slow and rapid changes. Scientists and engineers develop solutions to reduce or prevent changes to the land caused by wind and water.

Standard Learning Targets

- I can observe and describe how wind and water can change the shape of the land. DOK 1
- I can give examples of Earth events that happen quickly (like earthquakes) or slowly (like erosion). DOK 2
- I can collect and use information to learn how the Earth changes over time. DOK 3
- I can look at pictures, videos, or data to find out what causes changes to land. DOK 2
- I can share what I learned about Earth's changes using drawings, writing, or talking. DOK 2

Standard Academic Vocabulary

- Earth's surface Change

Indicator

SC.2.13.3.a Use information from several sources to provide evidence that Earth events can occur quickly or slowly.

Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.
***Assessment Boundary**: Assessment does not include quantitative measurements of timescales.*

Indicator Learning Targets	Academic Vocabulary
• I can use books, videos, or pictures to learn about Earth events. DOK • I can tell the difference between fast Earth events (like volcanoes and earthquakes) and slow ones (like erosion or weathering). DOK 2 • I can give examples of Earth events that happen quickly or slowly. DOK 2 • I can use information I find to explain how Earth changes over time. DOK 3 • I can share what I learned using writing, drawing, or talking. DOK 2	• fast change (*volcanic eruptions, earthquakes, landslide*) • slow change (*erosion*) • Stable • Unstable

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.2.13.3.b Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.
Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.

Indicator Learning Targets	Academic Vocabulary
• I can describe how wind and water can change the land (like making hills smaller or washing soil away). DOK 1 • I can explore and compare different ways people try to stop wind or water from changing the land. DOK 2 • I can look at more than one solution and talk about how well each one works. DOK 3 • I can use pictures, models, or writing to show how these solutions help protect the land. DOK 2 • I can explain which solution I think works best and why. DOK 3	• Wind • Water • Prevent • Problem • Design • Model • Test • Compare • Solution • Stable • Unstable

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator
SC.2.13.3.c Develop a model to represent the shapes and kinds of land and bodies of water in an area.
***Assessment Boundary**: Assessment does not include quantitative scaling in models.*

Indicator Learning Targets	Academic Vocabulary
• I can name and describe different landforms like mountains, hills, valleys, and plains. DOK 1 • I can name and describe bodies of water like rivers, lakes, and oceans. DOK 1 • I can use pictures, drawings, or 3D models to show different land and water features. DOK 2 • I can build or draw a model that shows what land and water look like in a certain place. DOK 2 • I can explain my model and what it shows about the land and water in that area. DOK 3	• Patterns • Landforms (valleys, canyons, mountains, floodplains) • water on Earth (Manmade dams, sandbagging, windbreaks, terracing) • Liquid • Solid • Ice • Maps • Location • Models

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator
SC.2.13.3.d Obtain information to identify where water is found on Earth and that it can be solid or liquid.

Indicator Learning Targets	Academic Vocabulary
• I can find and use information to learn where water is found on Earth. DOK 2 • I can name places where water is found, like oceans, rivers, lakes, and glaciers. DOK 1 • I can describe water as a liquid (like rain or rivers) or a solid (like ice or snow). DOK 1 • I can tell the difference between liquid water and solid water. DOK 2 • I can share what I learned about water using words, pictures, or writing. DOK 2	• Water on Earth (oceans, rivers, lakes, ponds) • Patterns • Landforms (valleys, canyons, mountains, floodplains) • Liquid • Solid • Ice • Maps • Location

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Third Grade Content Standards

Grade 3 science instruction engages students in exploring motion, forces, life systems, and weather patterns, encouraging them to see both stability and change in the natural world. By studying how living things adapt, how forces act on objects, and how humans respond to environmental challenges, students grow in understanding of the order within creation and their role in caring for it. Focus areas include:

- **Forces and Motion:** Determining how balanced and unbalanced forces affect the motion of an object and describing electrical and magnetic interactions between objects that are not in contact.
- **Using Magnets:** Applying knowledge of magnetic interactions to design simple solutions that make use of magnets.
- **Traits and Life Cycles:** Examining life cycles and inherited traits of organisms, exploring how environmental factors influence traits, and understanding how variations among individuals can help them survive and reproduce.
- **Changes Over Time:** Comparing plants, animals, and environments of the past with those of today to see how life and habitats change over time.
- **Environmental Change:** Investigating how organisms respond when their environment changes—whether by adapting, relocating, or declining in number—highlighting the importance of balance within ecosystems.
- **Weather and Climate:** Organizing and using data to describe typical weather patterns during different seasons and regions.
- **Weather-Related Hazards:** Evaluating design solutions intended to reduce the impact of weather-related hazards, emphasizing how knowledge can be used to protect life and property.

Standard	
Standard Topic: Forces and Interactions: Motion and Stability **Standard Code: SC.3.1.1 Gather, analyze, and communicate evidence of forces and their interactions.**	
Indicator	
3.1.1.a Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.	
Clarification Statement: Examples could include an unbalanced force on one side of a ball can make it start moving; and balanced forces pushing on a box from both sides will not produce any motion at all. ***Assessment Boundary****: Assessment is limited to one variable at a time: number, size, or direction of forces. Assessment does not include quantitative force size, only qualitative and relative. Assessment is limited to gravity being addressed as a force that pulls objects down.*	
Learning Targets	**Academic Vocabulary**
• I can explain the difference between balanced and unbalanced forces. DOK 1	• Forces (e.g. number, size, direction)

• I can predict how an object will move when forces acting on it are balanced or unbalanced. DOK 2 • I can plan an investigation to test how forces affect the motion of an object. DOK 4 • I can collect and record data to show how forces change an object's motion. DOK 2 • I can use evidence from my investigation to explain how balanced or unbalanced forces affect motion. DOK 3 • I can communicate my results and explain what they show about force and motion. DOK 3 • I can conduct an investigation to provide evidence of forces. DOK 4	• Balanced • Unbalanced • Motion (e.g., starting, stopping, or changing direction) • Object • Contact • Cause and Effect Relationship

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://thewonderofscience.com/3-forces-and-interactions
https://openscied.org/instructional-materials/3-1-forces-interactions/
https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html
https://www.coreknowledge.org/science/
https://k12alliance.org/earlyimplementers/Grade3/index.html
www.brainpop.com ***
www.mysteryscience.com ***
www.generationgenius.com ***

Indicator

3.1.1.b Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

Clarification Statement: Examples of motion with a predictable pattern could include a child swinging in a swing, a ball rolling back and forth in a bowl, and two children on a seesaw.
***Assessment Boundary**: Assessment does not include technical terms such as period and frequency.*

Learning Targets	Academic Vocabulary
• I can observe and describe how an object moves, such as speed, direction, or distance. DOK 1 • I can measure an object's motion using tools like rulers, timers, or stopwatches. DOK 1 • I can identify patterns in how an object moves over time. DOK 2 • I can use patterns in motion to make predictions about where or how an object will move next. DOK 2 • I can explain how repeated observations and measurements help us understand and predict motion. DOK 3	• Patterns of motion (e.g., swinging pendulum, ball on curved track, magnet repulsion) • Prediction • Similarities • Differences • Investigation • Variables • Evidence • Unbalanced Force

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://thewonderofscience.com/3-forces-and-interactions
https://openscied.org/instructional-materials/3-1-forces-interactions/
https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html
https://www.coreknowledge.org/science/
https://k12alliance.org/earlyimplementers/Grade3/index.html
www.brainpop.com ***
www.mysteryscience.com ***
www.generationgenius.com ***

Indicator

3.1.1.c Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.

Clarification Statement: Examples of an electric force could include the force on hair from an electrically charged balloon and the electrical forces between a charged rod and pieces of paper; examples of a magnetic force could include the force between two permanent magnets, the force between an electromagnet and steel paper clips, and the force exerted by one magnet versus the force exerted by two magnets. Examples of cause-and-effect relationships could include how the distance between objects affects strength of the force and how the orientation of magnets affects the direction of the magnetic force.
***Assessment Boundary**: Assessment is limited to forces produced by objects that can be manipulated by students, and electrical interactions are limited to static electricity.*

Learning Targets

- I can ask questions about how electric or magnetic forces work between objects that are not touching. DOK 2
- I can describe examples of electric or magnetic interactions between objects that are not in contact, such as magnets attracting or repelling each other. DOK 3
- I can identify the cause (force) and effect (motion or reaction) in electric or magnetic interactions. DOK 2
- I can explain that magnetic and electric forces can act at a distance. DOK 3
- I can use observations or investigations to support my understanding of how these forces cause changes in motion. DOK 3
- I can ask questions to find the cause-and-effect relationship of magnets. DOK 3

Academic Vocabulary

- Non-contact force
- Electric force
- Magnetic force
- Charged object (e.g., static electricity)
- Magnet
- Cause and Effect
- Testable question
- Non-testable question

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://thewonderofscience.com/3-forces-and-interactions
https://openscied.org/instructional-materials/3-1-forces-interactions/
https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html
https://www.coreknowledge.org/science/
https://k12alliance.org/earlyimplementers/Grade3/index.html
www.brainpop.com ***
www.mysteryscience.com ***

www.generationgenius.com ***

Indicator

3.1.1.d Define a simple design problem that can be solved by applying scientific ideas about magnets.

Clarification Statement: Examples of problems could include constructing a latch to keep a door shut and creating a device to keep two moving objects from touching each other.

Learning Targets	Academic Vocabulary
• I can identify a real-world problem that could be solved using magnets. DOK 2 • I can describe how magnets can be used to solve a simple design problem. DOK 3 • I can explain the science behind how magnets attract or repel objects. DOK 2 • I can define the criteria (what the solution must do) and constraints (limits or rules) of a magnetic design solution. DOK 3 • I can use what I know about magnets to help create or improve a solution to a problem. DOK 4	• Magnet • Magnetic force • Design solution • Testable questions • Non-testable questions • Engineer/engineering • Technology

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://thewonderofscience.com/3-forces-and-interactions
https://openscied.org/instructional-materials/3-1-forces-interactions/
https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html
https://www.coreknowledge.org/science/
www.brainpop.com ***
www.mysteryscience.com ***
www.generationgenius.com ***

Standard

Standard Topic: Interdependent Relationships in Ecosystems
Standard Code: SC.3.7.2 Gather, analyze, and communicate evidence of the interdependent relations in ecosystems.

Indicator

SC.3.7.2.a Construct an argument that some animals form groups that help members survive.

Learning Targets	Academic Vocabulary
• I can identify animals that live and work in groups, such as bears, bees, and fish. DOK 1 • I can describe ways animal groups help members survive, such as	• Survival (e.g., obtaining food, defense, response to environmental change)

protection, finding food, or caring for young. DOK 1 • I can gather evidence from texts, videos, or observations about how animals benefit from living in groups. DOK 1 • I can explain the cause-and-effect relationship between group behavior and survival. DOK 2 • I can construct an argument using evidence to show how living in a group helps animals survive. DOK 3	• Cause and Effect • Scientific argumentation • Claim • Evidence • Reasoning • Relationships

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://thewonderofscience.com/3-ecosystem-change
https://openscied.org/curriculum/elementary-school/explore-the-curriculum/
https://www.coreknowledge.org/science/
www.brainpop.com ***
www.mysteryscience.com ***
www.generationgenius.com ***

Indicator

SC.3.7.2.b Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.

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

Learning Targets	Academic Vocabulary
• I can describe what fossils are and how they form. DOK 1 • I can analyze fossil evidence to learn about organisms that lived long ago. DOK 2 • I can use data from fossils to describe what past environments were like. DOK 2 • I can compare fossil findings to current plants and animals to identify similarities and differences. DOK 2 • I can explain how scientists use fossils to understand changes in organisms and environments over time. DOK 2 • I can analyze the relationship between fossil data and changes in the environment. DOK 3	• Organisms (plants and animals) • Environments • Fossils • Extinct • Scale (time)

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://thewonderofscience.com/3-ecosystem-change
https://openscied.org/curriculum/elementary-school/explore-the-curriculum/
https://www.coreknowledge.org/science/
www.brainpop.com ***
www.mysteryscience.com ***

www.generationgenius.com ***

Indicator

SC.3.7.2.c Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

Learning Targets	Academic Vocabulary
• I can describe the features of a specific habitat (like desert, forest, ocean, or tundra). DOK 1 • I can identify which organisms are best suited to live in a particular habitat and explain why. DOK 2 • I can explain that some organisms struggle or cannot survive if the habitat does not meet their needs. DOK 2 • I can gather evidence (from texts, observations, or videos) about how different organisms survive in a habitat. DOK 2 • I can construct an argument using evidence to show why some organisms survive well and others do not in the same environment. DOK 3 • I can explain how different factors in a habitat can impact an organism's survival. DOK 2	• Organisms • Characteristics • Needs • Habitat • Survival • Cause and effect • Claim • Evidence • Relationship

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://thewonderofscience.com/3-ecosystem-change
https://openscied.org/curriculum/elementary-school/explore-the-curriculum/
www.brainpop.com ***
www.mysteryscience.com ***
www.generationgenius.com ***

Indicator

SC.3.7.2.d Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

***Assessment Boundary**: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.*

Learning Targets	Academic Vocabulary
• I can identify problems that happen when the environment changes (like pollution, deforestation, climate change, or natural disasters). DOK 1 • I can explain how changes in the environment can affect the plants and animals that live there. DOK 2 • I can describe possible solutions to help plants and animals survive environmental changes. DOK 2 • I can make a claim about how well a solution works to reduce the impact of environmental change. DOK 2	• Environmental change • Organisms • Ecosystem • Design solution • Population • System

• I can support my claim with evidence and reasoning from observations, data, or research. DOK 3 • I can explain how different environmental changes could affect plants and animals living in an area. DOK 3 • I can make a claim about the best solution to a problem caused by changes to the environment. DOK 4	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://thewonderofscience.com/3-ecosystem-change
https://openscied.org/curriculum/elementary-school/explore-the-curriculum/
https://www.coreknowledge.org/science/
www.brainpop.com ***
www.mysteryscience.com ***
www.generationgenius.com ***

Indicator

SC.3.7.2.e Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Learning Targets	Academic Vocabulary
• I can define a problem and identify its criteria (what the solution must do) and constraints (limits like time, materials, or cost). • I can brainstorm and list multiple possible solutions to a problem. DOK 4 • I can evaluate how well each solution meets the criteria and stays within the constraints. DOK 4 • I can compare the strengths and weaknesses of different solutions. DOK 3 • I can select the best solution based on evidence and reasoning. DOK 3 • I can use a model to show a solution to a problem. DOK 2 • I can design and test a solution. DOK 4	• Environmental change • Organisms • Ecosystem • Design solution • Population • System • Criteria • Constraint

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://thewonderofscience.com/3-ecosystem-change
https://openscied.org/curriculum/elementary-school/explore-the-curriculum/
https://www.coreknowledge.org/science/
www.brainpop.com ***
www.mysteryscience.com ***
www.generationgenius.com ***

Standard

Standard Topic: Inheritance and Variation: Life Cycles and Traits
Standard Code: SC.3.9.3 Gather and analyze data to communicate an understanding of inheritance and variation of traits through life cycles and environmental influences.

Indicator

SC.3.9.3a Develop models to describe that organisms have unique and diverse life cycles, but all have in common birth, growth, reproduction, and death.

***Assessment Boundary**: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.*

Learning Targets	Academic Vocabulary
• I can describe the life cycle of different organisms. DOK 1 • I can identify the stages of birth, growth, reproduction, and death in an organism's life cycle. DOK 1 • I can compare the life cycles of different animals or plants to find similarities and differences. DOK 2 • I can explain that all organisms go through a life cycle that includes being born, growing, reproducing, and dying. DOK 2 • I can create a model (like a diagram or chart) to show the life cycle of an organism. DOK 3 • I can use evidence to support that life cycles are different among species but always include key stages. DOK 3 • I can observe or research how insects, mammals, amphibians, or plants grow and change over time. DOK 1	• Organisms (both plant* and animal**) • Life cycles • Birth • Growth • Reproduction • Death • Patterns • Flowering plants • Model • Diagram

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://thewonderofscience.com/3-life-cycles-and-traits
https://openscied.org/curriculum/elementary-school/explore-the-curriculum/
https://www.coreknowledge.org/science/
www.brainpop.com ***
www.mysteryscience.com ***
www.generationgenius.com ***

Indicator

SC.3.9.3b Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

***Assessment Boundary**: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.*

Learning Targets	Academic Vocabulary

• I can identify traits in plants and animals that are inherited from their parents. DOK 1 • I can recognize that offspring of the same species can have similar but not identical traits. DOK 1 • I can collect or analyze data (charts, images, observations) to find patterns of inherited traits. DOK 2 • I can describe how traits can vary within a group of the same type of organism. DOK 2 • I can explain the difference between inherited traits and traits influenced by the environment. DOK 2 • I can use evidence to support the idea that both inheritance and variation are seen in living things. DOK 2 • I can use data to explain how traits are passed down from parents to offspring. DOK 2 • I can analyze data to show the relationship between parents and offspring. DOK 2	• Organisms (plants and animals) • Group • Traits • Parents and offspring • Inheritance • Variation • Patterns

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://thewonderofscience.com/3-life-cycles-and-traits
https://openscied.org/curriculum/elementary-school/explore-the-curriculum/
https://www.coreknowledge.org/science/
www.brainpop.com ***
www.mysteryscience.com ***
www.generationgenius.com ***

Indicator

SC.3.9.3c Use evidence to support the explanation that traits can be influenced by the environment.

Learning Targets	Academic Vocabulary
• I can describe how environmental factors can affect traits in living organisms. DOK 1 • I can identify examples where the environment changes a trait. DOK 1 • I can use evidence from plants, animals, or humans to explain how the environment influences traits. DOK 2 • I can compare and contrast inherited traits and environmentally influenced traits. DOK 2 • I can explain that traits are not always fixed and can change depending on environmental conditions. DOK 2	• Organisms (plants and animals) • Environmental factors (e.g., amount of food or water, exercise, chemicals) • Traits (e.g., height or weight of a plant or animal, color or quantity of the flowers) • Cause and Effect • Inherit

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://thewonderofscience.com/3-life-cycles-and-traits

https://openscied.org/curriculum/elementary-school/explore-the-curriculum/
https://www.coreknowledge.org/science/
www.brainpop.com ***
www.mysteryscience.com ***
www.generationgenius.com ***

Indicator

SC.3.9.3d Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

Learning Targets	Academic Vocabulary
• I can describe how individuals of the same species can have variations in traits. DOK 1 • I can explain how some variations in traits can help an individual survive better in its environment. DOK 1 • I can explain how certain traits can make it easier for individuals to find mates and reproduce. DOK 1 • I can use real-world examples and evidence to support how trait variations give survival and reproductive advantages. DOK 2 • I can construct an explanation based on evidence that connects trait variation to survival and reproduction success. DOK 3	• Characteristics (e.g., plant thorns, animal camouflage) • Variations • Individuals • Species • Effect • Surviving • Finding mates • Reproduction

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://thewonderofscience.com/3-life-cycles-and-traits
https://openscied.org/curriculum/elementary-school/explore-the-curriculum/
https://www.coreknowledge.org/science/
www.brainpop.com ***
www.mysteryscience.com ***
www.generationgenius.com ***

Standard

Standard Topic: Weather and Climate
Standard Code: SC.3.12.4 Gather and analyze data to communicate an understanding of weather and climate.

Indicator

SC.3.12.4.a Represent data in table, pictograph, and bar graph displays to describe typical weather conditions expected during a particular season.

***Assessment Boundary**: Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.*

Learning Targets	Academic Vocabulary
• I can collect and organize weather data for a season. DOK 2 • I can create tables to display seasonal weather data. DOK 2 • I can create graphs to show patterns in seasonal weather conditions. DOK 2 • I can describe typical weather conditions for a season based on the data shown in tables or graphs. DOK 3 • I can use data to compare weather patterns between different seasons. DOK 3	• Weather conditions (e.g., average temperature, precipitation and wind direction) • Seasons • Climate • Areas • Patterns • Data table

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://thewonderofscience.com/3-weather-and-climate
https://openscied.org/instructional-materials/3-2-weather-hazards/
https://www.coreknowledge.org/science/
www.brainpop.com ***
www.mysteryscience.com ***
www.generationgenius.com ***

Indicator

SC.3.12.4.b Obtain and combine information to describe climates in different regions of the world.

Learning Targets	Academic Vocabulary
• I can find and gather information about the climate in different parts of the world. DOK 2 • I can describe the main features of climate, such as temperature, precipitation, and seasons. DOK 2 • I can compare the climates of two regions using facts and data. DOK 2 • I can explain how climate differs from day-to-day weather. DOK 1 • I can use maps, charts, and texts to describe and explain climate patterns around the world. DOK 2	• Climates • Regions • Patterns

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://thewonderofscience.com/3-weather-and-climate
https://openscied.org/instructional-materials/3-2-weather-hazards/
https://www.coreknowledge.org/science/
www.brainpop.com ***
www.mysteryscience.com ***
www.generationgenius.com ***

Indicator

SC.3.12.4.c Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

Learning Targets	Academic Vocabulary
• I can identify different weather-related hazards, such as floods, hurricanes, or wildfires. DOK 1 • I can describe design solutions that help reduce the impact of weather-related hazards. DOK 2 • I can make a claim about how well a design solution works to reduce damage or danger from a specific hazard. DOK 3 • I can support my claim with evidence and reasoning from research or data. DOK 3 • I can explain why one solution might be better than another for reducing the impact of a weather hazard. DOK 3	• Weather-related hazards (e.g., heavy rain or snow, strong winds, lightning, etc.) • Impact (e.g., flooding, fires) • Cause and effect • Design solution

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://thewonderofscience.com/3-weather-and-climate
https://openscied.org/instructional-materials/3-2-weather-hazards/
https://www.coreknowledge.org/science/
www.brainpop.com ***
www.mysteryscience.com ***
www.generationgenius.com ***

Standard

Engineering Design

Indicator

3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

Learning Targets	Academic Vocabulary
• I can identify a need or want that could be solved with a design solution. DOK 1 • I can clearly define a simple design problem based on that need or want. DOK 2 • I can describe what the solution must do (criteria for success). DOK 2 • I can list any limits on materials, time, or cost (constraints). DOK 2 • I can explain how understanding the criteria and constraints helps guide the design process. DOK 2	• Design solution • Criteria • Constraint • Design process

Resources

https://yes.mos.org/curricula/
https://www.teacherspayteachers.com/Product/FREE-STEM-Activity-Paper-Chain-STEM-Challenge-2749232
https://www.teacherspayteachers.com/Product/FREE-STEM-Activity-Rosie-Revere-Engineer-Flying-Machine-Challenge-5287805

Indicator

3-5-ETS1-2
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Learning Targets	Academic Vocabulary
• I can think of and describe multiple possible solutions to a problem. DOK 3 • I can explain what the solution needs to do (criteria). DOK 3 • I can identify the limits or restrictions (constraints), such as time, materials, or cost. DOK 2 • I can compare each solution based on how well it meets the criteria and stays within the constraints. DOK 3 • I can choose the best solution and explain why it is the most effective based on evidence. DOK 3	• Criteria • Constraint • Evidence

Resources

https://yes.mos.org/curricula/
https://www.teacherspayteachers.com/Product/FREE-STEM-Activity-Paper-Chain-STEM-Challenge-2749232
https://www.teacherspayteachers.com/Product/FREE-STEM-Activity-Rosie-Revere-Engineer-Flying-Machine-Challenge-5287805

Indicator

3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled, and failure points are considered to identify aspects of a model or prototype that can be improved.

Learning Targets	Academic Vocabulary
• I can plan a fair test by changing only one variable at a time and keeping others the same. DOK 4 • I can carry out a test to collect data on how a model performs. DOK 2 • I can observe and identify where a model does not work well. DOK 2 • I can use test results to figure out what parts of the design need improvement. DOK 3 • I can suggest changes to make a model work better based on evidence from testing. DOK 3	• Model • Evidence • Controlled variables • Failure points • Prototype

Resources

https://yes.mos.org/curricula/
https://www.teacherspayteachers.com/Product/FREE-STEM-Activity-Paper-Chain-STEM-Challenge-2749232
https://www.teacherspayteachers.com/Product/FREE-STEM-Activity-Rosie-Revere-Engineer-Flying-Machine-Challenge-5287805
https://www.sciencebuddies.org/science-fair-projects/science-projects/third-grade

Fourth Grade Content Standards

Grade 4 science instruction engages students in exploring energy, waves, life structures, and Earth processes. Students study how energy moves, how living things are structured for survival, and how Earth changes over time. These investigations encourage problem-solving and highlight how knowledge can be used responsibly in caring for the world.
Focus areas include:

- **Waves and Motion:** Using models to describe wave patterns in terms of amplitude and wavelength and understanding how waves can cause objects to move.
- **Energy and Motion:** Explaining how the speed of an object relates to its energy and how energy transfers through sound, light, heat, electrical currents, and collisions.
- **Energy Solutions:** Designing, testing, and refining devices that convert energy from one form to another.
- **Structures of Living Things:** Examining how internal and external structures support survival, growth, behavior, and reproduction, and how light and vision allow us to observe the world.
- **Earth Processes:** Studying how water, ice, wind, and vegetation change landforms and evaluating solutions to reduce the impact of these processes on humans.
- **Mapping Earth's Features:** Using maps to identify and interpret patterns of Earth's features.

Standard

Standard Topic: Waves: Waves and Information
Standard Code: SC.4.2 Gather, analyze, and communicate evidence of waves and the information they transfer.

Indicator

SC.4.2.1 Gather, analyze, and communicate evidence of waves and the information they transfer.

***Assessment Boundary**: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.*

Learning Targets	Academic Vocabulary
• I can collect evidence of waves and the information they transfer. DOK 2 • I can analyze evidence of waves and the information they transfer. DOK 4 • I can communicate the evidence of waves and the information they transfer. DOK 1	• wave • transfer • analyze • amplitude • wavelength • crest • trough • peak • rate • period

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
Formative Assessment – Nebraska Department of Education
Password: ScienceFA
Stackable, Instructionally-Embedded, Portable Science (SIPS) Assessments project

Indicator

SC4.2.a Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. (NGSS 4-PS4-1)

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.*

Learning Targets	Academic Vocabulary
• I can use a model of waves to demonstrate wave behavior. DOK 1 • I can identify similarities and differences in wave patterns. DOK 2 • I can describe wave patterns of repeating amplitude and wavelength. DOK 1 • I can describe relationships involving wave amplitude, wavelength, and the motion of an object. DOK 1	• waves • wave patterns • amplitude • wavelength • model • criteria • constraints

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
Levitating Objects Using Sound! - Quick Bytes

Indicator

SC.4.2.b Generate and compare multiple solutions that use patterns to transfer information. (NGSS 4-PS4-3)

Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.

Learning Targets	Academic Vocabulary

• I can generate multiple solutions to transfer information. DOK 4 • I can compare solutions using patterns to transfer information. DOK 2/3	• generate • compare • transfer • pattern • wave • encode • decode • transmit • convert • problem • solution • criteria • constraints • model • data • test • modify • optimizing solution

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
PhET

Standard

Standard SC.4.4 Energy: Conservation and Transfer
Indicator SC.4.4.2
Gather, analyze, and communicate evidence of energy conservation and use patterns to transfer information.

Learning Targets	Academic Vocabulary
• I can gather evidence of energy conservation. DOK 2 • I can analyze evidence of energy conservation. DOK 4 • I can communicate evidence of energy conservation. DOK 1 • I can use patterns to transfer information. DOK 2	• conservation • transfer • collision • contact force • sound • light • heat • motion • affected

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
The Wonder of Science
PhET

Indicator

SC.4.4.a Ask questions and predict outcomes in relating the speed of an object to the energy of that object.

Clarification Statement: 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.*

Learning Targets	Academic Vocabulary
• I can ask questions relating the speed of an object to the energy of that object. DOK 2 • I can predict outcomes in relating the speed of an object to the energy of that object. DOK 2	• speed • energy • predict • outcome • motion • energy moved by motion

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
The Wonder of Science
PhET

Indicator

SC.4.4.b Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric current. (NGSS 4-PS3-2)

***Assessment Boundary**: Assessment does not include quantitative measurements of energy.*

Learning Targets	Academic Vocabulary
• I can explain how sound energy moves from place to place. DOK 2 • I can explain how light energy moves from place to place. DOK 2 • I can explain how heat energy moves from place to place. DOK 2 • I can explain how electric current moves from place to place. DOK 2	• sound energy • light energy • heat energy • electric current

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
4-PS3-2 Lesson Plans | Energy Transfer

Indicator

SC.4.4.c Ask questions and predict outcomes about the changes in energy that occur when objects collide. (NGSS 4-PS3-3)

Clarification Statement: 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.*

Learning Targets	Academic Vocabulary
• I can ask questions about what will happen when two objects hit each other (collide). DOK 2 • I can predict what will happen when two objects hit each other (collide). DOK 2	• collision • predict • energy transfer • contact forces • motion • sound • light • heat • affected

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
The Wonder of Science
PhET

Indicator

SC.4.4.d Apply scientific ideas to design, test, and refine a device or prototype that converts energy from one form to another. (NGSS 4-PS3-4)

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.*

Learning Targets	Academic Vocabulary
• I can design and build a device that changes energy from one form to another. DOK 4 • I can test and refine a device that changes energy from one form to another. DOK 3	• scientific method • prototype • energy • conversion • electric energy • energy in motion • sound energy • light energy • heat energy • conversion • model • test • data • modify • problem • solution

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
https://www.teachengineering.org/lessons/view/ucd_energy_lesson03
NGSS - Energy & Collisions Activities for 4th Grade Science
The Wonder of Science

Indicator

SC.4.4.e Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. (NGSS 4-ESS3-1)

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.

Learning Targets	Academic Vocabulary
• I can describe how energy and fuels are derived from natural resources. DOK 1 • I can explain how fuels used from natural resources affect the environment. DOK 2	• types of fuels • natural resources • environment • resources • data

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
Renewable Energy - Lesson - TeachEngineering

Standard

Standard SC.4.6 Structures, functions, and information processing

Indicator

SC.4.6.3 Analyze the data to communicate that living things have internal and external structures that function to support survival, growth, and behavior.

Learning Targets	Academic Vocabulary
• I can develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. DOK 3	• sense receptors • receiving information • processing information • responding to information • perception

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
4-LS1-1: Internal and External Structures

Indicator

SC.4.6.3.a Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. (NGSS 4-LS1-1)

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.*

Learning Targets	Academic Vocabulary
• I can construct an argument that plants and animals have internal structures that function to support survival, growth, behavior, and reproduction. DOK 3 • I can construct an argument that plants and animals have external structures that function to support survival, growth, behavior, and reproduction. DOK 3	• organism • internal • external • structure • function • survival • growth • behavior • reproduction • variation

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
https://nebraskapublicmedia.pbslearningmedia.org/subjects/science/?gad_source=1&gad_campaignid=18796878875&gbraid=0AAAADQ6XOnOZAhIyEX6-bxrPxTSArRLc&rank_by=recency

Indicator

SC.4.6.3.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 different ways. (NGSS 4-LS1-2)

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.*

Learning Targets	Academic Vocabulary
• I can use a model to describe how animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.	• sense receptors • receiving information • processing information • responding to information • perception

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
Animals and Their Senses: 4th Grade NGSS Models for Information Processing — The Science Penguin

Standard

SC.4.13 Earth's Systems: Processes That Shape the Earth

Indicator

SC.4.13.4 Gather and analyze data to communicate an understanding of Earth's systems and processes that shape the Earth.

Learning Targets	Academic Vocabulary
• I can gather data to communicate an understanding of Earth's systems and processes that shape the Earth. DOK 2 • I can analyze data to communicate an understanding of Earth's systems and processes that shape the Earth. DOK 4	• effects • natural hazard • reduce • impact • problem • solutions • criteria • constraint • models • data • test • modify • optimizing solutions

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
EarthLabs - TERC

Indicator

SC.4.13.4.a Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. (NGSS 4-ESS1-1)

***Clarification Statement**: Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.* ***Assessment Boundary**: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.*

Learning Targets	Academic Vocabulary

• I can identify evidence from patterns in rock formations. DOK 2 • I can identify fossils in rock layers to support an explanation for changes in a landscape over time. DOK 2	• environment • rock layers • fossils • change over time

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
EarthLabs - TERC

Indicator

Sc.4.13.4.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. (NGSS 4- ESS2-1)

***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.*

Learning Targets	Academic Vocabulary
• I can make observations to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. DOK 2 • I can make measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. DOK 2	• weathering • erosion • vegetation • sediment • geosphere • hydrosphere • biosphere • effects

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
Glaciers, Water and Wind, Oh My! - Activity - TeachEngineering
LDC Core Tools

Indicator

SC.4.13.c Analyze and interpret data from maps to describe patterns of Earth's features. (NGSS 4-ESS2-2)

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.

Learning Targets	Academic Vocabulary
• I can analyze data from maps to describe patterns of Earth's features. DOK 4 • I can interpret data from maps to describe patterns of Earth's features. DOK 3	• earthquake • volcano • mountain range • mountain chain

	• continent • boundary • ocean floor • ocean trench • topographic map • Earth's features

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
Earths Features: Interpreting Patterns with Topographic Maps - Teachers (U.S. National Park Service)
Teacher Resources

Indicator

SC.4.13.4.c Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. (NGSS 4-ESS3-2)

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.*

Learning Targets	Academic Vocabulary
• I can generate multiple solutions to reduce the impacts of natural Earth processes on humans. DOK 2 • I can compare multiple solutions to reduce the impacts of natural Earth processes on humans. DOK 2	• effects • natural hazard • reduce • impact • problem • solution • criteria • constraint • models • data • test • modify • optimizing solution

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
Earth's Processes & Mapping - Mosa Mack Science
Engineering to Prevent Natural Disasters: Save Our City! - Activity - TeachEngineering

Standard

Engineering Design

Indicator

Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

Learning Targets	Academic Vocabulary
• I can define a simple design problem reflecting a need or a want. DOK 1 • I can summarize a simple design problem to include specified criteria for success and constraints on materials, time, or cost. DOK 2	• criteria • constraints • simple design

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
Defining an Engineering Design Problem with Paper Airplanes | Lesson Plan
Formative Assessment – Nebraska Department of Education
Password: ScienceFA
Exploring Energy: Energy Conversion - Lesson - TeachEngineering

Indicator

Plan and carry out fair tests in which variables are controlled, and failure points are considered to identify aspects of a model or prototype that can be improved

Learning Targets	Academic Vocabulary
• I can test different solutions for an engineering problem. DOK 2 • I can summarize if an idea will work, fail, or just needs improvement. DOK 2	• variables • controlled variable • prototype • model

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
Formative Assessment – Nebraska Department of Education
Password: ScienceFA
Exploring Energy: Energy Conversion - Lesson - TeachEngineering

Indicator

Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Learning Targets	Academic Vocabulary

• I can create different solutions for an engineering problem. DOK 4 • I can analyze if an idea will work, fail, or just needs improvement. DOK 4	• solutions • criteria • constraints

Resources

Science Classroom Formative Task Repository – Nebraska Department of Education
Formative Assessment – Nebraska Department of Education
Password: ScienceFA
Exploring Energy: Energy Conversion - Lesson - TeachEngineering

Fifth Grade Content Standards

Grade 5 science instruction helps students see patterns and relationships in the physical world, life systems, and Earth's resources. Students investigate matter and energy, water distribution and movement, and patterns in the sky. These studies deepen understanding of how natural systems work together and encourage responsible use of knowledge and resources in caring for the world. Focus areas include:

- **Matter and Its Changes:** Modeling that matter is made of particles too small to be seen and understanding that total weight (mass) is conserved, even when matter changes form.
- **New Substances:** Investigating whether mixing substances results in new materials with different properties.
- **Matter and Energy in Ecosystems:** Modeling how matter cycles among plants, animals, decomposers, and the environment, and how energy in food originates from the sun and flows through living systems.
- **Water on Earth:** Graphing and describing the distribution of water on Earth, modeling interactions among Earth's systems, and considering design solutions for conserving fresh water.
- **Patterns in the Sky:** Observing and describing changes in shadows, day and night cycles, and the seasonal appearance of stars to identify consistent patterns in nature.

The following resources can be used for all 5th grade Science Standards:
https://www.coreknowledge.org/science/ https://sipsassessments.org/resources/ https://openscied.org/curriculum/elementary-school/explore-the-curriculum/ https://thewonderofscience.com/5-matter-structure-and-properties https://mysteryscience.com/home (requires paid subscription) https://www.generationgenius.com/ (requires paid subscription) https://www.brainpop.com/discover/ (requires paid subscription)

Standard

Structure and Properties of Matter
Standard SC.5.3.1 Gather, analyze, and communicate evidence of structure and properties of matter.

Indicator

SC.5.3.1.a Develop a model to describe that matter is made of particles too small to be seen.

Clarification Statement: Examples of evidence supporting a model could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.
***Assessment Boundary**: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.*

Learning Targets	Academic Vocabulary
• I can develop a model to describe a phenomenon. DOK 3 • I can explain that matter is made up of particles too small to be seen. DOK 1	• Matter • Particles • Substance • Model • Atom • Materials

Resources

NGSS 5-PS1-1
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://phet.colorado.edu/sims/html/states-of-matter-basics/latest/states-of-matter-basics_en.html

Indicator

SC.5.3.1.b Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.

Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.
***Assessment Boundary**: Assessment does not include distinguishing mass and weight.*

Learning Targets	Academic Vocabulary
• I can explain the difference between a chemical and physical change. DOK 2 • I can make predictions about physical and chemical changes prior to their occurrence. DOK 2 • I can explain that matter is never created or destroyed, it only changes forms. DOK 1 • I can use various scientific tools to measure and graph weight. DOK 2 • I can create a variety of graphs and tables to display information gathered	• Physical change Chemical change • Quantities • Weight • Substance • Matter • Temperature • Phase change

from experiments. DOK 2	Dissolving • Properties • Reaction • Particles

Resources

NGSS 5-PS1-2
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://www.acs.org/education/resources/k-8/inquiryinaction/fifth-grade/chapter-4/conservation-of-mass.html

Indicator

SC.5.3.1.c Make observations and measurements to identify materials based on their properties.

Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.
***Assessment Boundary**: Assessment does not include density or distinguishing mass and weight.*

Learning Targets	Academic Vocabulary
• I can describe different materials using properties like color, texture, hardness, flexibility, and ability to conduct heat or electricity. DOK 2 • I can measure and compare properties such as mass, temperature, volume, and length using scientific tools. DOK 2 • I can identify unknown materials by observing and measuring their properties. DOK 2 • I can record and organize data from observations and measurements to help make conclusions. DOK 2	• Matter • Mass • Temperature • Volume • Properties • Material • Measurement • Conduction • Electricity • Observations

Resources

5-PS1-3
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://www.impactcoachingpartners.com/science/elementary-standards/es-physical-science/5-ps1-3

Indicator

5.3.1.b Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

Learning Targets	Academic Vocabulary
• I can plan and carry out an investigation to mix substances safely. DOK 4 • I can observe and record what happens when I mix two or more substances. DOK 1	• Substance • Particle • Chemical property

• I can identify signs that a new substance may have formed (like color change, gas bubbles, temperature change, or a new solid). DOK 2 • I can explain the difference between a physical change (no new substance) and a chemical change (new substance formed). DOK 1	• Physical property • Physical change • Chemical change • Investigation

Resources

5-PS1-4
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://www.acs.org/education/resources/k-8/inquiryinaction/fifth-grade/chapter-3/exploring-baking-powder.html

Standard

Standard Topic: Matter and Energy in Organisms and Ecosystems

Standard Code: SC.5.8.2 Gather and analyze data to communicate understanding of matter and energy in organisms and ecosystems.

Indicator

SC.5.8.2.a Use models to describe that energy in animals' food (used for body repair, growth, and motion and to maintain body warmth) was once energy from the sun.

Clarification Statement: Examples of models could include diagrams, and flow charts.

Learning Targets	Academic Vocabulary
• I can use models to show how energy from the sun moves through a food chain. DOK 2 • I can explain that plants use sunlight to make their own food through photosynthesis. DOK 1 • I can describe how animals get energy by eating plants or other animals. DOK 1 • I can show that the energy animals use for movement, growth, and warmth originally came from the sun. DOK 2 • I can identify how energy flows from the sun → plants → animals in a model (like a diagram or food web). DOK 2	• Energy • Matter • Transfer • Growth • Repair • Movement • Heat

Resources

5-PS3-1
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.5.8.2.b Support an argument that plants get the materials they need for growth chiefly from air and water.

Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil

Learning Targets	Academic Vocabulary
• I can explain that plants mostly use air and water—not soil—for their growth. DOK 1 • I can describe how plants take in carbon dioxide from the air and water from the ground. DOK 1 • I can use evidence (like observations or data) to support my explanation of how plants grow. DOK 3 • I can support an argument using models, experiments, or information. DOK 3	• Plant matter • Photosynthesis • Convert • Energy

Resources

5-LS1-1
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.5.8.2.c Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Clarification Statement: Focus on helping students understand that plants take in non-food matter (air, water, and nutrients from decomposed materials in soil) and transform it into food. Examples of systems to explore include individual organisms, whole ecosystems, and the Earth as a system.
***Assessment Boundary**: Assessment does not include molecular explanations.*

Learning Targets	Academic Vocabulary
• I can develop a model that shows how matter moves through a food web or ecosystem. DOK 3 • I can describe how plants get matter from air and water to grow. DOK 1 • I can explain how animals get matter by eating plants or other animals. DOK 1 • I can describe how decomposers break down dead plants and animals and return matter to the environment. DOK 1 • I can use my model to show how matter cycles between living things and the environment. DOK 2	• Food • Organism • Food web • Decomposer • Soil • System • Interaction

Resources

5-LS2-1
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Space Systems: Earth's Stars and Solar System
Standard SC.5.11.3 Gather and analyze data to communicate understanding of space systems: Earth's stars and solar system.

Indicator

SC.5.11.3.a Support an argument that the gravitational force exerted by Earth on objects is directed down toward Earth's center.

Clarification Statement: "Down" is a local description of the direction that points toward the center of the spherical Earth.
***Assessment Boundary**: Assessment does not include mathematical representation of gravitational force.*]

Learning Targets	Academic Vocabulary
• I can describe gravity as a force that pulls objects down toward Earth. DOK 1 • I can use evidence from investigations or observations to support that Earth's gravity pulls things toward its center. DOK 3 • I can support an argument that gravity acts the same no matter which direction something is facing—it always pulls "down." DOK 3 • I can explain that gravity affects all objects, even if we can't see it working. DOK 1	• Earth • Downward • Gravity • Force • Spherical • Exert • Gravitational force

Resources

5-PS2-1
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.5.11.3.b Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.

***Assessment Boundary**: Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).*

Learning Targets	Academic Vocabulary
• I can describe that stars (including the Sun) give off their own light. DOK 1 • I can explain that the Sun looks brighter than other stars because it is much closer to Earth. DOK 1 • I can use models or evidence to show how distance affects how bright a star appears from Earth. DOK 2 • I can support an argument with evidence. DOK 3	• Star • Apparent brightness Visible • Relative distance Measurement units

Resources

5-ESS1-1

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.5.11.3.c Represent data in graphical displays to reveal patterns of daily changes in the length and direction of shadows, length of day and night, and the seasonal appearance of some stars in the night sky.

Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.
***Assessment Boundary**: Assessment does not include causes of seasons*

Learning Targets	Academic Vocabulary
• I can collect and use data to show how shadows change in length and direction throughout the day. DOK 3 • I can create graphs or charts that show how the length of daylight changes with the seasons. DOK 2 • I can identify patterns in the appearance of stars in the night sky during different seasons. DOK 1 • I can explain how Earth's movement causes these patterns in shadows, daylight, and star visibility. DOK 3 • I can use my graphs or models to describe and share the patterns I see in the data. DOK 2	• North • South • East • West • Axis • Stars • Constellation • Planets • Orbit • Rotation • Revolves • Patterns • North Pole • South Pole • Rates of change • Quantitative data • Qualitative data

Resources

5-ESS1-2
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Standard Topic: Earth's Systems
Standard Code: SC.5.13.4 Gather and analyze data to communicate understanding of Earth's systems

Indicator

SC.5.13.4.a Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence

of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.
***Assessment Boundary**: Assessment is limited to the interactions of two systems at a time.*

Learning Targets	Academic Vocabulary
• I can describe what the geosphere, biosphere, hydrosphere, and atmosphere are. DOK 1 • I can give examples of how Earth's systems interact (like rain causing landslides or plants affecting the air). DOK 2 • I can develop a model (like a diagram or drawing) to show how two or more Earth systems affect each other. DOK 3 • I can explain how changes in one Earth system can cause changes in another. DOK 2 • I can use my model to describe and communicate how Earth's systems are connected. DOK 2	• Geosphere • Biosphere • Hydrosphere • Atmosphere • Matter • Energy • Cycle • System • Interactions

Resources

5-ESS2-1
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.5.13.4.b Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

***Assessment Boundary**: Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.*

Learning Targets	Academic Vocabulary
• I can describe where Earth's water is found, including oceans, glaciers, rivers, lakes, and groundwater. DOK 1 • I can identify which sources contain fresh water and which contain salt water. DOK 1 • I can collect and organize data about the amounts and percentages of water in different reservoirs. DOK 2 • I can create graphs or charts to show the distribution of water and fresh water on Earth. DOK 2 • I can explain what my graphs show about where most of Earth's fresh water is located. DOK 2	• Freshwater • Saltwater • Reservoir • Glaciers • Ground water • Polar ice caps • Hydrosphere • Percentage • Distribution

Resources

5-ESS2-2
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.5.13.4.c Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Learning Targets	Academic Vocabulary
• I can find and gather information about how communities use science to protect natural resources. DOK 1 • I can explain different ways people in communities help conserve water, energy, and other resources. DOK 1 • I can combine information from different sources to understand how science helps the environment. DOK 2 • I can give examples of actions communities take to reduce pollution and protect ecosystems. DOK 1 • I can share what I learn about protecting Earth's resources with others. DOK 1	• Environment • Conserve • Resources • Evaluate • Problem • Proposed solutions • Criteria • Constraints • Data • Optimal solution

Resources

5-ESS3-1
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.5.13.4.d Define a simple design problem that can be solved by applying scientific ideas about the conservation of fresh water on Earth.

Learning Targets	Academic Vocabulary
• I can explain why conserving fresh water is important for Earth. DOK 1 • I can identify a problem related to saving or using fresh water wisely. DOK 2 • I can recognize any limits like materials, time, or cost that affect solving the problem. DOK 1 • I can write a clear design problem about conserving fresh water that includes the need, criteria, and constraints. DOK 4	• Conservation • Freshwater • Water cycle • Precipitation • Evaporation • Condensation • Collection • Groundwater • Conserving • Design problem • Criteria • Constraints

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://www.teachengineering.org/activities/view/water_filtration
https://yes.mos.org/unit/engineering-plastic-filters/

Standard

Engineering Design

Indicator

3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

Learning Targets	Academic Vocabulary
• I can identify a problem or need that requires a solution. DOK 3 • I can describe what a successful solution should do (criteria for success). DOK 1 • I can recognize limits or constraints like materials, time, or cost that affect the solution. DOK1 • I can write a clear design problem that includes the need, criteria, and constraints. DOK 4 • I can explain why considering criteria and constraints is important when solving a problem. DOK 1	• Design problem • Criteria • Constraints

Resources

https://yes.mos.org/curricula/
https://cdssec.fiu.edu/eow-lesson-plans/
https://www.teachengineering.org/standards/ngss
https://www.jpl.nasa.gov/edu/resources/collection/engineering-in-the-classroom/ngss-engineering-grades-3-5/

Indicator

3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Learning Targets	Academic Vocabulary
• I can come up with several different ideas to solve a problem. DOK 3 • I can describe how each idea meets the success criteria. DOK 1 • I can explain how each idea fits within the limits of materials, time, or cost (constraints). DOK 2 • I can compare my ideas to decide which might work best. DOK 3 • I can choose the best solution based on how well it meets the criteria and constraints. DOK 3	• Problem • Criteria • Constraints • Solution

Resources

https://yes.mos.org/curricula/
https://cdssec.fiu.edu/eow-lesson-plans/
https://www.teachengineering.org/standards/ngss

https://www.jpl.nasa.gov/edu/resources/collection/engineering-in-the-classroom/ngss-engineering-grades-3-5/

Indicator

3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled, and failure points are considered to identify aspects of a model or prototype that can be improved.

Learning Targets	Academic Vocabulary
● I can plan a test that changes only one variable at a time to be fair. DOK 4 ● I can carry out my test carefully and record what happens. DOK 3 ● I can identify parts of my model or prototype that don't work well (failure points). DOK 3 ● I can think about how to fix or improve those parts. DOK 3 ● I can explain why controlling variables is important when testing ideas. DOK 1	● Variable ● Controlled variables ● Test ● Model ● Prototype

Resources

https://yes.mos.org/curricula/
https://cdssec.fiu.edu/eow-lesson-plans/
https://www.teachengineering.org/standards/ngss
https://www.jpl.nasa.gov/edu/resources/collection/engineering-in-the-classroom/ngss-engineering-grades-3-5/

Sixth Grade Content Standards

Grade 6 science instruction focuses on energy transfer, life systems, weather and climate, and Earth's interconnected processes. Students explore how energy moves, how organisms are structured for life functions, and how Earth systems interact. These studies help students recognize order and interdependence in nature and encourage thoughtful use of knowledge to solve problems and care for the world.

Focus areas include:

- **Energy Transfer:** Distinguishing between energy and temperature, examining the relationship between force and energy, and applying design principles to the transfer of energy from one object or system to another.
- **Structures and Functions of Organisms:** Understanding that all organisms are made of cells, that specific structures perform particular functions, and that many organisms function as systems of interacting subsystems from cells to entire bodies.
- **Growth, Development, and Reproduction:** Explaining how structures, functions, and behaviors of organisms change predictably from birth to old age.
- **Weather and Climate:** Modeling the factors that influence weather and climate, including how energy from the sun moves through Earth's oceans and atmosphere and affects weather patterns.
- **Water in Earth's Systems:** Modeling how water moves through and interacts with Earth's geosystems, highlighting the cycling of matter and flow of energy among different systems.

Science Discipline:	Standard Color:
Life Science	Green
Earth Science	Red
Physical Science / Chemistry	Gold
Energy	Teal

Standard

SC.6.4.1 Gather, analyze, and communicate evidence of energy.

Indicator

SC.6.4.1.a

Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

Clarification Statement: Examples of devices could include an insulated box, a solar cooker, and a Styrofoam cup
Assessment Boundary: *Assessment does not include calculating the total amount of thermal energy transferred*

Learning Targets	Academic Vocabulary
• I can define thermal energy, conduction, insulator, and radiation. • I can identify which materials are insulators or conductors. • I can use evidence to explain which design best minimized or maximized heat transfer. • I can design, test, and improve a heat transfer device based on test results	• Thermal energy • Temperature • Heat transfer • Conduction • Convection • Radiation • Insulator • Conductor

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://www.youtube.com/watch?v=QYLCo6CFUm4

Indicator

SC. 6.4.1.b Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

Learning Targets	Academic Vocabulary
• I can define criteria, constraints, environment, impact. • Identify the criteria and constraints of a simple design problem. • I can analyze how different solutions meet the criteria and work within constraints. • I can develop a design solution that considers scientific ideas and real-world impacts.	• constraints • criteria • precision • accuracy • environment • natural resources • ethical

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Indicator

SC.6.4.1.c **Plan an investigation to determine the relationships among the energy transferred, type of matter, mass, and change in average kinetic energy of particles as measured by the temperature of the sample.**

Clarification Statement: Examples of experiments could include comparing final water temperatures after different masses of ice melted in the same volume of water with the same initial temperature, the temperature change of samples of different materials with the same mass as they cool or heat in the environment, or the same material with different masses when a specific amount of energy is added
Assessment Boundary: Assessment does not include calculating the total amount of thermal energy transferred

Learning Targets	Academic Vocabulary
• I can define terms like matter, mass, and temperature. • I can collect and record data on temperature changes. • I can analyze how mass or material type affects the temperature change of a sample when heated. • I can plan and conduct an experiment to test how matter, mass, and energy relate to temperature changes.	• energy transfer • matter • kinetic energy • mass • temperature • atoms • molecules • average kinetic energy

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://www.youtube.com/watch?v=QYLCo6CFUm4

Indicator

6.4.1.d Construct, use, and present arguments to support the claim that when kinetic energy of an object changes, energy is transferred to or from the object.

***Assessment Boundary**: Assessment does not include calculations of energy.*

Learning Targets	Academic Vocabulary
• I can define energy, kinetic energy, and energy transfer. • I can identify when energy is transferred in real-world examples (e.g., ball stopping, swing moving). • I can explain where the energy is going in a collision. • I can use evidence to support the claim that energy is transferred when an object speeds up or slows down. • I can construct and present a full argument, including claim, evidence, and reasoning (CER).	• energy • energy transfer • kinetic energy • claim • evidence • argument/reasoning

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://phet.colorado.edu/en/simulations/energy-skate-park/about

Standard

SC.6.6.2 Gather, analyze, and communicate evidence of the relationship between structure and function in living things.

Indicator

SC.6.6.2.a Conduct an investigation to provide evidence that living things are made of cells; either one cell or many varied cells

Clarification Statement: Emphasis is on developing evidence that living things are made of cells, distinguishing between living and nonliving things, and understanding that living things may be made of one cell or many and varied cells.

Learning Targets	Academic Vocabulary
• I can identify and define vocabulary like "cell," "unicellular," and "multicellular." • I can use a microscope to observe cells in prepared slides of unicellular and multicellular organisms • I can compare and contrast organisms made of one cell and those made of many cells. • I can plan and conduct an investigation to show that living things are made of cells and explain the evidence.	• cell • organism • unicellular • multicellular • microscope • living/nonliving • structure and function

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://www.caryinstitute.org/sites/default/files/public/downloads/lesson-plans/1a1_is_it_alive_lab_version.pdf
https://www.sheppardsoftware.com/science/cell/animal/tutorial/
https://www.sheppardsoftware.com/science/cell/plant/tutorial/

Indicator

SC.6.6.2.b Develop and use a model to describe the function of a cell as a whole and ways parts of a cell contribute to the function.

***Assessment Boundary**: Assessment of organelle structure/function relationships is limited to the cell wall and cell membrane. Assessment of the function of the other organelles is limited to their relationship to the whole cell. Assessment does not include the biochemical function of cells or cell parts.*

Learning Targets	Academic Vocabulary

• I can describe the job of the cell wall and cell membrane. • I can explain that all living things are made of cells. • I can define key vocabulary (cell, organelle, model, function). • I can match parts of a cell (e.g., cell wall, membrane) with their functions using a model or diagram. • I can use a microscope to gather evidence about the structure of cells in different organisms. • I can make and explain a model of a cell and how its parts help it work and stay alive.	• cell • unicellular • cell wall • cell membrane • cell wall • organelle • nucleus • eukaryotic/prokaryotic • mitochondria • chloroplast • cytoplasm • endoplasmic reticulum • Golgi body/apparatus • lysosomes • ribosomes • vacuole

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://teach.genetics.utah.edu/content/cells/files/is%20it%20alive.pdf
https://www.youtube.com/watch?v=tVcEEw6qbBQ&t=1s
https://www.biologycorner.com/2024/11/17/a-journey-through-the-cell/

Indicator

SC.6.6.2.c Use arguments supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

Clarification Statement: Emphasis is on the conceptual understanding that cells form tissues and tissues form organs specialized for particular body functions. Examples could include the interaction of subsystems within a system and the normal functioning of those systems.
Assessment Boundary*: Assessment does not include the mechanism of one body system independent of others. Assessment is limited to the circulatory, excretory, digestive, respiratory, muscular, and nervous systems.*

Learning Targets	Academic Vocabulary
• I can name parts of the circulatory, respiratory, and other systems. • I can give examples and facts to show how body systems help each other. • I can explain that body systems need each other to keep the body working.	• system • circulatory • respiratory • digestive • excretory • muscular • nervous • skeletal • organs • tissues • subsystem • cells

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://www.youtube.com/watch?v=Cpb0RBBL9Wc

Indicator

SC.6.6.2.d Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or stored as memories.

***Assessment Boundary**: Assessment does not include mechanisms for the transmission of this information.*

Learning Targets	Academic Vocabulary
• I can describe how my body senses things like light, sound, or touch. • I can explain how messages go from my senses to my brain. • I can tell how the brain helps me react or remember things I sense. • I can collect and combine facts to explain how senses and the brain work together.	• stimuli • brain • nerves • sensory receptors • behavior • memory • nervous system • brain • spinal cord • message/response

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://humanbenchmark.com/tests/reactiontime
https://www.justpark.com/creative/reaction-time-test/

Standard

SC.6.9.3 Gather, analyze, and communicate evidence of the inheritance and variation of traits.

Indicator

SC.6.9.3.a Use arguments based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

Clarification Statement: Examples of behaviors that affect the probability of animal reproduction could include nest building to protect young from cold, herding of animals to protect young from predators, and vocalization of animals and colorful plumage to attract mates for breeding. Examples of animal behaviors that affect the probability of plant reproduction could include transferring pollen or seeds and creating conditions for seed germination and growth. Examples of plant structures could include bright flowers attracting butterflies that transfer pollen, flower nectar and odors that attract insects that transfer pollen, and hard shells on nuts that squirrels bury.

Learning Targets	Academic Vocabulary
• I can use facts and data to explain how animals or plants increase their chances to reproduce. • I can describe animal behaviors that help them to reproduce. • I can describe parts of plants, like flowers or seeds, that help make new plants.	• argument • empirical evidence • scientific reasoning • reproduction • asexual/sexual • behavior • structure • pollination • pollinator • seed dispersal • attract

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://websites.nku.edu/~dahlem/BIO%20120/LabReviews/PlantAdaptations.HTM

Indicator

SC.6.9.3.b Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

Clarification Statement: Examples of local environmental conditions could include availability of food, light, space, and water. Examples of genetic factors could include large breed cattle and species of grass affecting growth of organisms. Examples of evidence could include drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, and fish growing larger in large ponds than they do in small ponds.

Learning Targets	Academic Vocabulary
• I can describe the difference between traits you're born with and things that happen from the outside. • I can explain how living things grow based on their genes and the world around them. • I can use facts and examples to show how plants or animals grow in different conditions.	• scientific explanation • evidence • environment • genetics factors • trait • inherited • environmental factors • genes

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Indicator

SC.6.9.3.c Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

Clarification Statement: Emphasis is on using models such as Punnett squares, diagrams, and simulations to describe the cause-and-effect relationship of gene transmission from parent(s) to offspring and resulting genetic variation.

Learning Targets	Academic Vocabulary
• I can define asexual and sexual reproduction. • I can make or use a model to show the differences between sexual and asexual reproduction. • I can use a model to explain why some offspring are identical and others are different.	• scientific explanation • evidence • environment • genetics factors • trait • inherited • environmental factors • genes

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Standard

SC.6.12.4 Gather, analyze, and communicate evidence of factors and interactions that affect weather and climate.

Indicator

SC.6.12.4.a Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.

Clarification Statement: Emphasis is on how air masses flow from regions of high pressure to low pressure, causing weather (defined by temperature, pressure, humidity, precipitation, and wind) at a fixed location to change over time, and how sudden changes in weather can result when different air masses collide. Emphasis is on how weather can be predicted within probabilistic ranges. Examples of data can be provided to students (such as weather maps, diagrams, and visualizations) or obtained through laboratory experiments (such as with condensation).

Learning Targets	Academic Vocabulary

• I can collect and record weather information like temperature and wind. • I can explain how warm and cold air masses move and meet. • I can tell how moving air masses change the weather. • I can use what I observe to explain why the weather changes.	• air mass • weather • cold/warm front • humidity • temperature • pressure • weather conditions • precipitation • clouds

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://ssec.si.edu/weather-and-climate-systems (paid resource)

Indicator

SC.6.12.4.b Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

Clarification Statement: Emphasis is on how patterns vary by latitude, altitude, and geographic land distribution. Emphasis of atmospheric circulation is on the sunlight-driven latitudinal banding, the Coriolis effect, and resulting prevailing winds; emphasis of ocean circulation is on the transfer of heat by the global ocean convection cycle, which is constrained by the Coriolis effect and the outlines of continents. Examples of models can be diagrams, maps and globes, or digital representations.

Learning Targets	Academic Vocabulary
• I can create or use a model to show how the Sun and Earth's spin move air and water. • I can explain why some places are hotter than others and how that affects the weather. • I can describe how ocean currents and winds shape the climate in different places. • I can connect how the Sun, wind, and oceans all work together to control climate.	• unequal heating • rotation • atmosphere • ocean currents • circulation • climate • regional climate • global winds • convection • equator/tropical • Earth's axis

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://gpm.nasa.gov/education/lesson-plans/meteorology-educators-resource-inquiry-based-learning-grades-5-9

Indicator

SC.6.12.4.c Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.

Learning Targets	Academic Vocabulary
• I can define climate change, greenhouse effect and fossil fuels. • I can find and use facts to help explain what is causing Earth's temperature to rise. • I can describe how both nature and people can affect the climate. • I can cite evidence that scientists use to study global warming.	• global temperature • fossil fuels • carbon dioxide • greenhouse effect • climate change • human activity • natural causes

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://phet.colorado.edu/en/simulations/greenhouse-effect
https://catholiccharitiesswks.org/about-us/46-home/news/social-justice/819-catholic-social-teaching-101-climate-change

Indicator

SC.6.12.4.d Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

Clarification Statement: Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and without notice, and thus are not yet predictable. Examples of natural hazards can be taken from interior processes (such as earthquakes and volcanic eruptions), surface processes (such as mass wasting and tsunamis), or severe weather events (such as hurricanes, tornadoes, and floods). Examples of data can include the locations, magnitudes, and frequencies of the natural hazards. Examples of technologies can be global (such as satellite systems to monitor hurricanes or forest fires) or local (such as building basements in tornado-prone regions or reservoirs to mitigate droughts).

Learning Targets	Academic Vocabulary
• I can describe natural hazards like tornadoes, floods, and hurricanes. • I can study and interpret data about natural disasters to find patterns and make predictions about when and where those disasters might happen. • I can explain how tools and technology can reduce the damage from natural hazards. • I can create a solution that people can prepare for or reduce the effects of natural hazards.	• natural hazard • catastrophic event • forecast • mitigate • impact

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://thinktv.pbslearningmedia.org/resource/weather-forecasting-data-accuracy-video/wxyz-weather-whys/

Standard

SC.6.13.5 Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

Indicator

SC.6.13.5.a Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

Clarification Statement: Emphasis is on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle. Examples of models can be conceptual or physical.

Learning Targets	Academic Vocabulary
• I can describe how water moves through the air, land, and bodies of water. • I can explain how the sun's energy and the force of gravity cause water to move through the cycle. • I can make a drawing or model to show how water moves around Earth.	• water cycle • system • evaporation • condensation • precipitation • collection • solar energy • gravity • run off • infiltration • transpiration

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://water.usgs.gov/edu/watercycle-kids-adv.html

Seventh Grade Content Standards

Grade 7 science instruction helps students explore the structure and behavior of matter, energy flow in living systems, and changes to Earth's surface over time. As students analyze patterns and processes in the natural world, they grow in appreciation for the design and order present in God's creation and are encouraged to consider how human actions impact the world entrusted to our care.

Focus areas include:

- **Thermal Energy and Particle Behavior:** Describing matter at the molecular level and explaining how thermal energy affects states of matter and changes between states.

- **Properties of Substances:** Understanding physical and chemical properties of pure substances and how atomic and molecular structures influence their behavior and uses.

- **Chemical Reactions:** Explaining how atoms rearrange during chemical reactions to form new substances, using molecular models to describe these changes.
- **Photosynthesis and Energy Use:** Using models to explain how organisms obtain energy through processes like photosynthesis and how matter cycles within ecosystems.
- **Ecosystem Dynamics:** Constructing explanations for the cycling of matter and flow of energy among organisms and within ecosystems.
- **Organism-Environment Interactions:** Exploring how organisms interact with both living and nonliving components of their environments to survive and grow.
- **Earth's History:** Analyzing geoscience data to understand the processes and evidence that reveal changes in Earth and life over time.
- **Geosystems and Change:** Modeling how energy flow and matter cycling within and among Earth's systems lead to changes in Earth's crust and surface features.
- **Human Impact on Earth:** Investigating how human activities affect Earth's systems and exploring ways to minimize negative impacts.

Standard	
SC.7.3.1 Gather, analyze, and communicate evidence of the structure, properties, and interactions of matter.	
Indicator	
SC.7.3.1.a Develop models to describe the subatomic structure and atomic composition of simple molecules.	
Clarification Statement: Emphasis is on developing models of molecules that vary in complexity. Examples of simple molecules could include ammonia and methanol. Examples of molecular-level models could include drawings; 3D ball and stick structures or computer representations showing different molecules with different types of atoms. Interpret the data provided on the periodic table in creating the model.	
Learning Targets	**Academic Vocabulary**
• I can name and describe the parts of an atom: protons, neutrons, and electrons. • I can explain how atoms connect to make simple molecules. • I can identify what atoms are in a molecule and how many there are. • I can create models to show atoms and how they form molecules.	• atom • subatomic particles • proton • neutron • electron • nucleus • molecule • atomic composition • periodic table • chemical symbol • atomic number

	• atomic mass • element • covalent bond • ionic bond

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://phet.colorado.edu/en/simulations/build-an-atom

Indicator

SC.7.3.1.b Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

Clarification Statement: Emphasis is on natural resources that undergo a chemical process to form the synthetic material. Examples of new materials could include new medicine, foods, and alternative fuels.

Learning Targets	Academic Vocabulary
• I can distinguish between a natural and synthetic material. • I can identify examples of synthetic materials. • I can describe how synthetic materials can help or harm society. • I can draw conclusions about the use of synthetic materials.	• synthetic material • natural resource • raw material • plastic • nylon • impact

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Indicator

SC.7.3.1.c Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

Clarification Statement: Emphasis is on qualitative molecular-level models of solids, liquids, and gases to show that adding or removing thermal energy increases or decreases kinetic energy of the particles until a change of state occurs. Examples of models could include drawings and diagrams. Examples of particles could include molecules or inert atoms. Examples of pure substances could include water, carbon dioxide, and helium.

Learning Targets	Academic Vocabulary
• I can define temperature, thermal energy, melting, freezing, and states of matter. • I can explain how particles move faster when heat is added and slower when it's removed. • I can create a model that shows how solids, liquids, and gases change	• states of matter • atoms/particles • motion • temperature • thermal energy

when heated or cooled.	• melting • freezing • evaporation • condensation • sublimation • deposition

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Standard

SC.7.5.2. Gather, analyze, and communicate evidence of chemical reactions.

Indicator

SC.7.5.2.a Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

Clarification Statement: Includes discrimination between physical and chemical changes. Examples of reactions could include burning sugar or steel wool, fat reacting with sodium hydroxide, and mixing zinc with HCl. ***Assessment Boundary****: Assessment is limited to analysis of the following properties: density, melting point, boiling point, solubility, flammability, and odor.*

Learning Targets	Academic Vocabulary
• I can distinguish between a physical and chemical change. • I can use data to explain how changes in properties (like odor or flammability) show a chemical reaction. • I can use data like melting point and solubility to prove that a new substance was made. • I can use data before and after an interaction to cite evidence of a change.	• pure substance • property • odor • melting point • boiling point • chemical change • physical change • density • mass • volume • solubility • state of matter • flammability

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://www.acs.org/middleschoolchemistry.html
https://www.legendsoflearning.com/learning-objectives/chemical-reactions-science-games/ (requires registration for a

free account)

Indicator

SC.7.5.2.b Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

Clarification Statement: Emphasis is on law of conservation of matter, and on physical models or drawings, including digital forms that represent atoms.
***Assessment Boundary**: Assessment does not include the use of atomic masses, balancing symbolic equations, or intermolecular forces.*

Learning Targets	Academic Vocabulary
• I can describe how the total mass doesn't change after a chemical reaction. • I can create and use a model to show that atoms are rearranged and that the number of atoms is the same before and after a reaction	• chemical reaction • mass • conserved • reactants • products • precipitate • chemical formula (coefficient, subscripts, yields and yield symbol) • law of conservation of mass/matter

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://phet.colorado.edu/en/simulations/reactants-products-and-leftovers
https://phet.colorado.edu/en/simulations/balancing-chemical-equations

Indicator

SC.7.5.2.c Design, construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

***Assessment Boundary**: Assessment is limited to the criteria of amount, time, and temperature of substance in testing the device.*

Learning Targets	Academic Vocabulary
• I can explain what thermal energy is. • I can plan and build a device that uses a chemical reaction to heat or cool. • I can use data to assess my device and modify it to make it better.	• thermal energy • chemical reaction/process • absorbs • release • amount

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://thinktv.pbslearningmedia.org/resource/lsps07-sci-phys-thermalenergy/thermal-energy-transfer/

Indicator

SC.7.5.2.d Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

Learning Targets	Academic Vocabulary
• I can follow a step-by-step method to test and choose a design solution. • I can compare and contrast data for multiple solutions. • I can assess the best parts of each solution. • I can synthesize the best ideas to make a new solution that works better.	• characteristics • compare • contrast • analyze

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://www.legendsoflearning.com/learning-objectives/chemical-reactions-evidence-of-a-reaction/
(requires registration for a free account)
kolbe.org/blog/science-and-a-catholic-education#:~:text=A%20CATHOLIC%20PHILOSOPHY%20OF%20SCIENCE&text=Faith%2C%20rather%20than%20hindering%20the,true%2C%20good%2C%20and%20beautiful.
https://catholicscientists.org/articles/catholic-tradition-science/

Standard

SC.7.7.3 Gather, analyze, and communicate evidence of interdependent relationships in ecosystems.

Indicator

SC.7.7.3.a Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial.

Learning Targets	Academic Vocabulary
• I can define symbiotic relationships, ecosystem, food web/chain. • I can describe how animals and plants affect each other in an ecosystem. • I can use data to predict how organisms interact based on patterns I see.	• ecosystems • food web/chain • competition

• I can analyze how these patterns are similar or different in different ecosystems.	• predator • prey • mutualism • parasitism • commensalism • symbiosis • population • biotic • abiotic • beneficial • detrimental • decomposer • consumer • producer • biodiversity

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://smithsonianeducation.org/interactives/predatorvsprey/index.html

Indicator

SC.7.7.3.b Develop and use a model to describe how stable ecosystems maintain biodiversity and ecosystem services, especially in ways that provide for human well-being and quality of life.

Clarification Statement: Emphasis is on food webs maintaining biodiversity

Learning Targets	Academic Vocabulary
• I can define ecosystem, biodiversity, and quality of life. • I can cite evidence of how a stable ecosystem supports many kinds of life. • I can create and use a model to show how an ecosystem works. • I can explain how biodiversity promotes healthy ecosystems which helps people live better lives.	• biodiversity • ecosystem • stable • ecosystem services (benefits from the ecosystem) • human well being • quality of life • maintain • ecosystem services/ benefits from the system

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Indicator

SC.7.7.3.c Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

Learning Targets	Academic Vocabulary
• I can follow a step-by-step method to test and choose a design. • I can compare and contrast data from different designs. • I can assess the best parts of a design. • I can explain what a solution needs to do and what limits it has. • I can choose the best design based on facts and results.	• evaluate • design solution • systematic process • constraints • revise

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Indicator

SC.7.7.3.d Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).

Learning Targets	Academic Vocabulary
• I can identify real world problems in the environment. • I can investigate ways humans damage the environment and solutions to fix it. • I can assess how people affect the planet over time. • I can suggest ways to reduce pollution or harm to the Earth.	• scientific principles • design • method • minimizing • environment

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://ourworldindata.org/air-pollution
https://laudatosimovement.org/news/catholic-church-and-climate-change-why-catholics-care-about-climate-change/

Standard

SC.7.8.4 Gather, analyze, and communicate evidence of interdependent relationships in ecosystems.
Indicator

Indicator

SC.7.8.4.a Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

Clarification Statement: Emphasis is on tracing movement of matter and flow of energy.
***Assessment Boundary**: Assessment does not include the biochemical mechanisms of photosynthesis.*

Learning Targets	Academic Vocabulary
• I can describe how plants make their own food using sunlight, air, and water. • I can use data to explain how matter and energy move through plants and animals. • I can analyze how photosynthesis helps living things survive.	• photosynthesis • matter • energy • organism • cycling of matter • flow of energy • nutrients • systems • oxygen • glucose • chloroplasts • carbon dioxide

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://www.pbs.org/wgbh/nova/interactive/illuminating-photosynthesis/

Indicator

SC.7.8.4.b Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as matter moves through an organism.

Clarification Statement: Emphasis is on describing that molecules are broken apart and put back together and that in this process, energy is released.
***Assessment Boundary**: Assessment does not include details of the chemical reactions for photosynthesis or respiration.*

Learning Targets	Academic Vocabulary
• I can make a model to explain how chemical reactions convert food into energy and usable molecules in my body. • I can describe how my body uses energy and food molecules to support growth.	• chemical reaction • reactants • products • nutrients • molecules • growth • energy • matter • digestion

	• mitochondria • glucose • oxygen • ATP (energy)

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Indicator

SC.7.8.4.c Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

Clarification Statement: Emphasis is on cause-and-effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.

Learning Targets	Academic Vocabulary
• I can describe how food, water, and space affect organisms and populations. • I can analyze data and explain what it shows about organisms and populations. • I can use data to explain how the number of organisms changes when resources increase or decrease.	• analyze • interpret • data • scarcity • population • ecosystem • organism • resources

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://www.usccb.org/sjp/resources-and-tools

Indicator

SC.7.8.4.d Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

Clarification Statement: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system.
***Assessment Boundary**: Assessment does not include the use of chemical reactions to describe the processes.*

Learning Targets	Academic Vocabulary
• I can distinguish between living and nonliving parts of an ecosystem. • I can explain how energy moves from the sun to plants to animals. • I can describe how water, oxygen, and nutrients are used again and again in an ecosystem.	• biotic/abiotic factors • matter • energy • flow of energy

• I can create a model to show how energy and matter move in an ecosystem.	• producer • consumer • decomposer • food chain/web • cycling of matter

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Indicator

SC.7.8.4.e Construct an argument supported by evidence that changes to physical or biological components of an ecosystem affect populations.

Clarification Statement: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.

Learning Targets	Academic Vocabulary
• I can distinguish between living and nonliving parts of an ecosystem. • I can make a claim about how changes in an ecosystem affect living things. • I can use facts and data to prove my claim.	• physical/biological components • affect • environment

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Standard

SC.7.13.5 Gather, analyze, and communicate evidence of the flow of energy and cycling of matter associated with Earth's materials and processes.

Indicator

SC.7.13.5.a Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

Clarification Statement: Emphasis is on tracing movement of matter and flow of energy.

Learning Targets	Academic Vocabulary
• I can define weathering, erosion, and cycle. • I can make a model that shows how Earth's materials move and change.	• cycle • flow of energy

• I can explain how rocks, soil, and water are used again and again in nature. • I can describe how heat from the sun or Earth's inside helps move Earth's materials. • I can show how parts of Earth (air, water, land, and life) are all connected.	• Earth's materials (abiotic) • carbon cycle • atmosphere (carbon dioxide) • geosphere (rocks, fossils) • ocean (phytoplankton, photosynthesis) • hydrosphere • biosphere • weathering/erosion

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://education.nationalgeographic.org/resource/walters-travels-weathering-and-erosion/

Indicator

SC.7.13.5.b Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

Clarification Statement: Emphasis is on how these resources are limited and typically non-renewable, and how their distributions are significantly changing as a result of removal by humans. Examples of uneven distributions of resources as a result of past processes include but are not limited to petroleum (locations of the burial of organic marine sediments and subsequent geologic traps), metal ores (locations of past volcanic and hydrothermal activity associated with subduction zones), and soil (locations of active weathering and/or deposition of rock).

Learning Targets	Academic Vocabulary
• I can define and describe multiple geoscience processes • I can use data and observations to explain why Earth's geoscience processes deposit resources in various locations.	• mineral • groundwater • geoscience processes • glaciers • volcanoes • past processes • current processes • natural resources • renewable/ nonrenewable resources

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Indicator

SC.7.13.5.c Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Clarification Statement: Examples of evidence include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes.

Learning Targets

- I can explain how more people can lead to more use of natural resources.
- I can describe how people use resources in daily life.
- I can make a claim, using facts, about population increase affecting resource consumption to support my ideas with evidence.
- I can draw conclusions about how human actions affect the Earth's systems like air, water, and land.

Academic Vocabulary

- per-capita consumption
- natural resources
- Earth's systems
- environmental impact
- consumption
- sustainability
- fossil fuels
- sustainable use
- overpopulation
- birth rate

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://www.usccb.org/resources/renewing-earth
https://catholiccharitiesswks.org/about-us/46-home/news/social-justice/819-catholic-social-teaching-101-climate-change

Standard

SC.7.14.6 Gather, analyze, and communicate evidence to explain Earth's history.

Indicator

SC.7.14.6.a Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

Clarification Statement: Emphasis is on how processes change Earth's surface at time and spatial scales that can be large (such as slow plate motions or the uplift of large mountain ranges) or small (such as rapid landslides or microscopic geochemical reactions), and how many geoscience processes (such as earthquakes, volcanoes, and meteor impacts) usually behave gradually but are punctuated by catastrophic events. Examples of geoscience processes include surface weathering and deposition by the movements of water, ice, and wind. Emphasis is on geoscience processes that shape local geographic features, where appropriate.

Learning Targets	Academic Vocabulary
• I can describe how natural geoscience processes like erosion or earthquakes shape Earth's surface. • I can identify that Earth changes slowly or quickly, and over small or large areas. • I can use historical data to identify patterns and explain how Earth's surface changes over time.	• geoscience cycles/processes • time scales • spatial scales • erosion • deposition • tectonic plates • fossil record • Pangea

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Indicator

SC.7.14.6.b Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of past plate motions.

Clarification Statement: Examples of data include similarities of rock and fossil types on different continents, the shapes of the continents (including continental shelves), and the locations of ocean structures (such as ridges, fracture zones, and trenches).

Learning Targets	Academic Vocabulary
• I can use fossil and rock data to show evidence of tectonic plate movement. • I can explain how the shapes of continents help us know about plate movement. • I can describe how ocean floor features support the idea of moving plates. • I can analyze and interpret data to find patterns about Earth's past movements.	• plate tectonics • continental drift • fault • plate boundary • subduction • divergent boundary • convergent boundary • transform boundary • seafloor spreading • Pangea • body fossil • trace fossil • evidence • strata • sediment

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Indicator

SC.7.14.6.c Analyze and interpret data on geologic hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

Clarification Statement: Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet predictable. Examples of natural hazards can be taken from interior processes (such as earthquakes and volcanic eruptions), surface processes (such as mass wasting and tsunamis), or severe weather events (such as hurricanes, tornadoes, and floods). Examples of data can include the locations, magnitudes, and frequencies of the natural hazards. Examples of technologies can be global (such as satellite systems to monitor hurricanes or forest fires) or local (such as building basements in tornado-prone regions or reservoirs to mitigate droughts).

Learning Targets	Academic Vocabulary
• I can describe different types of geologic hazards like earthquakes and volcanoes. • I can study and interpret data about natural disasters to find patterns and make predictions about when and where those disasters might happen. • I can explain how scientists use data to predict future natural disasters. • I can describe how technology helps reduce damage from natural disasters. • I can share ideas about how we can prepare for or reduce the effects of geologic hazards.	• geological hazard • forecast • catastrophic event • mitigate • effect • hazard • analyze • interpret • data

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Eighth Grade Content Standards

Grade 8 science instruction explores forces and motion, energy, waves, genetics, natural selection, and Earth's place in the universe. Students apply scientific models to explain interactions between objects, describe how energy is stored and transferred, and examine how traits and environmental changes affect life over time. These studies highlight patterns and relationships in nature and encourage responsible decision-making as students consider the impact of science and technology on society and the environment.

Focus areas include:

- **Forces and Motion:** Applying Newton's Third Law to explain motion, describing gravitational, electrical, and magnetic forces, and explaining why some materials attract while others repel.
- **Energy in Systems:** Understanding that moving objects have kinetic energy and that objects can store potential energy based on their position in a system.
- **Waves and Technology:** Describing the properties and behaviors of waves, predicting how waves interact with matter, and applying wave principles for sending digital information.
- **Genetics and Human Impact:** Exploring how genes can change, including the effects of technology and selective breeding, and discussing ethical considerations related to genetic modification.
- **Variation and Natural Selection:** Analyzing fossil data and patterns of variation to explain how traits affect survival and reproduction, how environments influence traits, and how these changes can lead to the development of new species.
- **Earth's Place in the Universe:** Modeling Earth's position within the solar system, Milky Way, and universe, and explaining cycles such as eclipses, tides, and seasons.

Standard
SC.8.1.1 Gather, analyze, and communicate evidence of forces and interactions.
Indicator
SC.8.1.1.a Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.
Clarification Statement: Emphasis is on balanced (Newton's First Law) and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion (Newton's Second Law), frame of reference, and specification of units. ***Assessment Boundary****: Assessment is limited to vertical or horizontal interactions in one dimension*

Learning Targets	**Academic Vocabulary**
• I can describe Newton's Third Law. • I can model how two objects apply equal and opposite forces to each other when they collide. • I can use Newton's Third Law to solve a real-world problem like improving safety in a crash.	• Newton's laws • force • motion • acceleration • collision • impact • mass • velocity/speed • momentum • equal • opposite • system • inertia • friction • resistance

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://phet.colorado.edu/en/simulations/forces-and-motion-basics

Indicator

SC.8.1.1.b Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Learning Targets	Academic Vocabulary
• I can create a model of an object, tool, or process • I can construct and test my design to see how well it works and find ways to improve it. • I can make changes to my design based on test results and modify until it meets the goal in the best way. • I can explain how my design meets the criteria and stays within the limits.	• iteration/iterative • modification • design • optimization • criteria • constraints • data • prototype

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://phet.colorado.edu/sims/html/forces-and-motion-basics/latest/forces-and-motion-basics_en.html

Indicator

SC.8.1.1.c Plan an investigation to provide evidence of Newton's Laws that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

Clarification Statement: Examples of evidence for arguments could include data generated from simulations or digital tools; and charts displaying mass, strength of interaction, distance from the Sun, and orbital periods of objects within the solar system.
***Assessment Boundary**: Assessment is limited to forces and changes in motion in one-dimension in an inertial reference frame and to change in one variable at a time; does not require the use of trigonometry*

Learning Targets	Academic Vocabulary
• I can explain Newton's Second Law of Motion using real-world examples. • I can plan an experiment to test how force and mass affect an object's motion. • I can change variables of the experiment and describe how motion changes. • I can synthesize my investigation results to support Newton's Second Law.	• inertia • force • mass • acceleration • motion • Newton's laws (second) • net force • variable

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://phet.colorado.edu/en/simulations/forces-and-motion-basics

Indicator

SC.8.1.1.d Ask questions about data to determine the factors that affect the strength of electrical and magnetic forces.

***Assessment Boundary**: Assessment about questions that require quantitative answers is limited to proportional reasoning and algebraic thinking.*

Learning Targets	Academic Vocabulary
• I can ask questions about data to find out what affects electric and magnetic forces. • I can look at graphs or charts to figure out what changes the strength of forces. • I can describe how changes in one thing cause changes in another (like distance and force). • I can make observations about how distance or charge changes the strength of electrical forces. • I can use simple equations or patterns to understand how force strength changes	• force • electrical force • magnetic force • charge • attraction • repulsion • field

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Indicator

SC.8.1.1.e Use evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

Clarification Statement: Examples of evidence for arguments could include data generated from simulations or digital tools; and charts displaying mass, strength of interaction, distance from the Sun, and orbital periods of objects within the solar system."

Learning Targets	Academic Vocabulary
• I can explain that gravity pulls objects together and never pushes them apart. • I can explain the effect of mass on gravitational force. • I can create a real-world example of mass affecting gravitational force.	• gravity • gravitational interaction • attractive force • mass • black hole

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Indicator

SC.8.1.1.f Conduct an investigation and evaluate the experimental design to provide evidence that electrical and magnetic fields exist between objects exerting forces on each other even though the objects are not in contact.

Clarification Statement: Examples of this phenomenon could include the interactions of magnets, showing static electricity using strips of tape or balloons, and electrically charged pith balls. Examples of investigations could include first-hand experiences or simulations.
Assessment Boundary: *Assessment is limited to electric and magnetic fields and limited to qualitative evidence for the existence of fields.*

Learning Targets	Academic Vocabulary
• I can use data to explain that electric and magnetic fields are invisible areas where forces happen. • I can describe how two objects affect each other through electric or magnetic fields. • I can investigate to show that electric and magnetic forces work without contact. • I can design and improve experiments to explore electric and magnetic forces from a distance.	• force • electric field • magnetic field • contact/non-contact force • qualitative • quantitative

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Standard

SC.8.1.1 Gather, analyze, and communicate evidence of waves and electromagnetic radiation.

Indicator

SC.8.2.2.a Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

Clarification Statement: Emphasis is on describing waves with both qualitative and quantitative thinking.
Assessment Boundary*: Assessment does not include electromagnetic waves and is limited to Standards & Indicators*

repeating waves.

Learning Targets	Academic Vocabulary
• I can define amplitude and energy • I can describe what a wave is and how it moves energy. • I can explain how the height (amplitude) of a wave is related to how much energy it has. • I can graph a wave showing its properties. • I can make or use a simple model to show how wave energy changes with amplitude.	• wave • amplitude • energy • crest • trough • wavelength (Greek letter lambda) • frequency • resting position (x-axis) • graph (mathematical model)

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://phet.colorado.edu/sims/html/waves-intro/latest/waves-intro_en.html
https://phet.colorado.edu/en/simulations/wave-on-a-string

Indicator

SC.8.2.2.b Develop and use a model to describe that light and mechanical waves are reflected, absorbed, or transmitted through various materials.

Clarification Statement: Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions.
***Assessment Boundary**: Assessment is limited to qualitative applications pertaining to light and mechanical waves.*

Learning Targets	Academic Vocabulary
• I can describe how light, and sound (mechanical) waves move. • I can explain what happens to waves when they hit different materials (reflect, absorb, or pass through). • I can identify materials as transparent, translucent, or opaque based on how they affect light. • I can develop and use a model to show how light, or sound behaves when it hits different surfaces. • I can prove that waves are reflected, absorbed, and transmitted with real-world examples	• wave • amplitude • energy • crest • trough • wavelength (Greek letter lambda) • frequency • resting position (x-axis) • graph (mathematical model)

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

https://phet.colorado.edu/en/simulations/wave-on-a-string
https://phet.colorado.edu/sims/html/waves-intro/latest/waves-intro_en.html
https://www.bbc.co.uk/bitesize/articles/z7rckty#z2c48hv

Indicator

SC.8.2.2.c Gather and make sense of information to support the claim that the structure of analog and digital signals allows for encoding and transmission of information.

Learning Targets	Academic Vocabulary
• I can explain the difference between analog and digital signals • I can describe how information can be turned into signals for sending. • I can give examples of how digital signals are more reliable than analog signals. • I can describe how phones, TVs, and computers use signals to send and receive information. • I can gather and explain evidence that supports how signal structure affects how well it sends data.	• signal • analog • digital • encode • transmit • binary code • noise • sound

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Standard

SC.8.4.3 Gather, analyze, and communicate evidence of energy.

Indicator

SC.8.4.3.a Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass and speed of an object.

Clarification Statement: Emphasis is on descriptive relationships between kinetic energy and mass separately from kinetic energy and speed. Examples could include riding a bicycle at different speeds, rolling different sizes of rocks downhill, and getting hit by a wiffle ball versus a tennis ball.

Learning Targets	Academic Vocabulary
• I can explain how mass and speed affect the amount of kinetic energy an object has. • I can use data to make a graph that shows how kinetic energy changes with mass or speed. • I can look at a graph and explain what it says about kinetic energy, mass, and speed.	• kinetic energy • potential energy • mass • speed • graph • relationship

• I can describe the pattern between speed and kinetic energy and between mass and kinetic energy. • I can use a graph to support my ideas about how motion affects energy.	• variable • trend • proportion • rate

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://phet.colorado.edu/en/simulations/energy-skate-park-basics

Indicator

SC.8.4.3.b Develop a model to describe that when the arrangement of objects interacting at a distance changes, then different amounts of potential energy are stored in the system.

Clarification Statement: Emphasis is on relative amounts of potential energy, not on calculations of potential energy. Examples of objects within systems interacting at varying distances could include: the Earth and either a roller coaster cart at varying positions on a hill or objects at varying heights on shelves, changing the direction/orientation of a magnet, and a balloon with static electrical charge being brought closer to a classmate's hair. Examples of models could include representations, diagrams, pictures, and written descriptions of systems.
***Assessment Boundary**: Assessment is limited to two objects. Assessment is limited to electric, magnetic, and gravitational interactions.*

Learning Targets	Academic Vocabulary
• I can explain that potential energy is stored in a system when objects interact from a distance. • I can describe how the distance between objects changes the amount of potential energy. • I can build or draw a model that shows how energy changes when the positions of objects change. • I can explain how gravity, magnets, or electric charges affect how energy is stored between objects.	• potential energy • system • gravitational force • magnetic force • electrical force • distance • model • interaction • attract • repel • arrangement • magnitude • protons • electrons

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Standard

SC.8.9.4 Gather, analyze, and communicate evidence of the inheritance and variation of traits.

Indicator

SC.8.9.4.a Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

Clarification Statement: Emphasis is on conceptual understanding that changes in genetic material may result in making different proteins

Learning Targets	Academic Vocabulary
• I can describe what genes and chromosomes are and what they do. • I can explain how mutations can change the way proteins work. • I can use a model to show how a mutation might change a protein and affect the body. • I can explain how a mutation might help, hurt, or not change an organism at all. • I can think about how changes in genes might affect the whole organism.	• mutations • chromosomes • DNA • traits • inheritance • dominant • recessive • genetic engineering • selective breeding • gene editing • ethics • synthesize • biotechnology

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://learn.genetics.utah.edu/content/basics/
https://contendingmodernities.nd.edu/science-the-human-person/catholic-conceptions-personhood/
https://www.catholic.com/qa/is-genetic-research-ethical
https://www.vatican.va/roman_curia/congregations/cfaith/documents/rc_con_cfaith_doc_20081208_dignitas-personae_en.html

Indicator

SC.8.9.4.b Gather, synthesize, and discuss the ethics of the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

Clarification Statement: Emphasis is on synthesizing information from reliable sources, including Catholic Church teachings (Example: CCC# 2275), about the influence of humans on genetic outcomes in artificial selection (such as genetically modified organisms (GMOs), animal husbandry, gene therapy); and, on the impacts these technologies have on society as well as the technologies leading to these scientific discoveries

Learning Targets	Academic Vocabulary
• I can explain how traits are passed from parents to offspring.	• Genes

• I can describe how people use technology to influence traits in plants and animals. • I can use evidence to formulate an argument about the ethical uses of gene technology. • I can connect my ideas clearly and respectfully in a discussion about genetics and ethics.	• traits • genetic engineering • selective breeding • DNA • gene editing • ethics • technology • synthesize • biotechnology • CRISPR

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Standard

SC.8.10.5 Gather, analyze, and communicate evidence of natural selection and adaptations.

Indicator

SC.8.10.5.a Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life under the assumption that natural laws operate today as in the past.

Clarification Statement: Emphasis is on finding patterns of changes in the level of complexity of anatomical structures in organisms and the chronological order of fossil appearance in the rock layers.

Learning Targets	Academic Vocabulary
• I can use fossil records to learn about Earth's past environments and living things. • I can look at fossil data and find patterns to explain that some living things have disappeared from Earth (extinction). • I can describe how the variety of life forms has increased or decreased throughout Earth's history. • I can explain that natural processes work the same way now as they did in the past.	• fossil • fossil record • extinct • diversity • life (scientific definition) • geological time scale

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://sciencespot.net/Pages/classearth.html#Anchorgeotime
https://www.geosociety.org/GSA/gsa/timescale/home.aspx

Indicator

SC.8.10.5.b Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.

Clarification Statement: Emphasis is on explanations of the evolutionary relationships among organisms in terms of similarity or differences of the gross appearance of anatomical structures.

Learning Targets	Academic Vocabulary
• I can compare and contrast body parts of living things and fossils. • I can apply science concepts to explain how similarities and differences show how organisms are related. • I can use fossils to understand how the body structures of organisms have evolved over time. • I can explain how animals today are connected to animals from the past through shared traits.	• evolution • evolutionary relationship • homologous structures • common ancestor • modern organism • anatomy • skeletal system

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Indicator

SC.8.10.5.c Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

Clarification Statement: Emphasis is on using simple probability statements and proportional reasoning to construct explanations.

Learning Targets	Academic Vocabulary
• I can describe how some traits help living things survive better in their environment and make them more likely to reproduce. • I can describe how where something lives affects its chances of survival based on its traits. • I can use evidence to explain why some individuals in a population are more likely to survive and reproduce.	• genetic variation • trait • population • survival • reproduction • probability • competition • resources • abiotic • biotic • natural selection • adaptation • camouflage • predation

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Indicator

SC.8.10.5.d Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

Clarification Statement: Emphasis is on using mathematical models, probability statements, and proportional reasoning to support explanations of trends in changes to populations over time.

Learning Targets	Academic Vocabulary
• I can use graphs and data to help explain how traits change in a population over time. • I can explain how natural selection causes helpful traits to increase in a population. • I can use data to show how some traits become more or less common as the environment changes.	• genetic variation • trait • population • survival • reproduction • probability • competition • resources • abiotic • biotic • natural selection • adaptation • camouflage • predation

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://phet.colorado.edu/en/simulations/natural-selection

Standard

SC.8.11.6 Gather, analyze, and communicate evidence of the interactions among bodies in space.

Indicator

SC.8.11.6.a Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, day, year, and seasons.

Clarification Statement: Examples of models can be physical, graphical, or conceptual.

Learning Targets	Academic Vocabulary
• I can build and use a model to show how the Earth, moon, and sun move. • I can use my model to explain why the moon has phases. • I can use my model to describe what happens during a solar or lunar eclipse. • I can use my model to show how Earth's movements cause day and year. • I can use my model to explain how Earth's tilt and orbit cause the seasons.	• system • model • cyclic • lunar phases • eclipse (solar, lunar) • day • month • year • season • moon phases • waning • waxing • crescent

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)
https://sciencespot.net/Pages/classastro.html#gsc.tab=0

Indicator

SC.8.11.6.b Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

Clarification Statement: Examples of models can be physical, graphical, or conceptual.

Learning Targets	Academic Vocabulary
• I can explain how gravity keeps planets in orbit around the sun and moons around planets. • I can show that without gravity, objects would not stay in orbit. • I can create and use a model to show how gravity affects objects in the solar system and galaxies.	• gravity • solar system • model • planets • moons • asteroids • galaxy • orbit • mass • force • attraction • star • orbit • comet • Milky Way

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Indicator

SC.8.11.6.c Analyze and interpret data to determine scale properties of objects in the solar system.

Clarification Statement: Emphasis is on the analysis of data from Earth-based instruments, space-based telescopes, and spacecraft to determine similarities and differences among solar system objects (includes knowledge of the planets, meteors, comets, and asteroids). Examples of scale properties include the sizes of an object's layers (such as crust and atmosphere), surface features (such as volcanoes), composition, and orbital radius. Examples of data include statistical information, drawings and photographs, and models.

Learning Targets	Academic Vocabulary
• I can look at and compare data about objects in the solar system. • I can use charts, graphs, or diagrams to understand the scale of planets, moons, and the sun. • I can describe how far apart planets are and how big they are compared to each other and the sun.	• scale • gravity • solar system • model • planets • moons • asteroids • galaxy • orbit • mass • force • attraction • star • orbit • comet • Milky Way • diameter • distance

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

Standard

SC.8.14.7 Gather, analyze, and communicate evidence to explain Earth's history.

Indicator

SC.8.14.7.a Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.

Clarification Statement: Emphasis is on how analyses of rock formations and the fossils they contain are used to establish relative ages of major events in Earth's history. Examples of Earth's major events could range from being very recent (such as the last Ice Age or the earliest fossils of homo sapiens) to very old (such as the formation of Earth or the earliest evidence of life). Examples can include the formation of mountain chains and ocean basins, the evolution or extinction of particular living organisms, or significant volcanic eruptions.

Learning Targets	Academic Vocabulary
• I can use rock layers and fossils as evidence to explain Earth's history. • I can explain how older rocks are found below younger rocks. • I can describe how scientists use the geologic time scale to organize events in Earth's past. • I can use fossils in rock layers to tell the relative ages of rocks and past events.	• rock strata • fossils • geologic time scale • relative age • absolute age • sedimentary rock • era • extinction event • layers • geologic signature • global impact

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
(password: ScienceFA)

CATHOLIC IDENTITY

Free Web resources

–https://catholicscientists.org/scientists-of-the-past/

–https://catholiceducation.org/en/science/25-famous-scientists-on-god.html

–https://mcgrath.nd.edu/about/centers-initiatives-and-programs/life-human-dignity/resources/ (requires free registration; includes climate change, human population/environment, and medical ethics all within a Catholic framework focused on human dignity).

–https://www.miracolieucaristici.org/en/liste/list.html (St. Carlo Acutis' website with details on the scientific investigations of many Eucharistic miracles worldwide)

Books

(Suitable for teacher reading and/or potential enrichment for interested or HAL students)

–Woods, T., & Cañizares, A. (2005). How the Catholic Church built Western Civilization. Regnery History.

--Chapter 4-The Church and the University

--Chapter 5-The Church and Science

–Warren, D. M., & Warren, J. (2020). Brilliant!: 25 Catholic scientists, mathematicians, and Supersmart people. Pauline Books & Media.

–Baglow, Christopher T. *Faith, Science & Reason: Theology on the Cutting Edge*. Midwest Theological Forum, 2012.

–Aquilina, M. (2017). The Healing Imperative: The Early Church and the Invention of Medicine as We Know It. Emmaus Road Pub.

–Mullenheim, Sophie De, et al. *Holy Mysteries!: 12 Investigations into Extraordinary Cases*. Magnificat; Ignatius, 2021.

–Górny, Grzegorz, et al. *Guadalupe Mysteries: Deciphering the Code*. Ignatius Press, 2016.

Catholic Scientists/Researchers/Medical Professionals relevant to the middle school content standards

Louis Pasteur	Sister Hilary Ross	St. Gianna Berretta Molla
St. Giuseppe Moscati	Ven. Jérôme Lejeune	Fr. Gregor Mendel
St. Hildegard of Bingen	St. Albert the Great	Sister Miriam Michael Stimson
Fr. Henri Breuil	Father Léon Provancher	Bl. Nicolas Steno
Laura Bassi	Maria Agnesi	Nicolaus Copernicus
Fr. Christopher Clavius	Fr. Angelo Secchi	Fr. Georges Lemaître
Karin Öberg	Giovanni Manzolini	Anna Morandi Manzolini

High School (Grades 9-12)

Abilities to do Scientific Inquiry and Engineering Practices

*This is an essential framework for teaching the entirety of the 9-12 science curriculum.

Scientific Inquiry:

Design and conduct investigations that will lead to descriptions of relationships between evidence and explanations.

Clarification Statement: Students should be able to do the following:

- Formulate testable questions that lead to predictions and scientific investigations.
- Design and conduct logical and sequential investigations including repeated trials
- Determine controls and use dependent and independent variables.
- Select and use equipment appropriate to the investigation; demonstrate correct techniques.
- Make qualitative and quantitative observations.
- Record, represent, interpret, and analyze data appropriately and review for quality, accuracy, and relevancy.
- Evaluate predictions, draw logical inferences based on observed. patterns/relationships, and account for non-relevant information.
- Communicate information, procedures, results, and conclusions with appropriate audiences.
- Engage in argument from provided evidence.
- Use appropriate mathematics in all aspects of scientific inquiry.
- Develop and use models.

Engineering Practices: Use the following steps to design a solution to a problem or solve a certain task.

- Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- Develop a model to generate data for repeated testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Science Discipline:	Standard Color:
Physical Science	Teal
Life Science	Green
Earth & Space Science	Gold

High School Physical Sciences

Physical sciences standards and indicators emphasize the patterns and predictability present in God's creation as students explore matter, chemical reactions, forces, energy, and wave applications. Students analyze structures and interactions from the atomic scale to large systems, connecting scientific principles to real-world applications and problem-solving while considering how scientific knowledge can be used to serve others and care for creation.

Focus areas include:

- **Structure and Properties of Matter:** Exploring atomic structure and explaining how particle arrangement determines the properties of substances, using the periodic table to predict element behaviors.
- **Chemical Reactions:** Investigating how substances combine or change to form new materials, characterizing chemical reactions, and applying design principles to optimize chemical systems.
- **Forces and Interactions:** Understanding forces within and between objects, applying momentum conservation to systems, predicting gravitational and electrostatic forces, and designing devices to reduce impact in collisions.
- **Energy Transfer and Conservation:** Describing energy at both macroscopic and atomic scales, accounting for energy as motion or stored energy in fields and understanding how energy transfers and remains conserved.
- **Waves and Information Technologies:** Applying wave properties and electromagnetic radiation interactions with matter to transfer information over long distances, store data, and study nature on various scales.

Standard
Standard Topic: Physical Science Content Standards: Forces and Interactions **Standard Code: SC.HS.1.1 Gather, analyze, and communicate evidence of forces and interactions.**
Indicator
SC.HS.1.1.a Analyze data to support the claim that Newton's First Law of motion describes the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
Clarification Statement: Emphasis is on balanced and unbalanced forces in a system, qualitative comparisons of forces, mass and changes in motion, frame of reference, and specification of units. ***Assessment Boundary:*** *Assessment is limited forces and changes in motion in one-dimension in an inertial reference frame and to change in one variable at a time.*

Learning Targets	Academic Vocabulary
• Describe Newton's First Law in relation to forces and mass. • Properly calculate the sum of forces. • Describe the relationship between mass and acceleration.	• Newton's First Law • Mass • Applied Force • Normal Force • Friction Force • Gravity Force

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://phet.colorado.edu/en/simulations/forces-and-motion-basics
https://phet.colorado.edu/en/simulations/friction

Indicator

SC.HS.1.1.b Analyze data to support the claim that Newton's Second Law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

Clarification Statement: Examples of data could include tables or graphs of position or velocity as a function of time for objects subject to a net unbalanced force, such as a falling object, an object rolling down a ramp, or a moving object being pulled by a constant force.
Assessment Boundary: *Assessment is limited to one-dimensional motion and to macroscopic objects moving at non-relativistic speeds.*

Learning Targets	Academic Vocabulary
• Define Newton's Second Law. • Organize data to present net force on an object, its mass (constant), and its acceleration. • Identify relationships between mass of an object and its acceleration. • Calculating using Net Force = mass x acceleration. • Identify the terms used in the F=ma equation.	• Newton's Second Law • Acceleration • Net Forces • Sum of Forces •

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://www.physicsclassroom.com/physics-Interactives/newtons-laws/force/force-interactive
https://www.walter-fendt.de/html5/phen/newtonlaw2_en.htm

Indicator

SC.HS.1.1.c Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.

Clarification Statement: Emphasis is on the quantitative conservation of momentum in interactions and the qualitative meaning of this principle.
Assessment Boundary: *Assessment is limited to systems of two macroscopic bodies moving in one dimension.*

Learning Targets	Academic Vocabulary

• Define the system of two interacting objects mathematically. • Identify and describe how the momentum of each object in the system is the product of its mass and velocity. • Perform calculations using p=mv. • Identify terms used in p=mv. • Identify the claim how the total momentum of a system of two objects has no net force if it is constant. • Analyze the motion of an object. • Support the claim for the conservation of momentum in a system. • Indicate that any change in momentum of one object is balanced by a change in the momentum of the other object to ensure conservation.	• Momentum • System • Velocity • Constant • Motion • Conservation of Momentum

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://www.sfponline.org/uploads/71/Momentum%20Worksheet.pdf
https://ophysics.com/e2.html

Indicator

SC.HS.1.1.d Apply science and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.

Assessment Boundary: *Assessment is limited to qualitative evaluations and/or algebraic manipulations.*

Learning Targets	Academic Vocabulary
• Incorporate the concept that for a given change in momentum, the force in the direction of the change in momentum is decreased by the time interval being increased in a collision. • Identify types of collisions. • Calculating using F(dt)=m(dv). • Identify terms in F(dt)=m(dv).	• Collisions • Types of Collisions (Elastic and Inelastic)

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://phet.colorado.edu/en/simulations/collision-lab
https://www.physicsclassroom.com/Physics-Interactives/Momentum-and-Collisions/Collision-Carts/Collision-Carts-Interactive
https://www.physicsclassroom.com/physics-interactives/momentum-and-collisions

Indicator

SC.HS.1.1.e Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.

Clarification Statement: Emphasis is on both quantitative and conceptual descriptions of gravitational.
Assessment Boundary: *Assessment is limited to systems with two objects.*

Learning Targets	Academic Vocabulary

• Identify gravitational pull as a constant acceleration due to the ratio of net force to mass remaining constant. • Calculate using given mathematical formulas, such as Force of Gravity and Force of Electrostatic. • Identify terms in the mathematical equations.	• Gravitational Force • Electrostatic Force

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://phet.colorado.edu/en/simulations/gravity-force-lab
https://phet.colorado.edu/en/simulations/coulombs-law
https://www.physicsclassroom.com/Physics-Interactives/Static-Electricity/Coulomb-s-Law/Coulomb-s-Law-Interactive

Indicator

SC.HS.1.1.f Plan and conduct an investigation to provide evidence that an electrical current can produce a magnetic field and that a changing magnetic field can produce an electrical current.

Assessment Boundary: *Assessment is limited to designing and conducting investigations with provided materials and tools.*

Learning Targets	Academic Vocabulary
• Understand that electric currents produce a magnetic field. • Identify that changing a magnetic field will produce an electric current. • Where electrical energy can be used in a circuit. • Understand how to measure electric current in a circuit. • Identify the magnetic field in a circuit. • Design a system to change the magnetic field to measure how it changes with electric current. • Measure and record electric currents and magnetic fields.	• Electric Current • Magnetic Field • Circuit

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://phet.colorado.edu/en/simulations/charges-and-fields
https://www.physicsclassroom.com/Physics-Interactives/Static-Electricity/Electric-Field-Lines/Electric-Field-Lines-Interactive

Indicator

SC.HS.1.1.g Recognize and describe examples of Newton's third law of motion which demonstrates forces occur in equal and opposite pairs. ***(Added from Arch)***

Clarification Statement: Emphasis is on forces acting on different objects, not necessarily resulting in equal movement.

Learning Targets	Academic Vocabulary
• Define Newton's Third Law.	• Newton's Third Law

• Identify action and reaction forces. • How action and reaction forces change with mass change.	• Action Forces • Reaction Forces

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://www.compadre.org/books/?ID=22&FID=41755
https://www.physicsclassroom.com/Teacher-Toolkits/Newton-s-Third-Law/Newton-s-Third-Law-Complete-ToolKit

Standard

Standard Topic: Waves and Electromagnetic Radiation
Standard Code: SC.HS.2.2 Gather, analyze, and communicate evidence of the interactions of waves.

Indicator

SC.HS.2.2.a Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

Clarification Statement: Examples of data could include electromagnetic radiation traveling in a vacuum and glass, sound waves traveling through air and water, and seismic waves traveling through the Earth.
Assessment Boundary: *Assessment is limited to algebraic relationships and describing those relationships qualitatively.*

Learning Targets	Academic Vocabulary
• Calculate using the Speed of Light and Energy equation. • Identify the terms in the speed of light equation. • Identify terms in the energy equation. • Identify constants in the Speed of Light and Energy equations. • Identify the relationships between Energy, Frequency, and Wavelength.	• Speed of Light • Energy • Planck's Constant • Frequency • Wavelength

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://www.youtube.com/watch?v=LgYMxH1LCdo
https://www.conantphysics.com/wp-content/uploads/2015/08/Wave-Speed-Worksheet.pdf

Indicator

SC.HS.2.2.b Evaluate claims about the advantages of digital transmission and storage of information.

Learning Targets	Academic Vocabulary
• Provide examples of digital transmission and storage of digital information.	• Digital Transmission

• Describe the importance of a stable system that can employ digital information. • Identify advantages and disadvantages of digital transmission and storage. • Provide real-life examples of digital transmission and storage.	• Digital Storage

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.2.2.c Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation is described by the wave-particle duality with each aspect being used to describe different phenomena and that for some situations one behavior is more useful than the other.

Clarification Statement: Emphasis is on how the experimental evidence supports the claim and how a theory is generally modified in light of new evidence. Examples of a phenomenon could include resonance, interference, diffraction, and photoelectric effect.
Assessment Boundary: *Assessment boundary does not include using quantum theory.*

Learning Targets	Academic Vocabulary
• Identify the wave-particle duality model (electromagnetic radiation is described to exist as a wave and particle). • Identify why the behavior of the radiation is important. • Evaluate based on given evidence how the behavior of electromagnetic radiation as a wave is important. • Evaluate based on given evidence how the behavior of electromagnetic radiation as a particle is important. • Analyze how the wave model may be more useful than the particle model to describe the transfer of energy and information.	• Wave-Particle Duality • Electromagnetic Radiation

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://www.nasa.gov/stem-content/double-slit-experiment-9-12/

Indicator

SC.HS.2.2.d Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.

Clarification Statement: Emphasis is on the idea that photons associated with different frequencies of light have different energies, and the damage to living tissue from electromagnetic radiation depends on the energy of the radiation. Examples of published materials could include trade books, magazines, web resources, videos, and other passages that may reflect bias.
Assessment Boundary: *Assessment is limited to qualitative descriptions.*

Learning Targets	Academic Vocabulary
• Compare and contrast at least two claims proposed in published material (using at least two sources per claim) regarding the effect of electromagnetic ration that is absorbed by matter. • Analyze and develop a reasoning about data presented to explore the validity and reliability of each claim. • Identify energies of photons involved in the claims and how this affects living tissues. • Describe the cause-and-effect reasoning in each claim on large and small scales using a particular wavelength to a single cell and how this affects the wavelength on the entire organism.	• Absorption • Validity • Reliability • Cell • Organism

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.2.2.e Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

Clarification Statement: Discussion should include devices that must depend on the photoelectric effect for its operation.
Assessment Boundary: *Assessments are limited to qualitative information. Assessments do not include band theory.*

Learning Targets	Academic Vocabulary
• Use at least two different formats to communicate technical information and ideas. • Describe at least two devices and physical properties the devices depend on. • Identify the wave behavior utilized by each device, or the absorption of photos and production of electrons for the device rely on the photoelectric effect. • Compare and contrast the research and development for each design. • Identify the cause-and-effect relationships used to produce the functional device.	• Photoelectric Effect • Wave Behavior

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Standard Topic: Structure and Properties of Matter

Standard Code: SC.HS.3.3 Gather, analyze, and communicate evidence of the structure, properties, and interactions of matter.

Indicator

SC.HS.3.3.a Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

Clarification Statement: Examples of properties that could be predicted from patterns could include reactivity of metals, types of bonds formed, numbers of bonds formed, and reactions with oxygen.
Assessment Boundary: *Assessment is limited to main group elements. Assessment does not include quantitative understanding of ionization energy beyond relative trends.*

Learning Targets	Academic Vocabulary
• Identify the components of each elemental model. • Identify the arrangement of elements in the Periodic Table. • Identify Valence Electrons for Main Group Elements. • Identify the organization and trends of the Periodic Table (Atomic Mass, Atomic Radius, Ionization Energy, Electronegativity, and Reactivity). • Identify the number and types of bonds between elements (Ionic, Covalent, and Metallic). • Develop an understanding over ion formation and the associated charges for various elements.	• Atomic Mass • Atomic Number • Valence Electrons • Element • Periodic Table • Main Group Elements • Reactivity • Ionization Energy • Electronegativity • Ionic • Covalent • Metallic • Metal • Non-metal • Metalloid • Ion • Atom • Atomic Charge

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://passionatelycurioussci.weebly.com/blog/periodic-aliens
https://www.chemedx.org/activity/trend-setter-lab
https://teachchemistry.org/classroom-resources/organizing-the-periodic-table

Indicator

SC.HS.3.3.b Plan and conduct an investigation to gather evidence to compare the structure of substances at the macro scale to infer the strength of forces between particles.

Clarification Statement: Emphasis is on understanding the strength between particles of solids, liquids, and gases, not on naming specific intermolecular forces (such as dipole-dipole). Examples of particles could include ions, atoms, molecules, and networked materials (such as graphite, diamond, Buckyballs). Examples of bulk properties of

substances could include the melting point and boiling point, vapor pressure, and surface tension.
Assessment Boundary: *Assessment does not include Raoult's law calculations of vapor pressure.*

Learning Targets	Academic Vocabulary
• Investigate melting point, boiling point, vapor pressure, and surface tension of a substance and the strength of electrical forces between the particles. • Compare and contrast the melting point, boiling point, vapor pressure, and surface tension between different compounds. • Infer how different properties (like melting point, boiling point, vapor pressure, and surface tension) can explain the strength of electrical forces between particles. • Describe how the spacing of the particles in substances can change as a result of experiments even if the identity of the particle is constant (like water boiling, the molecules are still water but further apart). • Identify the relationship thermal (kinetic) energy has an effect on the electrical attraction between particles. • Analyze how the molecular scale patterns of interactions of particles can be translated to the macroscopic scale. • Compare and contrast the patterns of different substances and how it connects to the electrical forces between particles.	• Melting Point • Boiling Point • Vapor Pressure • Surface Tension • Electrical Forces • Thermal (Kinetic) Energy • Molecular Scale • Macroscopic Scale • Particles • Compounds

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://phet.colorado.edu/sims/html/states-of-matter-basics/latest/states-of-matter-basics_en.html
https://www.sas.upenn.edu/~justinpb/Files/inquirylabteacher.pdf

Indicator

SC.HS.3.3.c Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.

Assessment Boundary: *Assessment does not include quantitative calculation of energy released. Assessment is limited to alpha, beta, and gamma radioactive decays.*

Learning Targets	Academic Vocabulary
• Identify the number of protons and neutrons before and after alpha, beta, and gamma decay. • Identify the correct emitted particle (alpha, beta, and gamma) based on the decay. • Define and develop models to illustrate (a) fission, (b) fusion, and (c) three distinct types of radioactive decay. • Compare and contrast the elements before and after the radioactive decay (follows Law of Conservation of Mass). • Compare and contrast fission and fusion models. • Compare and contrast the three types of radioactive decay.	• Alpha • Beta • Gamma • Fission • Fusion • Radioactive Decay • Law of Conservation of Mass

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://phet.colorado.edu/en/simulations/alpha-decay
https://teachchemistry.org/classroom-resources/radioactive-decay-simulation

Indicator

SC.HS.3.3.d Communicate scientific and technical information about why molecular-level structure is important in the functioning of designed materials.

Clarification Statement: Possible examples are the different physical properties of molecular substances, network structures, and polymers. Different carbon structures such as graphite, diamond, and buckyball could also be discussed.
Assessment Boundary: *Assessment is limited to provided molecular structures of specific designed materials.*

Learning Targets	Academic Vocabulary
• Identify and communicate evidence why the molecular level structure is important for the function of designed materials. • Describe the effects that attractive and repulsive forces between molecules have on the arrangement (structure) of different materials.	• Molecular Level • Attractive Forces • Repulsive Forces

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Standard Topic: Energy
Standard SC.HS.4.4 Gather, analyze, and communicate evidence of the interactions of energy.

Indicator

SC.HS.4.4.a Create and use a model to calculate a change in energy when energy flows within, or in and out of a system.

Clarification Statement: Examples of phenomena at the macroscopic scale could include the conversion of kinetic energy to thermal energy, or the conversion of potential energy to kinetic energy. Examples of models could include diagrams, drawings, descriptions, and computer simulations.
Assessment Boundary: *Assessment is limited to basic algebraic expressions or computations; to systems of two or three components; and to thermal energy, kinetic energy, and/or the energies in gravitational, magnetic, or electric fields.*

Learning Targets	Academic Vocabulary

• Identify that energy is expressed quantitatively in Joules no matter the system's components (e.g., energy in fields, thermal energy, kinetic energy, energy stored in springs, etc.). • Understand how energy flows in and out of a system. • Calculate initial and final energies in a system and identify how it follows the conservation of energy. • Calculate the changes in energy of one component and how it reflects to the other.	• Joules • Conservation of Energy

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://www.wlwv.k12.or.us/cms/lib/OR01001812/Centricity/Domain/756/Energy%20Practice.pdf
https://mrfifieldcorner.weebly.com/uploads/1/3/5/8/13584180/physics_2204_worksheet_8_conservation_of_mechanical_energy__2018.pdf

Indicator

SC.HS.4.4.b Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motion of particles (objects) and energy associated with the relative positions of particles (objects).

Learning Targets	Academic Vocabulary
• Identify that energy flows in a system and the surrounding area. • Compare and contrast the forms of energy present in microscopic and macroscopic scales. • Describe the changes in the relative position of objects in gravitational, magnetic, or electrostatic fields and how it can affect energy. • Compare and contrast the parts of thermal energy (kinetic and potential energy). • Describe an example of conservation of energy in a system. • Describe the relationship between different types of energy in a system. • Compare and contrast the conservation of energy in an open and closed system.	• Thermal Energy • Kinetic Energy • Potential Energy • Conservation of Energy • Open System • Closed System

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://phet.colorado.edu/en/simulations/energy-skate-park
https://phet.colorado.edu/en/simulations/energy-forms-and-changes

Indicator

SC.HS.4.4.c Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

Clarification Statement: Emphasis is on both qualitative and quantitative evaluations of devices. Examples of devices could include Rube Goldberg devices, wind turbines, solar cells, solar ovens, and generators. Examples of constraints could include use of renewable energy forms and efficiency.

Assessment Boundary: *Assessment for quantitative evaluations is limited to total output for a given input. Assessment is limited to devices constructed with materials provided to students.*

Learning Targets	Academic Vocabulary
• Identify that energy flows in a system and the surrounding area. • Compare and contrast the forms of energy present in microscopic and macroscopic scales. • Describe the changes in the relative position of objects in gravitational, magnetic, or electrostatic fields and how it can affect energy. • Compare and contrast the parts of thermal energy (kinetic and potential energy). • Describe an example of conservation of energy in a system. • Describe the relationship between different types of energy in a system. • Compare and contrast the conservation of energy in an open and closed system.	• Thermal Energy • Kinetic Energy • Potential Energy • Conservation of Energy • Open System • Closed System

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://phet.colorado.edu/en/simulations/energy-skate-park
https://phet.colorado.edu/en/simulations/energy-forms-and-changes

Standard

Standard SC.HS.4.4 Gather, analyze, and communicate evidence of the interactions of energy.

Indicator

SC.HS.4.4.e Analyze a major global challenge and a potential solution based on care for the common good.

Clarification Statement: Examination of qualitative, quantitative and ethical impacts should be considered and explained.

Learning Targets	Academic Vocabulary
• Analyze a major global problem. • Challenge the rationale for why it is considered a major global problem. • Research and evaluate the viability and reasoning provided. • Identify qualitative and quantitative criteria and constraints for acceptable solutions to the problem.	• Qualitative • Quantitative

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.4.4.e Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).

Clarification Statement: Emphasis is on analyzing data from student investigations and using mathematical thinking to describe the energy changes both quantitatively and conceptually. Examples of investigations could include mixing liquids at different initial temperatures or adding objects at different temperatures to water.
Assessment Boundary: *Assessment is limited to investigations based on materials and tools provided to students.*

Learning Targets	Academic Vocabulary
• Investigate the thermal energy of two different substances at different temperatures that are combined in a closed system. • Identify the heat capacity of each component in the system. • Calculate the change in thermal energy of each component in the system.	• Heat Capacity

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

https://thermtest.com/thermal-resources/specific-heat-test-experiment

Indicator

SC.HS.4.4.f Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.

Clarification Statement: Examples of models could include drawings, diagrams, and texts, such as drawings of what happens when two charges of opposite polarity are near each other.
Assessment Boundary: *Assessment is limited to systems containing two objects.*

Learning Targets	Academic Vocabulary
• Identify two objects in a system, identifying their initial positions and velocities in one dimension • Identify the interaction (electric or magnetic) between the two objects in the system. • Identify the relative magnitude and direction of each net force on the objects. • Represent a field as a quantity with magnitude and directions. • Describe the relationship between the objects in terms of changing energy given the initial and final positions and velocities.	• Relative Magnitude • Relative Direction

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Standard Topic: Chemical Reactions

Standard SC.HS.5.5 Gather, analyze, and communicate evidence of chemical reactions.

Indicator

SC.HS.5.5.a Construct an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.

Clarification Statement: Examples of chemical reactions could include the reaction of sodium and chlorine, of carbon and oxygen, or of carbon and hydrogen.
Assessment Boundary: *Assessment is limited to main group elements. Assessment does not include quantitative understanding of ionization energy beyond relative trends.*

Learning Targets	Academic Vocabulary
• Identify the total number of atoms on the reactants and products side of an equation. • Identify the total number and types of bonds on the reactants and products side of an equation. • Identify the outermost (valence) electron state of the atoms on the reactants and products side of an equation. • Describe the pattern for each type of chemical reaction. • Predicting the products of a chemical reaction based on provided reactants. • Identify the types of chemical bonds in a chemical reaction.	• Reactants • Products • Bond Types • Outermost Electrons • Chemical Reaction • Synthesis • Decomposition • Single Replacement • Double Replacement • Neutralization • Combustion

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

https://www.chemistrylearner.com/worksheets/law-of-conservation-of-mass-worksheets

https://www.physicsclassroom.com/Concept-Builders/Chemistry/Reaction-Types

https://whs.rocklinusd.org/documents/Science/RXN_Types%20-Balancing_Equations.pdf

Indicator

HS.SC.5.5.b Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

Clarification Statement: Emphasis is on the idea that a chemical reaction is a system that affects the energy change. Examples of models could include molecular-level drawings and diagrams of reactions, graphs showing the relative energies of reactants and products, and representations showing energy is conserved.
Assessment Boundary: *Assessment does not include calculating the total bond energy changes during a chemical reaction from the bond energies of reactants and products.*

Learning Targets	Academic Vocabulary
• Identify the bonds that are broken and formed in a chemical reaction. • Identify the energy transfer in a chemical reaction. • Create a connection on the transformation of potential energy into kinetic energy by molecular collisions in a chemical reaction. • Calculate the net change of energy within a system based on broken and formed bonds. • Define how the conservation of energy is followed in a chemical reaction.	• Chemical Change • Conservation of Energy • Kinetic Energy • Potential Energy

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

https://www.labxchange.org/library/items/lb:LabXchange:467158e0:lx_simulation:1

Indicator

HS.SC.5.5.c Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.

Clarification Statement: Emphasis is on student reasoning that focuses on the number and energy of collisions between molecules based on changes in temperature, concentration, or surface area.
Assessment Boundary: *Assessment is limited to simple reactions in which there are only two reactants; evidence from temperature, concentration, and rate data; and qualitative relationships between rate and temperature.*

Learning Targets	Academic Vocabulary
• Describe how kinetic energy increases as the number of collisions increases and how this affects the rate of the chemical reaction. • Use provided evidence (e.g., a data table) to identify a relationship between concentration and chemical reaction rate. • Use provided evidence (e.g., a data table) to identify the relationship between temperature and chemical reaction rate.	• Collisions • Chemical Reaction Rate • Concentration

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

https://phet.colorado.edu/en/simulations/reactions-and-rates

Indicator

SC.HS.5.5.d Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.

Clarification statement: focus on equilibrium changes due to altering pressure, temperature, and/or concentration.
Assessment Boundary: *Assessment is limited to specifying the change in only one variable at a time. Assessment*

does not include calculating equilibrium constants and concentrations.

Learning Targets	Academic Vocabulary
• Describe the relationship between potential changes in a component and how it relates to a particular series at equilibrium. • Observe how one change at the molecular level can impact the equilibrium of a system. • Observe how a change of concentration of one component can impact the equilibrium of a system, and how it changes the rate of the reaction. • Understand how both forward and backward reactions will occur at the same rate.	• Le Chatelier's Principle • Equilibrium • Forward Reaction • Backward Reaction

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

https://phet.colorado.edu/en/activities/3174

https://www.tsfx.edu.au/resources/W_-_Mrs_Motohashi_-_eq_2_lechatelier_worksheet_and_KEY.pdf?srsltid=AfmBOoqWeSSkN8SbaedACA7vHIxZFEmBXmgpSHxlsnwPZDulVn77VxEy

Indicator

SC.HS.5.5.e Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Clarification Statement: Complex is defined as a problem whose solution cannot be achieved in a single step.

Learning Targets	Academic Vocabulary
• Analyze a complex real-world problem. • Challenge the rationale for why it is considered a complex real-world problem. • Research and evaluate the viability and reasoning provided. • Identify qualitative and quantitative criteria and constraints for acceptable solutions to the problem.	• Qualitative • Quantitative

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.5.5.f Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

Clarification Statement: Emphasis is on using mathematical ideas to communicate the proportional relationships

between masses of atoms in the reactants and the products, and the translation of these relationships to the macroscopic scale using the mole as the conversion from the atomic to the macroscopic scale. Emphasis is on assessing students' use of mathematical thinking and not on memorization and rote application of problem-solving techniques.
Assessment Boundary: *Assessment does not include complex chemical reactions.*

Learning Targets	Academic Vocabulary
• Calculate the number of atoms or grams on each side of a chemical equation to prove the conservation of mass in a chemical reaction. • Compare and contrast the difference of masses before and after a reaction. • Relate the changes to mass being observed in terms of the experiment being performed in an open or closed system. • Identify the importance of balancing chemical reactions to ensure the conservation of mass is being followed.	• Conservation of Mass • Skeleton Equation • Balanced Equation

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
https://phet.colorado.edu/en/simulations/balancing-chemical-equations
https://phet.colorado.edu/sims/html/balancing-chemical-equations/latest/balancing-chemical-equations_en.html
https://simpop.org/reactions/reactions.htm
https://phet.colorado.edu/en/simulations/reactants-products-and-leftovers

Standard

Standard Topic: Human Influence in Physical Science

Standard SC.HS.6.6 Gather, analyze, and communicate an ethical solution.

Indicator

SC.HS.6.6.a Explain and evaluate an ethical solution addressing the use of advanced technology. ***(Added from Arch)***

Clarification Statement: Examples could include alternative energy sources, nuclear processes (fission and fusion), global climate change, chemical warfare, robotics, pharmaceuticals, and chemical engineering.

- Note: Solutions should not conflict with Catholic Church teachings.

Learning Targets	Academic Vocabulary
• Connect teachings of the Catholic Church to different ethical solutions. • Evaluate if an ethical solution follows the Catholic Church teaching. • Analyze how to change an ethical solution to fit what is taught by the	• Ethical Solution

Catholic Church.	

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

High School Life Sciences

Life Science standards and indicators highlight the complexity and interdependence of life as part of God's creation. Students explore cells, genetics, ecosystems, and biodiversity to understand how living things grow, adapt, and interact, fostering appreciation for life's diversity and responsibility for caring for all living things.

Focus areas include:

- **Structure and Function of Organisms:** Investigating how cells and body systems support life's processes, including growth and maintenance through interacting subsystems.
- **Heredity and Genetics:** Understanding how DNA and chromosomes function in cell division and trait inheritance, exploring variation within species, and considering ethical dimensions of genetic technologies.
- **Matter and Energy in Ecosystems:** Exploring how organisms obtain and use energy, interact with their environments, and cycle matter and energy through ecosystems.
- **Interactions and Behavior:** Examining biodiversity and animal behavior in relation to the survival of individuals and species, and how these interactions influence ecosystem dynamics.
- **Natural Selection and Evolution:** Investigating how natural selection and evolution explain both similarities and differences among organisms and how biodiversity supports life on Earth.

Standard	
Standard Topic: Structure and Function **Standard SC.HS.6.1 Gather, analyze, and communicate evidence of the relationship between structure and function in living things.**	
Indicator	
SC.HS.6.1.a Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	
Assessment Boundary: *Assessment does not include identification of specific cell or tissue types, whole body systems, specific protein structures and functions.*	
Learning Targets	**Academic Vocabulary**
• Define and use the vocabulary words listed • Describe the structure of DNA. Identify the location of DNA in cells. • Draw the components of a nucleotide, identifying their functions • Explain how the nucleotide fits into the model of the double stranded DNA structure.	DNA, Double Stranded, Nucleotide, Phosphate Group, Sugar, Base, Messenger RNA (mRNA), Codon, Anticodon, Amino

• Interpret a codon chart. • Translate an mRNA sequence into an amino acid sequence. • Sequence the steps of transcription and translation. • Label a diagram depicting translation. • Predict the change (if any) in the amino acid sequence when the DNA is mutated in specific places. • Provide differences and similarities in gene expression between cell types. • Give examples of functions different proteins can have and what they would do in different cell types. • Demonstrate the cause-and-effect relationship of how a mutation in a gene resulted in a change in the amino acid sequence of the resultant protein, which then, in turn, resulted in the loss of function of that protein and a loss of function of the specialized cells in which it is expressed and a deleterious effect on the organism. DNA->protein->specialized cell->tissue type->functioning of the whole organism. (Calls also on LS1-2. • Construct an explanation for gene expression which includes regions of DNA called genes determine the structure of proteins, which carry out the essential functions of life through systems of specialized cells.	Acid, Protein Synthesis, Ribosome, Nucleus, Cytoplasm, Transfer RNA (tRNA), Ribosomal RNA (rRNA), transcription, Translation, Gene, Gene Expression, Central Dogma, Nucleus, RNA Polymerase, Template, Complementary, Base Pair, Promoter, Termination, Promoter, Polypeptide, Protein, Peptide Bond, Start Codon, Stop Codon, Genetic Code, Mutation, Terminator, Trait, Phenotype, Genotype, Specialized Cell, Gene Regulation

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com
biointeractive.com

Indicator

SC.HS.6.1.b Develop and use a model to illustrate the hierarchical organization of interacting components that provide specific functions within multicellular organisms.

Clarification Statement: Emphasis is on functions at the organism level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. Examples of cell, tissue, organ, organ system hierarchy. ***Assessment Boundary:*** *Assessment does not include interactions and functions at the molecular or chemical reaction level.*

Learning Targets	Academic Vocabulary
• Define and utilize the vocabulary words listed. • Identify the pattern of the cell→tissue→organ→organ system for various organ systems. • Develop and use a model to illustrate the hierarchical organization of interacting components that provide specific functions within multicellular organisms.	Differentiation, Cell, Specialized, Tissue, Organ, Organ System

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

amoebasisters.com

Indicator

SC.HS.6.1.c Analyze evidence that feedback mechanisms maintain homeostasis.

Clarification Statement: Examples could include heart rate response to exercise, stomata response to moisture and temperature, and root development in response to water levels.
Assessment Boundary: *Assessment does not include the cellular processes involved in the feedback mechanism.*

Learning Targets	Academic Vocabulary
• Define and use the vocabulary words listed • Identify the evidence: Given data from an example of a feedback mechanism, identify change in the external environment of a living system, responses of a living system that stabilize and maintain the system's internal conditions (homeostasis) and whether this is a positive or negative feedback mechanism. • Analyze evidence that feedback mechanisms maintain homeostasis.	Homeostasis, Positive Feedback, Negative Feedback, Feedback Loop

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com

Indicator

SC.HS.6.1.d Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. Give the scientific basis for Catholic Church teachings on beginning of life issues including abortion and embryonic stem cell usage.

Clarification Statement: Emphasis on how mitosis and differentiation are required to produce and maintain complex organisms, but also how uncontrolled cell division can lead to cancer. Adult (somatic) cell research therapeutics are more effective and do not go against the Church teachings about the sanctity of life.
Assessment Boundary: *Assessment does not include specific gene control mechanisms.*

Learning Targets	Academic Vocabulary
• Define and use the vocabulary words listed. • Draw and label a cell cycle diagram. • Identify the reasons mitosis is necessary. • Clarify that differences between different cell types within a multicellular organism are due to gene expression — not different genetic material within that organism. • Distinguish between normal cell growth and cancer • Use the cell cycle model to explain how cancer arises	Asexual Reproduction, Sexual Reproduction, Differentiation, Stem Cell, Embryonic Stem Cell, Adult Or Somatic Stem Cell, Mitosis, Cell Division, Parent Cell, Daughter Cell, Cell Cycle, Cancer, Somatic

• Explain how a multicellular organism is made up of differentiated cells. • Explain, using a model, how mitosis and differentiation are required to produce and maintain complex organisms • Use a cell cycle and mitosis model to explain how: • Mitotic cell division produces two genetically identical daughter cells from one parent cell. • Explain why each somatic cell contains homologous chromosome pairs. • Describe development from the formation of the first cell of the new individual (zygote) to adulthood. • Distinguish between embryonic stem cells and adult (somatic) stem cells, including the scientific and ethical advantages of adult (somatic) stem cell research and therapies. • Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. Give the scientific basis for Catholic Church teachings on beginning of life issues including abortion and embryonic stem cell usage.	Cell, Gamete, Zygote, Apoptosis, Totipotent, Pluripotent, Multipotent, G1, S, G2, Checkpoint, Mutation, Chromosome, Homologous Chromosomes, Karyotype, Chromatid, Interphase, Prophase, Metaphase, Anaphase, Telophase, Cytokinesis, Centromere, Centrosome, Centriole, Tumor, Metastasis, Benign, Malignant, G1 Checkpoint, G2 Checkpoint, Metaphase Checkpoint, Cyclin, Growth Factor, Clone

Resources

Helpful slides especially about embryonic stem cells
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com
biointeractive.com

Indicator

SC.HS.6.1.e Distinguish between different types of microscopies. Display the correct utilization of a compound light microscope. Describe the structure and functions of eukaryotic cell organelles and components. Explain the mechanisms of transport across the cell membrane. Compare and contrast eukaryotic and prokaryotic cell types.

Clarification Statement: The cell organelle structure and function element of this Standards & Indicators can be covered relatively quickly since it should be reinforcement of previous knowledge with more detail for the high school level.

Learning Targets	Academic Vocabulary
• Define and utilize the vocabulary words listed • Explain the functions of each component of a compound light microscope. • Explain the correct technique of using a compound light microscope. • Compare and contrast light microscopy and electron microscopy. • Describe the structure and functions of eukaryotic cell organelles and components. • Describe the various ways that molecules can pass in and out of a cell. • List functions of different cell membrane proteins. • Compare and contrast eukaryotic and prokaryotic cell types.	Organelle, Nucleus, Prokaryotic Cell, Eukaryotic Cell, Cell Membrane, Nuclear Membrane, Cytoplasm, Nucleolus, Centrosome, Ribosome, Endoplasmic Reticulum, Golgi Apparatus Or Body, Mitochondria, Chloroplast, Cell Wall, Lysosome, Vesicle, Vacuole, Light

	Microscopy, Electron Microscopy, Magnification, Objective Lens, Ocular Lens, Stage, Arm, Base, Course Adjustment, Fine Adjustment, Condenser, Light Source, Passive Transport, Active Transport, Phospholipid Bilayer, Selectively Permeable, Diffusion, Osmosis, Facilitated Diffusion, Homeostasis, Receptor

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com

Standard

Standard Topic: Interdependent Relationships in Ecosystems

Standard SC.HS.7.2 Gather, analyze, and communicate evidence of interdependent relationships in ecosystems.

Indicator

SC.HS.7.2.a Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity and biodiversity of ecosystems at different scales.

Clarification Statement: Emphasis is on quantitative analysis and comparison of the relationships among interdependent factors including boundaries, resources, climate, and competition. Examples of mathematical comparisons could include graphs, charts, histograms, and population changes gathered from simulations or historical data sets.
Assessment Boundary: *Assessment does not include deriving mathematical equations to make comparisons.*

Learning Targets	Academic Vocabulary
• Define and use the vocabulary words listed. • Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity and biodiversity of ecosystems at different scales.	Biosphere, Species, Population, Community, Ecology, Ecosystem, Biome, Biotic Factor, Abiotic Factor, Autotroph, Heterotroph, Primary Producer, Photosynthesis, Chemosynthesis, Consumer, Carnivore, Herbivore, Omnivore, Detritivore, Decomposer, Scavenger, Food Chain, Food Web, Trophic Level, Ecological Pyramid, Pyramid Of Energy, Pyramid Of Biomass, Pyramid Of Numbers, Biomass, Limiting Nutrient, Phytoplankton, Zooplankton, Nitrogen Fixation, Denitrification, Transpiration, Biodiversity, Carrying

	Capacity

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com
biointeractive.com

Indicator

SC.HS.7.2.b Evaluate the claims, evidence, and reasoning that the interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

Clarification Statement: Examples of changes in ecosystem conditions could include modest biological or physical changes, such as moderate hunting, invasive species, or a seasonal flood; and extreme changes, such as volcanic eruption or sea level rise.

Learning Targets	Academic Vocabulary
• Define and use the vocabulary words listed. • Construct food chains and food webs, explaining the interactions between organisms. • Predict consequences of changes in ecosystem components when one factor is changed. • Evaluate the claims, evidence, and reasoning that the interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	Species, Population, Community, Ecology, Ecosystem, Biome, Biotic Factor, Abiotic Factor, Autotroph, Heterotroph, Primary Producer, Photosynthesis, Chemosynthesis, Consumer, Carnivore, Herbivore, Omnivore, Detritivore, Decomposer, Scavenger, Food Chain, Food Web, Trophic Level, , Limiting Nutrient, Phytoplankton, Zooplankton, Extinction

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com
biointeractive.com

Indicator

SC.HS.7.2.c Design and evaluate a solution to a real-world problem impacting the environment and biodiversity.

Clarification Statement: Examples can include dissemination of invasive species, pollution, urbanization.
- Note: Solutions should not conflict with Catholic Church teachings.

Learning Targets	Academic Vocabulary
• Define and use the vocabulary words listed. • Design and evaluate a solution to a real-world problem impacting the environment and	Biosphere, Species, Population, Community, Ecology, Ecosystem, Biome, Biotic Factor, Abiotic Factor, Autotroph, Heterotroph, Primary Producer,

biodiversity.	Photosynthesis, Chemosynthesis, Consumer, Carnivore, Herbivore, Omnivore, Detritivore, Decomposer, Scavenger, Food Chain, Food Web, Trophic Level, Ecological Pyramid, Pyramid Of Energy, Pyramid Of Biomass, Pyramid Of Numbers, Biomass, Biogeochemical Cycle, Water Cycle, Carbon Cycle, Nitrogen Cycle, Phosphorus Cycle, Limiting Nutrient, Phytoplankton, Zooplankton, Nitrogen Fixation, Denitrification, Transpiration, Extinction, Biodiversity

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com
biointeractive.com

Standard

Standard Topic: Matter and Energy in Organisms and Ecosystems

Standard SC.HS.8.3 Gather, analyze, and communicate evidence of the flow of energy and cycling of matter in organisms and ecosystems.

Indicator

SC.HS 8.3.a Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

Clarification Statement: Emphasis is on illustrating inputs and outputs of matter and transformation of energy in photosynthesis by plants and other photosynthesizing organisms. Examples of models could include diagrams, chemical equations, experiments and conceptual models.
Assessment Boundary: *Assessment does not include specific biochemical steps.*

Learning Targets	Academic Vocabulary
• Define and understand the vocabulary words listed. • Give the overall chemical reaction for photosynthesis. • Break down the steps of photosynthesis (light dependent and light-independent reactions) and describe where and when they occur. • Identify and describe the components of a model to illustrate that photosynthesis transforms light energy into stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen, including: energy in the form of light; breaking of chemical bonds to absorb energy; formation of chemical bonds to release energy; and matter in the form of carbon dioxide, water, sugar, and oxygen. • Use a model to show the transfer of matter and flow of energy between the organism and its environment during photosynthesis.	ATP, Glucose, Carbohydrate, Chemical Bond, Heterotroph, Autotroph, Photosynthesis, Chloroplast, Pigment, Chlorophyll, Thylakoid, Granum, Grana, Stroma, NADP+, Light Dependent Reactions, Light Independent Reactions (Calvin Cycle), Thylakoid Membranes, NADPH

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com

Indicator

SC.HS 8.3.b Explain how carbon, hydrogen, and oxygen, along with phosphorus and nitrogen, form simple molecules (monomers) which join to form the 4 basic macromolecules of life: nucleic acids, proteins, lipids, and carbohydrates.

Assessment Boundary: *Assessment does not include the details of the specific chemical reactions.*

Learning Targets	Academic Vocabulary
• Define and use the vocabulary words listed. • Identify the monomers for each of the 4 major biomolecules/macromolecules. • Summarize which of these elements (carbon, hydrogen, oxygen, nitrogen, phosphorus) are found in each of the 4 major biomolecules/macromolecules. • Describe the structure and functions of each of the 4 main biomolecules/macromolecules. • Explain how enzymes work. • Defend the importance of the role of enzymes for cell survival.	Monomer, Polymer, Sugar, Monosaccharide, Fatty Acid, Glycerol, Nucleotide, Amino Acid, Polysaccharide, Carbohydrate, Lipid, Nucleic Acid, RNA, DNA, Protein, Polypeptide, Enzyme, Active Site, Substrate, Catalyst, Product, Membrane Protein, Activation Energy, Denatured

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com
biointeractive.com

Indicator

SC.HS 8.3.c Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.

Clarification Statement: Emphasis is on the conceptual understanding of the inputs and outputs of the process of cellular respiration.
Assessment Boundary: *Assessment should not include detailed biochemical steps involved in cellular respiration.*

Learning Targets	Academic Vocabulary

• Define and use the vocabulary words listed • Identify and describe the components in a model that illustrate the following aspects of cellular respiration: the reactants and products, where chemical bonds are broken and formed, forms of energy • Explain that the process of cellular respiration releases energy because the energy released when the bonds that are formed in CO2 and water is greater than the energy required to break the bonds of sugar and oxygen. • Recall the law of conservation of energy to explain how the chemical reaction of oxygen and food molecules releases energy as matter is rearranged, existing chemical bonds are broken, and new chemical bonds are formed, but matter and energy are neither created nor destroyed. • Use a model to illustrate that: the chemical reaction of oxygen and food molecules releases energy as the matter is rearranged, existing chemical bonds are broken, and new chemical bonds are formed, but matter and energy are neither created nor destroyed. • Food molecules and oxygen transfer energy to the cell to sustain life's processes, including the maintenance of body temperature despite ongoing energy transfer to the surrounding environment.	Cellular Respiration, Glucose, Chemical Energy, ATP, Photosynthesis, Mitochondria, Glycolysis, Krebs Cycle, Citric Acid Cycle, Electron Transport Chain, Pyruvic Acid, Aerobic, Anaerobic, Mitochondrial Matrix, ATP Synthase, Calorie, Carbohydrate, Glycogen

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com

Indicator

SC.HS.8.3.d Explain the conditions for and overall steps of aerobic and anaerobic cellular respiration.

Assessment Boundary: *Assessment does not include the detailed biochemical steps of either aerobic or anaerobic respiration.*

Learning Targets	Academic Vocabulary
Define and use the vocabulary words listed. Compare and contrast cellular respiration and fermentation. Compare and contrast lactic acid fermentation and alcoholic fermentation. Explain the conditions for and overall steps of aerobic and anaerobic cellular respiration.	Cellular Respiration, Glucose, Chemical Energy, ATP, Photosynthesis, Mitochondria, Glycolysis, Krebs Cycle, Citric Acid Cycle, Electron Transport Chain, Pyruvic Acid, Aerobic, Anaerobic, Mitochondrial Matrix, ATP Synthase, Calorie, Carbohydrate, Glycogen, Fermentation, Lactic Acid Fermentation, Alcohol Fermentation, Anaerobic Respiration

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com

Indicator

SC.HS.8.3.e Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

Clarification Statement: Emphasis is on using a mathematical model of stored energy in biomass to describe the transfer of energy from one trophic level to another and that matter and energy are conserved as matter cycles and energy flows through ecosystems. Emphasis is on atoms and molecules such as carbon, oxygen, hydrogen and nitrogen being conserved as they move through an ecosystem.
Assessment Boundary: *Assessment is limited to proportional reasoning to describe the cycling of matter and flow of energy.*

Learning Targets	Academic Vocabulary
• Define and use the vocabulary words listed. • Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	Species, Population, Community, Ecosystem, Biome, Biotic Factor, Abiotic Factor, Autotroph, Heterotroph, Primary Producer, Photosynthesis, Chemosynthesis, Consumer, Carnivore, Herbivore, Omnivore, Detritivore, Decomposer, Scavenger, Food Chain, Food Web, Trophic Level, Ecological Pyramid, Pyramid Of Energy, Pyramid Of Biomass, Pyramid Of Numbers, Biomass, Biogeochemical Cycle, Water Cycle, Carbon Cycle, Nitrogen Cycle, Phosphorus Cycle, Limiting Nutrient, Phytoplankton, Zooplankton, Nitrogen Fixation, Denitrification, Transpiration

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com
biointeractive.com

Standard
Standard SC.HS.8.3 Gather, analyze, and communicate evidence of the flow of energy and cycling of matter in organisms and ecosystems.

Indicator

SC.HS.8.3.f Develop a model to illustrate the role of photosynthesis, cellular respiration, and combustion of fossil fuels in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

Clarification Statement: Examples of models could include simulations and mathematical models and the impact of human use of fossil fuels.
Assessment Boundary: *Assessment does not include the specific chemical steps of photosynthesis and respiration.*

Learning Targets	Academic Vocabulary
• Define and use the vocabulary words listed • Develop a model to illustrate the role of photosynthesis, cellular respiration, and combustion of fossil fuels in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.	Biogeochemical Cycle, Water Cycle, Carbon Cycle, Nitrogen Cycle, Phosphorus Cycle, Limiting Nutrient, Phytoplankton, Zooplankton, Nitrogen Fixation, Denitrification, Transpiration, Hydrosphere, Biosphere, Geosphere, Atmosphere, Photosynthesis, Cellular Respiration

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com
biointeractive.com

Standard

Standard Topic: Heredity: Inheritance and Variation of Traits

Standard SC.HS.9.4 Gather, analyze, and communicate evidence of the inheritance and variation of traits.

Indicator

SC.HS.9.4.a Distinguishing between genes, DNA, and chromosomes, explain the roles of each in passing on traits from parents to offspring.

Assessment Boundary: *Assessment does not include the biochemical mechanism of specific steps in the process.*

Learning Targets	Academic Vocabulary
• Define and use the vocabulary words listed. • Distinguishing between genes, DNA, and chromosomes, explain the roles of each	Gene, DNA, Chromosome, Sexual Reproduction, Meiosis, Meiosis I, Meiosis II, Mitosis, Parent Cell, Daughter Cell, Somatic Cell, Gamete, Egg, Sperm, Zygote, Homologous Chromosomes, Karyotype, Chromatid, Interphase, Prophase,

in passing on traits from parents to offspring.	Metaphase, Anaphase, Telophase, Cytokinesis, Centromere, Centrosome, Centriole, Genetic Variation, Crossing Over, Independent Assortment, Sex Chromosome, Autosome

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com
biointeractive.com

Indicator

SC.HS.9.4.b Explain that inheritable genetic variations may result from these processes: new genetic combinations and recombination during meiosis, plus possible viable errors occurring during replication, and mutations caused by environmental factors.

Assessment Boundary: *Assessment does not include the biochemical mechanism of specific steps in the process.*

Learning Targets	Academic Vocabulary
• Define and use the vocabulary words listed. • Describe the steps in meiosis. • -Compare and contrast meiosis and mitosis. • Explain the sources of genetic variation that occur through meiosis. • Distinguish between gene mutations and chromosomal mutations. • Distinguish between chromosomal deletion, chromosomal duplication, translocation and inversion. • Distinguish between silent mutations, missense mutations, nonsense mutations, and frameshift mutations • Discuss the relative severity of the different types of mutations. • Develop and use a model to explain the relationships between the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. • Make and defend a claim based on evidence that inheritable genetic variations may result from these processes: new genetic combinations and recombination during meiosis, plus possible viable errors occurring during replication, and mutations caused by environmental factors. • Explain that inheritable genetic variations	Asexual Reproduction, Sexual Reproduction, Meiosis, Meiosis I, Meiosis II, Mitosis, Cell Division, Parent Cell, Daughter Cell, Somatic Cell, Gamete, Egg, Sperm, Zygote, , Mutation, Chromosome, Homologous Chromosomes, Karyotype, Chromatid, Interphase, Prophase, Metaphase, Anaphase, Telophase, Cytokinesis, Centromere, Centrosome, Centriole, Clone, Genetic Variation, Crossing Over, Independent Assortment, Gene Mutation, Chromosomal Mutation, Nondisjunction, Point Mutation, Silent Mutation, Nonsense Mutation, Frameshift Mutation, Missense Mutation, Chromosomal Deletion, Chromosomal Duplication, Translocation, Inversion

may result from these processes: new genetic combinations and recombination during meiosis, plus possible viable errors occurring during replication, and mutations caused by environmental factors.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com
biointeractive.com

Indicator

SC.HS.9.4.c Apply concepts of statistics and probability to explain the variation and distribution of inherited traits.

Clarification Statement: Emphasis is on the use of mathematics to describe the probability (Punnett squares) of traits as it relates to genetic inheritance. Environmental factors can be discussed.
Assessment Boundary: *Assessment does not include Hardy-Weinberg calculations.*

Learning Targets	Academic Vocabulary
• Define and use the vocabulary words listed. • Describe Mendel's experiments. • Explain Mendel's experiments in terms of alleles of gene, chromosomes, and independent assortment during meiosis. • Distinguish between genotype and phenotype. • Distinguish between dominant and recessive. • Distinguish between homozygous and heterozygous. • Use Punnett squares to predict the probabilities of certain genotypes and phenotypes in the offspring of a given genetic cross. • Explain how environmental factors can affect the expression of traits and give an example. • Apply concepts of statistics and probability to explain the variation and distribution of expressed traits.	Gene, DNA, Chromosome, Sexual Reproduction, Meiosis, Meiosis I, Meiosis II, Mitosis, Parent Cell, Daughter Cell, Somatic Cell, Gamete, Egg, Sperm, Zygote, Homologous Chromosomes, Karyotype, Genetic Variation, Crossing Over, Independent Assortment, Sex Chromosome, Autosome, Punnett Square, Fertilization, Genetics, Gregor Mendel, Offspring, Model System, True-Breeding, Purebred, Pollen, Anther, Stigma, Trait, Hybrid, Allele, Dominant, Recessive, Segregation, Probability, Homozygous, Heterozygous, Phenotype, Genotype, Monohybrid, Dihybrid, Codominance, Incomplete Dominance, Polygenic, Multiple Alleles

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com
biointeractive.com

Standard

Standard Topic: Biological Evolution

Standard SC.HS.10.5 Gather, analyze, and communicate evidence of biological evolution.

Indicator

SC.HS.10.5.a Describe the divisions of the geological timeline. Compare and contrast relative and radiometric dating methods. Describe the history of the earth and life on earth from geological, chemical, and paleontological evidence.

Learning Targets	Academic Vocabulary
• Define and use the vocabulary words listed, • Describe the divisions of the geological timeline. • Explain the process by which a fossil forms. • Identify what types of remains can be fossilized and why. • Explain what trace fossils are and give examples. • Compare and contrast relative and radiometric dating methods. • Describe the history of the earth and life on earth from geological, chemical, and paleontological evidence.	Extinct, Fossil, Trace Fossil, Paleontology, Sedimentary Rock, Relative Dating, Radiometric Dating, Index Fossils, Trilobite, Half-Life, C-14 Dating, Geological Time Scale, Eon, Era, Period, Epoch, Plate Tectonics, Continental Drift, Endosymbiotic Theory, Cyanobacteria

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com
biointeractive.com

Indicator

SC.HS.10.5.b Classify living things in a modernized Linnaean hierarchy based on similar characteristics. Utilize evolutionary relationships for classification and interpret cladograms.

Clarification Statement: Explain and utilize genus and species notation. Explain evolutionary lineages based on nearest common ancestor. Distinguish degree of relatedness of taxa as interpreted from a cladogram.

Learning Targets	Academic Vocabulary
Define and use the vocabulary words listed ● Employ the binomial nomenclature system to correctly name any species. ● Diagram the levels of classification from domain to species. ● Compare and contrast the criteria used for classification by Linnaean classification and phylogenetic classification. ● Interpret a cladogram. ● Compare and contrast prokaryotic and eukaryotic cells. ● Describe the similarities and differences between the 3 domains. ● Describe the characteristics of each of the 6 kingdoms. ● Give example organisms for each of the 3 domains and 6 kingdoms. ● Classify living things in a modernized Linnaean hierarchy based on similar characteristics. ● Utilize evolutionary relationships for classification and interpret cladograms.	Binomial Nomenclature, Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species, Linnaean Classification, Systematics, Taxon, Taxa, Phylogeny, Clade, Cladogram, Domain Bacteria, Domain Archaea, Domain Eukarya, Eubacteria, Archaebacteria, Protista, Fungi, Plantae, Animalia, Eukaryote, Prokaryote, Autotroph, Heterotroph

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com

Indicator

SC.HS.10.5.c Explain the scientific evidence that common ancestry and biological evolution are supported by empirical evidence from multiple fields of science.

Clarification Statement: Emphasis is on a conceptual understanding of the role each line of evidence has relating to common ancestry and biological evolution. Examples of evidence could include similarities in DNA sequences and anatomical structures.

Learning Targets	Academic Vocabulary
● Define and use the vocabulary words listed. ● Communicate scientific evidence that common ancestry and biological evolution are supported by multiple lines of empirical evidence from the fields of molecular biology (similarities in DNA sequences), paleontology (fossil record), geology, and comparative anatomy. ● Explain the scientific evidence that common ancestry and biological evolution are supported by empirical evidence from multiple fields of science.	Evolution, Geology, Paleontology, Fossil, DNA Sequencing, Comparative Anatomy, Molecular Biology

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

amoebasisters.com

biointeractive.com

https://www.biointeractive.org/classroom-resources/fossil-record-stickleback-evolution

Indicator

SC.HS.10.5.d Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (2) competition for limited resources (3) inherited traits that increase an organism's ability to survive and reproduce in its environment (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

Clarification Statement: Emphasis is on using evidence to explain the influence each of the four factors has on the number of organisms, behaviors, morphology, or physiology in terms of ability to compete for limited resources and subsequent survival of individuals and adaptation of species. Examples of evidence could include mathematical models such as simple distribution graphs and proportional reasoning.
Assessment Boundary: *Assessment does not include other mechanisms of evolution, such as genetic drift, and gene flow through migration.*

Learning Targets	Academic Vocabulary
• Define and use the vocabulary words listed. • Construct an explanation based on evidence that natural selection primarily results from four factors: (1) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (2) competition for limited resources (3) inherited traits that increase an organism's ability to survive and reproduce in its environment (4) the proliferation of those organisms that are better able to survive and reproduce in the environment. Use a variety of valid and reliable sources for the evidence (e.g., data from investigations, theories, simulations, peer reviewed articles).	Charles Darwin, HMS Beagle, Natural Selection, Artificial Selection, Natural Genetic Variation, Sexual Reproduction, Adaptation, Competition for Limited Resources, Fitness, Mimicry, Camouflage, Survival in Evolutionary Terms, Inherited Traits, Extinct, Species

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com
biointeractive.com

Indicator

SC.HS.10.5.e Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

Learning Targets	Academic Vocabulary

• Define and use the vocabulary words listed • Construct an explanation based on evidence for how natural selection leads to adaptation of populations. • Students identify and describe the evidence to construct their explanation, including: • Changes in a population when some feature of the environment changes. • Relative survival rates of organisms with different traits in a specific environment. • The fact that individuals in a species have genetic variation (through mutations and sexual reproduction) that is passed on to their offspring; and the fact that individuals can have specific traits that give them a competitive advantage relative to other individuals in the species. • Advanced: Synthesize the valid and reliable evidence to distinguish between cause and correlation to construct the explanation about how natural selection provides a mechanism for species to adapt to changes in their environment, including the following elements: • Differences between living (biotic) and nonliving (abiotic) factors in ecosystems influence which traits are more likely to help organisms survive and reproduce. Traits that provide an advantage become more common in the population over generations because individuals with those traits are more likely to survive and pass them on. Over time, this leads to a population that is well adapted to its environment, showing traits that give it a competitive edge. •	Natural Selection, Artificial Selection, Natural Genetic Variation, Sexual Reproduction, Adaptation, Competition for Limited Resources, Fitness, Mimicry, Camouflage, Survival in Evolutionary Terms, Inherited Traits, Extinct, Species

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
amoebasisters.com
biointeractive.com

Indicator

SC.HS.10.5.f Construct an explanation and evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

Clarification Statement: Emphasis is on determining cause and effect relationships for how changes to the environment such as drought, flood, and the rate of change of the environment affect distribution, and human activities.

Learning Targets	Academic Vocabulary
• Define and use the vocabulary words listed. • Construct an explanation and evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	Charles Darwin, HMS Beagle, Natural Selection, Artificial Selection, Natural Genetic Variation, Sexual Reproduction, Adaptation, Competition for Limited Resources,

	Fitness, Mimicry, Camouflage, Survival in Evolutionary Terms, Inherited Traits, Extinct, Species, Speciation, Geographic Isolation, Habitat Isolation, Behavioral Isolation, Temporal Isolation, Mechanical Isolation, Gametic Isolation, Reproductive Barrier, Biogeography, Fossil Record
Resources	
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/ amoebasisters.com biointeractive.com	

High School Earth & Space Sciences

Earth and space sciences standards and indicators examine Earth's systems, the solar system, and the universe beyond. Students explore the history and processes of Earth, patterns in the sky, and the ways humans depend on and impact Earth's resources. These studies encourage awe at God's creation and thoughtful care for the planet entrusted to us.

Focus areas include:

- **The Universe and Earth's Motion:** Investigating the formation and evolution of the universe and solar system, processes in stars, and predictable patterns caused by Earth's movement such as seasons, eclipses, and tides.
- **Earth's History and Plate Tectonics:** Constructing explanations of Earth's history and geologic time using available evidence, including how and why continents move over time.
- **Water's Role in Shaping Earth:** Modeling how water properties and movement shape Earth's surface, affect weather, and drive chemical cycles within Earth's systems.
- **Weather and Climate Regulation:** Examining how system interactions control weather and climate and analyzing data to explain factors that influence climate change on various timescales.
- **Human Interactions and Resources:** Studying how humans depend on Earth's natural resources, how human activities affect Earth's systems, and how models and data can be used to predict and mitigate environmental impacts.

Standard	
Standard Topic: Earth and Space Science Content Standards **Standard SC.HS11.1 Gather, analyze, and communicate evidence to defend that the universe changes over time.**	
Indicator	
SC.HS.11.1.a Use a model based on evidence to illustrate how the stages of stars and the role of nuclear fusion in a star's core releases energy that reaches Earth in the form of radiation.	
Assessment Boundary: *Assessment does not include details of the atomic and subatomic processes involved with the sun's nuclear fusion.*	
Learning Targets	**Academic Vocabulary**

• I can identify and describe the stages in the life cycle of a star (e.g., nebula, main sequence, red giant, white dwarf, supernova, neutron star, black hole). DOK Level 1: Recall • I can explain that stars release energy through nuclear fusion in their cores. DOK Level 2 • I can model the process by which energy from a star's core reaches Earth in the form of electromagnetic radiation. DOK Level 3 • I can use evidence from observations (e.g., star color, brightness, spectrum) to support a model of stellar evolution. DOK Level 3 • I can construct or interpret a model that shows how energy produced by fusion in a star's core travels through the star and into space. DOK Level 3 • I can compare the energy output and life cycle of different types of stars (e.g., small vs. massive stars) using evidence-based models. DOK Level 3 • I can revise a model of star formation and radiation output based on new or hypothetical evidence. DOK Level 4	Nebula, Protostar, Main sequence star, Red giant, White dwarf, Supernova, Neutron star, Black hole, Stellar evolution, Nuclear fusion, Energy, Plasma, Thermonuclear reaction, $E=mc^2$, Electromagnetic radiation, Photon, Radiative zone, Convective zone, Photosphere, Radiation, Speed of light, Apparent magnitude, Absolute magnitude, Luminosity, Spectroscopy, Emission spectrum, Absorption spectrum, Hertzsprung-Russell diagram, Radiative transfer, Convection, Corona
Resources	
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/	
Indicator	
SC.HS.11.1.b Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.	
Learning Targets	**Academic Vocabulary**
• I can describe the Big Bang theory as the leading scientific explanation for the origin of the universe. DOK Level 1 • I can identify types of evidence that support the Big Bang theory, including light spectra, redshift, and the composition of matter. DOK Level 2 • I can explain how redshift indicates that galaxies are moving away from us and supports the expansion of the universe. DOK Level 2 • I can interpret light spectra data to determine the motion and distance of galaxies. DOK Level 3	Redshift, Background Radiation, Big Bang Theory, Universe, Wavelength, Doppler Effect, Spectrum Lines, Spectroscope, Cosmic Background Radiation
Resources	
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/	
Indicator	
SC.HS.11.1.c Communicate scientific ideas about the way stars, throughout their stellar stages, produce elements.	

Assessment Boundary: *Details of the many different nucleosynthesis pathways for stars of different masses are not assessed.*

Learning Targets	Academic Vocabulary
• I can describe that stars create elements through the process of nuclear fusion. DOK Level 1 • I can identify which elements are formed during different stages in the life cycle of a star (e.g., hydrogen to helium in main sequence stars). DOK Level 2 • I can explain how fusion in stars leads to the formation of heavier elements over time. DOK Level 2 • I can communicate scientific ideas (e.g., through writing, models, presentations) about how stars contribute to the elemental composition of the universe. DOK Level 3 • I can use observational evidence (e.g., spectral lines, stellar remnants) to support explanations of element formation in stars. DOK Level 3 • I can compare the role of low-mass and high-mass stars in producing elements without detailing every nucleosynthesis process. DOK Level 3 • I can revise a communication or explanation about stellar element formation based on peer feedback or new evidence. DOK Level 4	Fusion, Protostar, Red Giant Stage, White Dwarf Star, Brown Dwarf, Black Hole, Supernova,

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.11.1.d Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

Clarification Statement: Mathematical representations for the gravitational attraction of bodies and Kepler's Laws of orbital motions should not deal with more than two bodies, nor involve calculus.

Learning Targets	Academic Vocabulary
• I can define and describe the basic principles of gravitational attraction between two objects in space. DOK Level 1 • I can use Newton's Law of Universal Gravitation to calculate the gravitational force between two objects. DOK Level 2 • I can describe and apply Kepler's Laws of planetary motion to explain or predict the orbits of objects in the solar system. DOK Level 2 • I can use mathematical models to predict how changes in mass or distance affect gravitational force between two objects. DOK Level 3 • I can analyze orbital motion using Kepler's Laws to determine properties such as orbital period, velocity, and distance. DOK Level 3 • I can construct or use a computational model (e.g., simulation or spreadsheet) to visualize and predict the motion of orbiting objects. DOK	Newton's Gravitational Formula, Kepler's Laws of Orbital Motion, Forces, Mass, Circular Motion, Centripetal Force

Level 3 ● I can evaluate and refine a mathematical or computational model based on how well it predicts the observed motion of planets or moons. DOK Level 4	

Resources

Standard

Standard Topic: Weather and Climate

Standard SC.HS.12.2 Gather, analyze, and communicate evidence to support that Earth's climate and weather are influenced by energy flow through Earth systems.

Indicator

SC.HS.12.2.a Construct an explanation based on evidence for how the sun's energy moves among Earth's systems.

Learning Targets	Academic Vocabulary
● I can identify the main Earth systems (atmosphere, geosphere, hydrosphere, biosphere) and describe how they interact. DOK Level 1 ● I can describe how the sun provides energy that drives processes in the atmosphere, hydrosphere, and biosphere. DOK Level 2 ● I can explain how solar energy causes wind, ocean currents, and the water cycle. DOK Level 2 ● I can analyze evidence (e.g., data on temperature, weather patterns, ocean currents) that shows how solar energy is absorbed, reflected, or redistributed in Earth's systems DOK Level 3 ● I can construct an explanation based on data to show how energy from the sun moves between Earth's systems (e.g., from ocean to atmosphere or atmosphere to biosphere). DOK Level 3 ● I can evaluate how disruptions in the flow of solar energy (e.g., due to atmospheric changes or human activity) affect Earth system interactions. DOK Level 4	Insolation, Air Cells, Ocean Currents, Convection Currents, Temperature Energy Relationship, Transpiration, Atmosphere, Hydrosphere, Biosphere, Lithosphere, Temperature Controls

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.12.2.b Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.

Assessment Boundary: *Assessment of the results of changes in climate is limited to changes in surface temperatures, precipitation patterns, glacial ice volumes, sea levels, and biosphere distribution.*

Learning Targets	Academic Vocabulary
• I can identify the major sources and sinks of energy in Earth's climate system (e.g., incoming solar radiation, outgoing infrared radiation, greenhouse gases). DOK Level 1 • I can describe how Earth's atmosphere, surface, and oceans absorb, reflect, and re-radiate energy. DOK Level 2 • I can explain how an imbalance in energy flow into and out of Earth's systems can lead to climate change. DOK Level 2 • I can use a model (e.g., diagram, simulation, or graph) to show how changes in energy flow affect climate variables like surface temperature and precipitation. DOK Level 3 • I can describe how evidence of glacial ice volume, sea level, and species distribution reflect changes in Earth's climate. DOK Level 3 • I can analyze data or a model to explain how human or natural factors affect the balance of energy in the climate system. DOK Level 3 • I can evaluate and refine a model to improve its ability to predict how energy flow changes impact the climate system. DOK Level 4	Albedo, Greenhouse Effect, Humidity, Radiation (Heat Transfer)

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.12.2.c Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate and scale of global or regional climate changes.

Learning Targets	Academic Vocabulary
• I can identify and interpret geoscience data sets related to climate (e.g., temperature records, ice core samples, sea level trends, CO_2 concentrations). • I can explain how global climate models are used to simulate and predict changes in Earth's climate systems. DOK Level 2 • I can analyze climate data to detect trends in temperature, precipitation, sea level, and ice volume over time. DOK Level 3 • I can compare results from different global climate models and geoscience data to assess consistency in predicted outcomes. DOK Level 3 • I can make an evidence-based forecast of the current rate and scale of climate change at global or regional levels using scientific data. DOK Level 3 • I can evaluate the reliability and limitations of climate models and geoscience data used in forecasting climate change. DOK Level 4 • I can construct and defend a scientific argument using climate model outputs and data to support predictions about future climate impacts. DOK	Climate, Biomes

Level 4	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.12.2.d Evaluate the validity and reliability of past and present models of Earth conditions to make projections of future climate trends and their impacts.

Learning Targets	Academic Vocabulary
• I can describe what climate models are and how they are used to simulate Earth's past, present, and future conditions. DOK Level 1 • I can explain how climate models are built using scientific data and assumptions about physical processes. DOK Level 2 • I can analyze how well past climate models predicted observed conditions and assess their accuracy. DOK Level 3 • I can evaluate the reliability of current climate models by comparing them to past model performance and real-world data. DOK Level 3 • I can identify the strengths and limitations of different climate models when making projections about future trends. Level 3 • I can use evidence from past and present models to justify projections of future climate trends and their potential impacts (e.g., temperature rise, sea level change, extreme weather). DOK Level 4 • I can critique the assumptions and data sources used in climate models to determine how they affect projections and outcomes. DOK Level 4	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Standard Topic: Earth's Systems

Standard SC.HS.13.3 Gather, analyze, and communicate evidence to defend the position that Earth's systems are interconnected and impact one another.

Indicator

SC.HS.13.3.a Analyze geoscience data to make the claim that one change to Earth's surface can create feedback that causes changes to other Earth systems.

Learning Targets	Academic Vocabulary

• I can identify examples of changes to Earth's surface (e.g., melting glaciers, deforestation, urban development). DOK Level 1 • I can describe how Earth's systems (geosphere, biosphere, hydrosphere, atmosphere) interact with one another. DOK Level 2 • I can explain how a change in one part of Earth's surface can trigger feedback effects in other systems (e.g., loss of ice reduces albedo, leading to further warming). DOK Level 2 • I can analyze geoscience data (e.g., satellite imagery, temperature trends, sea level data) to identify patterns and evidence of feedback between Earth systems. DOK Level 3 • I can make and support a claim using data that shows how one surface change (e.g., permafrost thaw) leads to changes in other systems (e.g., atmosphere through methane release). DOK Level 3 • I can evaluate the cause-and-effect relationships between human-caused or natural surface changes and their impact across Earth systems. DOK Level 4 • I can construct a scientific argument based on evidence to explain how Earth system feedback amplifies or reduces the effects of surface changes. DOK Level 4	Albedo, Geosphere, Biosphere, Lithosphere, Feedback Loop

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.13.3.b Develop a model based on evidence of Earth's interior to describe the cycling of matter.

Learning Targets	Academic Vocabulary
• I can identify the major layers of Earth's interior (crust, mantle, outer core, inner core) and their properties based on evidence. DOK Level 1 • I can describe how matter moves within Earth's interior through processes like convection and plate tectonics. DOK Level 2 • I can explain the role of Earth's interior in the cycling of matter, including rock formation and recycling through plate movements. DOK Level 2 • I can develop a model (e.g., diagram, physical, or computational) that represents the cycling of matter inside Earth's interior. DOK Level 3 • I can use evidence from seismic data, volcanic activity, and rock samples to support my model of matter cycling inside Earth. DOK Level 3 • I can revise and refine my model based on new evidence or peer feedback to more accurately describe matter cycling in Earth's interior. DOK Level 4	Crust, Mantle, Inner Core, Outer Core, Plate (Geologic), Heat Plume, Subduction, Convergent Plate Boundary, Divergent Plate Boundary, Transform Plate Boundary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.13.3.c Construct an argument based on evidence to explain the multiple processes that cause Earth's plates to move.

Learning Targets	Academic Vocabulary
• I can identify the major tectonic plates and describe their general movement patterns. DOK Level 1 • I can describe key processes that contribute to plate movement, such as mantle convection, slab pull, and ridge push. DOK Level 2 • I can explain how the interaction of multiple geological processes causes the movement of Earth's plates. DOK Level 2 • I can analyze evidence from earthquakes, volcanic activity, and seafloor spreading to support explanations of plate movement. DOK Level 3 • I can construct an evidence-based argument that integrates multiple processes to explain why and how Earth's plates move. DOK Level 3 • I can evaluate alternative explanations or models of plate tectonics and defend the most supported argument based on available evidence. DOK Level 4	Subduction, Convergent Plate Boundary, Divergent Plate Boundary, Transform Plate Boundary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.13.3.d Plan and conduct an investigation of the properties of water and their effects on Earth materials, surface processes, and groundwater systems.

Learning Targets	Academic Vocabulary
• I can identify key physical and chemical properties of water (e.g., cohesion, adhesion, polarity, solvent ability). DOK Level 1 • I can describe how water interacts with different Earth materials (e.g., soil, rock, sediment) based on its properties. DOK Level 2 • I can design an investigation to test how water properties affect surface processes such as erosion, infiltration, and sediment transport. DOK Level 3 • I can conduct experiments to observe water's effects on Earth materials and record data accurately. DOK Level 3 • I can analyze investigation results to explain how water properties influence groundwater movement and surface changes. DOK Level 3 • I can communicate findings from my investigation using scientific explanations, models, or presentations. DOK Level 3 • I can evaluate the investigation design and suggest improvements or further questions about water's role in Earth systems. DOK Level 4	Polarity, Intermolecular Forces, Solvent, Solute, Soluble , Insoluble

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.13.3.e Develop a quantitative model to describe the cycling of carbon and other nutrients among the hydrosphere, atmosphere, geosphere, and biosphere, today and in the geological past.

Learning Targets	Academic Vocabulary
• I can identify the major Earth systems involved in the cycling of carbon and other nutrients: hydrosphere, atmosphere, geosphere, and biosphere. DOK Level 1 • I can describe the key processes that move carbon and nutrients among Earth's systems (e.g., photosynthesis, respiration, sedimentation, volcanic activity). DOK Level 2 • I can explain how carbon and nutrient cycles have changed over geological time based on scientific evidence. DOK Level 2 • I can develop a quantitative model (e.g., diagram with fluxes, spreadsheet, or simulation) that represents the cycling of carbon and nutrients among Earth systems. DOK Level 3 • I can use data to calculate rates of carbon or nutrient exchange between Earth systems in the present and past. DOK Level 3 • I can analyze how changes in one Earth system affect the cycling of carbon and nutrients in the others using my model. DOK Level 3 • I can evaluate and refine my quantitative model based on new data or feedback to improve its accuracy and predictive power. DOK Level 4	Hydrosphere, Atmosphere, Atmosphere, Geosphere/Lithosphere, Nitrogen Cycle, Carbon Cycle,

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Standard Topic: History of Earth

Standard SC.HS.14.4 Gather, analyze, and communicate evidence to interpret Earth's history

Indicator

SC.HS.14.4.a Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the differences in age, structure, and composition of crustal and sedimentary rocks.

Learning Targets	Academic Vocabulary
• I can identify the major types of crust—continental and oceanic—and their	Continental Crust, Oceanic

general characteristics. DOK Level 1 • I can describe how plate tectonics theory explains the movement of continental and oceanic crust. DOK Level 2 • I can analyze geological evidence (e.g., fossil distribution, magnetic striping, rock ages) that supports the movement of crustal plates. DOK Level 3 • I can compare and contrast the age, structure, and composition of crustal and sedimentary rocks from different plate tectonic settings. DOK Level 3 • I can evaluate how past and current crustal movements have influenced the formation and characteristics of sedimentary rocks. DOK Level 4 • I can construct an evidence-based explanation linking plate tectonics to observed differences in rock types and structures. → DOK Level 4	Crust, Subsidence, Uplift, Sedimentary, Metamorphic, Igneous, Crystals, Inclusions

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.14.4.b Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to reconstruct Earth's formation and early history.

Learning Targets	Academic Vocabulary
• I can identify ancient Earth materials, meteorites, and planetary surface features that provide evidence about Earth's formation. DOK Level 1 • I can describe how scientists use evidence from these materials to understand Earth's early history. DOK Level 2 • I can analyze scientific data from ancient rocks, meteorites, and planetary surfaces to infer processes involved in Earth's formation. DOK Level 3: Strategic Thinking • I can apply scientific reasoning to synthesize evidence and develop a coherent explanation of Earth's formation and early history. DOK Level 3: Strategic Thinking • I can evaluate different scientific interpretations and models of Earth's formation based on available evidence. DOK Level 4: Extended Thinking	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.14.4.c Develop a model to illustrate how Earth's internal and surface processes operate over time to form, modify, and recycle continental and ocean floor features.

Assessment Boundary: *Assessment does not include memorization of the details of the formation of specific geographic features of Earth's surface.*

Learning Targets	Academic Vocabulary
• I can identify Earth's internal processes (like mantle convection and plate tectonics) and surface processes (like erosion and sedimentation). DOK Level 1 • I can describe how these internal and surface processes work over time to shape Earth's continents and ocean floors. DOK Level 2 • I can develop a model (e.g., diagram or physical representation) that shows the interactions of Earth's internal and surface processes in forming and recycling landforms. DOK Level 3 • I can use evidence from geological data to support my model of how Earth's features change over time. DOK Level 3 • I can revise my model based on new evidence or peer feedback to improve its accuracy in illustrating Earth's dynamic systems. DOK Level 4	Mantle, Convection, Erosion, Fluvial, Subduction

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator
SC.HS.14.4.d Construct an argument based on evidence to validate coevolution of Earth's systems and life on Earth.
Assessment Boundary: *Assessment does not include a comprehensive understanding of the mechanisms of how the biosphere interacts with all of Earth's other systems.*

Learning Targets	Academic Vocabulary
• I can identify Earth's major systems (geosphere, atmosphere, hydrosphere, biosphere) and basic interactions among them. DOK Level 1 • I can describe examples of how life on Earth has influenced Earth's systems and vice versa over time. DOK Level 2 • I can analyze scientific evidence that shows the coevolution of Earth's systems and life, such as changes in atmosphere composition linked to biological activity. DOK Level 3 • I can construct an evidence-based argument that explains how Earth's systems and life have evolved together. DOK Level 3 • I can evaluate alternative explanations and defend the argument for coevolution using scientific data. DOK Level 4	

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Standard Topic: Sustainability

Standard SC.HS.15.5 Gather, analyze, and communicate evidence to describe the interactions between society, environment, and economy.

Indicator

SC.HS.15.5.a Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

Learning Targets	Academic Vocabulary
• I can identify key natural resources, types of natural hazards, and examples of climate changes that affect human activity. DOK Level 1 • I can describe how the availability of natural resources influences human settlement, economy, and lifestyle. DOK Level 2 • I can explain the impact of natural hazards (like earthquakes, floods, hurricanes) on human communities and infrastructure. DOK Level 2 • I can analyze evidence showing how changes in climate have historically influenced human activities such as agriculture, migration, and urban development. DOK Level 3 • I can construct an evidence-based explanation that integrates the effects of natural resources, hazards, and climate change on human activity. DOK Level 3 • I can evaluate how different human societies have adapted to or modified their environments in response to these natural factors. DOK Level 4	Natural Resource, Renewable Resource, Nonrenewable Resource, Fossil Fuels, Soil, Minerals, Agriculture, Energy Source, Resource Availability, Sustainability, Natural Hazard, Seismic Activity, Climate, Global Warming, Greenhouse Gases, Historical Climate Data, Urban Development, Adaptation, Sustainability

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.15.5.b Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

Learning Targets	Academic Vocabulary
• I can identify different types of energy and mineral resources and common design solutions for their development and management. DOK Level 1 • I can explain the concept of cost-benefit analysis as it applies to resource development and management. DOK Level 2 • I can analyze data on economic, environmental, and social factors to compare different design solutions for energy and mineral resource use. DOK Level 3	Types Of Energy, Kinetic Energy, Potential Energy, Radiant Energy, Kinds Of Energy, Mechanical Energy, Sound Energy, Electrical Energy, Nuclear Energy, Light Energy, Heat Energy,

• I can evaluate competing design solutions by weighing their costs and benefits to recommend the most effective approach. DOK Level 3 • I can construct and defend an argument supporting a design solution based on a detailed cost-benefit analysis. DOK Level 4	Chemical Energy

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.15.5.c Use a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

Assessment Boundary: *Assessment is limited to using provided multi-parameter programs or constructing simplified spreadsheet calculations.*

Learning Targets	Academic Vocabulary
• I can identify key factors that affect natural resource management, human population sustainability, and biodiversity. DOK Level 1 • I can describe how changes in natural resource management impact human populations and biodiversity. Level 2 • I can use a computational simulation or simplified spreadsheet to model interactions among resource management, population sustainability, and biodiversity. DOK Level 3 • I can analyze simulation results to explain how varying resource management strategies influence sustainability and biodiversity outcomes. DOK Level 3 • I can communicate findings from the simulation to support decisions about sustainable resource management. DOK Level 3 • I can evaluate the limitations of the simulation model and suggest improvements or additional factors to consider. DOK Level 4	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.15.5.d Evaluate or refine a technological solution that increases positive impacts of human activities on natural systems.

Learning Targets	Academic Vocabulary
• I can identify technological solutions designed to reduce negative impacts or increase positive impacts of human activities on natural systems. DOK Level 1	

• I can describe the intended positive effects of a given technological solution on natural systems. DOK Level 2 • I can evaluate the effectiveness of a technological solution using evidence and criteria related to environmental impact. DOK Level 3 • I can analyze feedback and data to identify potential improvements or refinements to the technological solution. DOK Level 3 • I can propose and justify refinements to a technological solution to enhance its positive impact on natural systems. DOK Level 4	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.15.5.e Evaluate a solution to a complex real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts

Learning Targets	Academic Vocabulary
• I can identify various criteria and constraints such as cost, safety, reliability, aesthetics, and social, cultural, and environmental impacts relevant to a real-world problem. DOK Level 1 • I can describe how different criteria and constraints influence the evaluation of solutions to complex problems. DOK Level 2 • I can analyze tradeoffs among criteria and constraints when evaluating different solutions to a problem. DOK Level 3 • I can evaluate a solution by prioritizing criteria and weighing tradeoffs, considering multiple constraints and impacts. DOK Level 3 • I can construct and justify a reasoned argument that supports the selection or improvement of a solution based on the evaluation. DOK Level 4	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.15.5.f Use a computational representation to illustrate the relationships among Earth systems and the degree to which those relationships are being modified due to human activity.

Assessment Boundary: *Assessment does not include running computational representations but is limited to using the published results of scientific computational models.*

Learning Targets	Academic Vocabulary

• I can identify the major Earth systems (geosphere, atmosphere, hydrosphere, biosphere) and describe how they interact. DOK Level 1 • I can explain how human activities are modifying relationships among Earth's systems. DOK Level 2 • I can interpret published computational model results to illustrate interactions and changes among Earth systems caused by human activity. DOK Level 3 • I can analyze data from computational models to assess the extent and impact of human-induced modifications on Earth systems. DOK Level 3 • I can communicate findings from computational representations to explain the consequences of human impacts on Earth's systems. DOK Level 3 • I can evaluate the strengths and limitations of computational models in representing Earth system interactions and human impacts. DOK Level 4	
Resources	
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/	

CATHOLIC IDENTITY:

Catholic Intellectual/Scientific Tradition: Including formation of the first universities from religious communities, the Catholic Origins of the scientific method (empiricism) highlighting of Catholic scientists such as Gregor Mendel, Georges LeMaitre, and Jerome Lejeune.

Quality resources teachers can sign up for from the McGrath Institute for Church Life (Notre Dame): https://mcgrath.nd.edu/about/centers-initiatives-and-programs/life-human-dignity/resources/

Synergy between Faith and Reason in the Church.
A good article on Popes' statements on Evolution and the Big Bang

High School Plus Standards (Optional)

The High School Plus (HSP) standards outline advanced science topics intended to increase the rigor of standard high school science programs or supplement specialized advanced courses. These standards are based on entry-level college science syllabi for science majors (such as UNL LIFE 120 and CHEM 109) and are designed to bridge high school and postsecondary coursework, giving students a strong foundation for future studies.

Science Discipline:	Standard Color:
Physics Plus	Teal
Chemistry Plus	Green
Biology Plus	Gold
Anatomy and Physiology Plus	Red

Physics Plus Content Standards

*Indicators for plus content do NOT have a requirement to be mastered. Indicators can be chosen based on the level of the course.

Standard
Standard Topic: Forces, Interactions, and Motion Standard SC.HSP.1.1: Gather, analyze, and communicate evidence of forces, interactions, and motion.
Indicator
SC.HSP.1.1.a: Generate and interpret mathematical and graphical representations to describe the relationships between position, velocity, acceleration and time.
Clarification Statement: Examples of data could include tables or graphs of position or velocity as a function of time for objects subject to no acceleration and objects undergoing a constant acceleration, including projectile motion, free fall, and circular motion. Examples should also include both average and instantaneous velocities. ***Assessment Boundary:*** *Assessment is limited to one and two-dimensional motion and to objects moving at non-relativistic speeds.*

Learning Targets	Academic Vocabulary
• Distinguish between distance and displacement. • Describe motion using displacement, velocity, and acceleration qualitatively and quantitatively, using an appropriate reference point. • Create and analyze motion graphs (position vs. time and velocity vs. time). • Quantitatively analyze motion using kinematic equations. • Describe and analyze free fall qualitatively and quantitatively. • Describe and analyze projectile motion qualitatively and quantitatively. • Describe and analyze circular motion qualitatively and quantitatively.	• Distance • Displacement • Velocity • Average velocity • Instantaneous velocity • Acceleration • Reference point • Motion graph • Kinematic equation • Free fall • Projectile motion • Circular motion

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator
SC.HSP.1.1.b: Use mathematical and pictorial models as applied to Newton's second law of motion describing the relationship among the net force on a macroscopic object, its mass, and its acceleration.
Clarification Statement: Examples include drawing and using free body diagrams to analyze the net force on the object and the resulting motion; vectors including decomposition and recomposition, addition and subtraction. ***Assessment Boundary:*** *Assessment is limited to two-dimensional motion.*

Learning Targets	Academic Vocabulary
• Identify and describe Newton's second law of motion. • Draw accurate free body diagrams, including friction, weight, and normal forces where applicable. • Use free body diagrams to calculate individual and net forces acting on the object. • Add, subtract, decompose, and recompose vectors in both one and two dimensions to solve force problems. • Solve for forces, masses, or accelerations using Newton's second law.	• Newton's second law • Free body diagram • Net force • Friction, weight • Normal force • Vector

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator
SC.HSP.1.1.c: Use mathematical representations of momentum to predict the outcome of a collision.

Clarification Statement: Emphasis is on the quantitative conservation of momentum in interactions and the qualitative meaning of this principle.
Assessment Boundary: *Assessment is limited to quantitative analysis of systems of two macroscopic bodies moving in one-dimension and qualitative analysis of multiple macroscopic bodies moving in two or three-dimensions.*

Learning Targets	Academic Vocabulary
• Explain the concept of momentum qualitatively and quantitatively. • Qualitatively and quantitatively predict the outcome of a one-dimensional collision between two objects in an isolated system. • Qualitatively predict the outcome of a two-dimensional collision between two objects in an isolated system.	• Momentum • Conservation of momentum • Isolated system

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.1.1.d Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.

Clarification Statement: Examples of evaluation and refinement could include determining the success of the device at protecting an object from damage and modifying the design to improve it by applying the impulse-momentum theorem. Examples of a device could include a football helmet or an airbag.
Assessment Boundary: *Assessment is limited to qualitative evaluations and/or algebraic manipulations.*

Learning Targets	Academic Vocabulary
• I can explain the relationship between force, impulse, and momentum during a collision. • I can identify design features of devices (e.g., helmets, airbags) that reduce force during collisions. • I can design a device aimed at minimizing force on an object during a collision using scientific principles • I can qualitatively evaluate how well a device reduces force and protects an object during a collision. • I can apply algebraic manipulations of the impulse-momentum theorem to analyze and improve the device design. • I can refine the device design based on evaluation results to better minimize collision forces.	• Force • Impulse • Momentum

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.1.1.e Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.

Clarification Statement: Emphasis is on both quantitative and conceptual descriptions of forces from gravitational and electric sources.
Assessment Boundary: *Assessment can be expanded to systems with multiple objects.*

Learning Targets	Academic Vocabulary
• Explain the nature of the long-range force fields. • Compare and contrast Newton's Law of Gravitation and Coulomb's Law. • Predict the gravitational force between at least two masses both qualitatively and quantitatively using Newton's Law of Gravitation. • Predict the electrostatic force between at least two-point charges both qualitatively and quantitatively using Coulomb's Law.	• Long-range force field • Newton's Law of Gravitation • Coulomb's Law Electrostatic force • Point charge

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.1.1.f Use mathematical models to describe the motion of an object undergoing simple harmonic motion, including its displacement, velocity, acceleration, and energy transformations over time.

Learning Targets	Academic Vocabulary
• I can define key terms related to simple harmonic motion (e.g., amplitude, period, frequency, phase, angular frequency). • I can use mathematical equations (e.g., • $x(t)=A\cos(\omega t+\phi)$) to model the displacement of an object in simple harmonic motion. • I can derive and interpret expressions for velocity and acceleration as functions of time in simple harmonic motion. • I can use graphical representations (e.g., displacement vs. time, velocity vs. time) to describe and compare aspects of oscillatory motion. • I can calculate and explain the transformation between potential and kinetic energy over time in a system undergoing simple harmonic motion. • I can analyze how changes in system parameters (mass, spring constant, amplitude) affect motion and energy in SHM using mathematical models. • I can use mathematical models to predict future motion (position, velocity, or energy) of an oscillating system at a given time.	• Simple harmonic motion • Amplitude • Period • Frequency • Phase • Angular frequency • Spring constant

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Standard SC.HSP.2.2: Gather, analyze, and communicate evidence of the interactions of waves and optics.

Indicator

SC.HSP.2.2.a Use mathematical representations to describe the relationships among the frequency, period, wavelength, and speed of waves traveling in various media.

Clarification Statement: Examples of data could include electromagnetic radiation traveling in a vacuum and glass, sound waves traveling through air and water, and seismic waves traveling through the Earth. Examples also include descriptive changes in observed frequency based on relative motion of observer or source (Doppler effect). ***Assessment Boundary:*** *Assessment is limited to algebraic relationships and describing those relationships qualitatively.*

Learning Targets	Academic Vocabulary
• Convert between frequency and period. • Use the wave equation to determine speed, frequency, or wavelength. • Explain the factors that cause changes in wave speed. • Explain the Doppler effect and some applications.	• Frequency • Period • Wavelength • Wave equation • Doppler effect

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.P.2.2.b Develop and use models to predict interactions of longitudinal and transverse waves in various media.

Clarification Statement: Examples could include P, S and Surface seismic waves, water waves, and waves on a spring. An extension could be standing waves and resonance. Emphasis is on structure and function of waves.

Learning Targets	Academic Vocabulary
• Compare and contrast longitudinal and transverse waves. • Describe types of wave interference. • Predict the results of constructive and destructive interference.	• Longitudinal • Transverse • Constructive interference • Destructive interference

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.2.2.c: Develop and use analysis methods to describe the behavior of light at the boundary of various media.

Clarification Statement: Emphasis is on both geometric (ray diagrams) and algebraic models (mirror and thin lens equation, Snell's Law).

Learning Targets	Academic Vocabulary
• Draw ray diagrams showing image formation from different types of mirrors. • Model refraction using ray diagrams and Snell's Law • Use the mirror and thin lens equation to solve for image distance, object distance, or focal length for both concave and convex mirrors and lenses. • Describe the types of images formed from mirrors and lenses (real and virtual)	• Ray diagram • Reflection • Law of reflection • Refraction • Snell's law • Object distance • Image distance • Focal length • Lens • Concave mirror/lens • Convex mirror/lens • Real image • Virtual image

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.2.2.d Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.

Clarification Statement: Emphasis is on how the experimental evidence supports the claim and how a theory is generally modified in light of new evidence. Examples of a phenomenon could include resonance, interference, diffraction, photoelectric effect and the idea that photons associated with different frequencies of light have different energies.
Assessment Boundary: *Assessment includes qualitative and quantitative models of light.*

Learning Targets	Academic Vocabulary
• Compare and contrast the wave model and particle model of electromagnetic radiation. • Determine which wave phenomena can best be described by the wave model.	• Electromagnetic radiation • Wave model • Particle model

• Determine which wave phenomena can best be described by the particle model (photons). • Articulate that the true nature of electromagnetic radiation is currently best described by wave-particle duality. • Describe the electromagnetic spectrum both qualitatively and quantitatively using wavelength, frequency, and energy.	• Photon

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.2.2.e: Use evidence to support explanations for causes of emission and absorption spectra of electromagnetic radiation.

Clarification Statement: Emphasis is on the idea that photons associated with different frequencies of light have different energies. This could include the displacement and broadening of spectral lines (redshift and blueshift). Examples could include different elements absorbing or emitting specific frequencies of light.
Assessment Boundary: *Assessment is limited to qualitative descriptions.*

Learning Targets	Academic Vocabulary
• Describe how matter absorbs and emits electromagnetic radiation to produce quantized spectral lines.	• Atomic emission • Atomic absorption • Spectral lines • Quantized

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.2.2.f Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

Clarification Statement: Examples could include solar cells capturing light and converting it to electricity; medical imaging; communications technology; lasers.
Assessment Boundary: *Assessments are limited to qualitative information. Assessments do not include band theory.*

Learning Targets	Academic Vocabulary
• I can identify technological devices that use wave behavior and wave interactions with matter to capture or transmit information and energy.	• Reflection • Refraction

• I can describe basic principles of wave behavior such as reflection, refraction, absorption, and transmission relevant to these devices. • I can explain qualitatively how specific devices (e.g., solar cells, lasers, medical imaging) use wave interactions to perform their functions. • I can communicate technical information clearly about how wave principles enable these devices to transmit or capture energy and information. • I can analyze the role of wave interactions in improving or limiting the effectiveness of these technological devices.	• Absorption • Transmission

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Standard SC.HSP.4.3: Gather, analyze, and communicate evidence of the interactions of energy.

Indicator

SC.HSP.4.3.a Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.

Clarification Statement: Emphasis is on explaining the meaning of mathematical expressions used in the model including the Work-Energy theorem.
Assessment Boundary: *Assessment is limited to basic algebraic expressions or computations; to systems of two or three components; and to thermal energy, kinetic energy, and/or the energies in gravitational, magnetic, or electric fields.*

Learning Targets	Academic Vocabulary
• Explain the relationship between work and energy both qualitatively and quantitatively (work-energy theorem). • Calculate the mechanical energy or total energy of a system. • Use the law of conservation of energy to track energy transfer as a system of two or three components changes.	• Work • Energy • Work-energy theorem • Mechanical energy • Nonmechanical energy • Kinetic energy • Potential energy • Thermal energy

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.4.3.b: Plan and conduct an investigation to rate the power and efficiency used in performing work on a system.

Clarification Statement: Emphasis is on the quantitative determination of power in interactions. Examples could include use of pulleys and electric motors.

Learning Targets	Academic Vocabulary
• Experimentally determine the work done by or on a system. • Experimentally determine the power used by or on a system. • Experimentally determine the efficiency of a system.	• Power • Efficiency

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.4.3.c Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

Clarification Statement: Emphasis is on both qualitative and quantitative evaluations of devices. Examples of devices could include Rube Goldberg devices, wind turbines, solar cells, solar ovens, generators, heat engines and heat pumps. Examples of constraints could include use of renewable energy forms and efficiency. Assessment for quantitative evaluations is limited to total output for a given input.
Assessment Boundary: *Assessment is limited to devices constructed with materials provided to students.*

Learning Targets	Academic Vocabulary
• I can identify different forms of energy and examples of devices that convert energy from one form to another. • I can explain constraints such as renewable energy use and efficiency that influence device design. • I can design a device within given constraints to convert one form of energy into another. • I can build a device using provided materials that performs energy conversion according to my design. • I can evaluate my device's performance qualitatively and quantitatively by comparing total energy output to input. • I can refine my device based on evaluation results to improve its efficiency or functionality.	• Temperature • Thermal energy • Heat • Specific heat capacity

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.4.3.d Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

Clarification Statement: Examples could include analysis of renewable energy systems for electricity generation and the effect of autonomous electric cars on the economy, society and the environment.

Learning Targets	Academic Vocabulary
• I can identify a major global challenge and describe its significance to society. • I can distinguish between qualitative and quantitative criteria relevant to evaluating solutions for the challenge. • I can specify constraints that must be considered when developing solutions, including societal needs and wants. • I can analyze how proposed solutions meet or fail to meet the identified criteria and constraints. • I can synthesize information to prioritize criteria and constraints for effective solutions that balance technical and societal factors.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.4.3.e Plan and conduct an investigation to provide evidence for the transfer of thermal energy within a system based on the Laws of Thermodynamics.

Clarification Statement: Emphasis is on analyzing data from student investigations and using mathematical thinking to describe the energy changes both quantitatively and conceptually, such as changes in entropy of a system. Examples of investigations could include mixing liquids at different initial temperatures or adding objects at different temperatures to water, changes from kinetic to thermal energy, and heat engines and heat pumps.
Assessment Boundary: *Assessment is limited to investigations based on materials and tools provided to students.*

Learning Targets	Academic Vocabulary
• Describe and differentiate among temperature, thermal energy, and heat. • Calculate heat gained or lost by systems based on their specific heat capacities and temperature changes. • Experimentally and theoretically determine the amount of heat exchange in a system.	• Temperature • Thermal energy • Heat • Specific heat capacity

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.4.3.f Develop and use a model of two objects interacting through gravitational, electric, or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.

Clarification Statement: Examples of models could include drawings, diagrams, and texts, such as drawings of what happens when two charges of opposite polarity are near each other.
Assessment Boundary: *Assessment is limited to systems containing two objects.*

Learning Targets	Academic Vocabulary
• Model the gravitational potential energies of two objects. • Model the gravitational energy changes as two objects interact. • Model the electrical potential energies of two objects. • Model the electrical energy changes as two objects interact. • Model the magnetic potential energies of two objects. • Model the magnetic energy changes as two objects interact.	• • Gravitational potential energy • Electrical potential energy • Magnetic potential energy

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Standard SC.HSP.16.4: Gather, analyze, and communicate evidence of electricity and magnetism.

Indicator SC.HSP.16.4.a Use mathematical representations of field forces to describe and predict forces at a distance between objects.

Clarification Statement: Emphasis is on both quantitative and conceptual descriptions of forces from gravitational and electric sources.
Assessment Boundary: *Assessment can be expanded to systems with multiple objects.*

Learning Targets	Academic Vocabulary
• I can identify gravitational and electric forces as examples of forces that act at a distance. • I can describe conceptually how gravitational and electric field forces act between objects without contact. • I can use mathematical formulas to calculate the magnitude of gravitational and electric forces between two objects. • I can apply mathematical representations to predict the net force on an object in a system with multiple gravitational or electric forces. • I can explain how changes in distance and magnitude of charges or masses	• Field force • Gravitational field • Magnetic field • Electrical field

affect the forces between objects.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.16.4.b Use models to visualize and describe gravitational, magnetic and electrical fields and predict resulting forces on nearby objects.

Clarification Statement: Examples of fields include point charges, charged parallel plates/rings/spheres, and bar magnets. Also, could include electromagnetic forces, such as the magnetic force acting on a moving charge.
Assessment Boundary: *Assessment is limited to descriptive analysis of the fields and the forces they produce.*

Learning Targets	Academic Vocabulary
• I can identify gravitational, magnetic, and electrical fields and their sources (e.g., masses, charges, magnets). • I can use models to visualize the shape and direction of gravitational, magnetic, and electrical fields. • I can describe qualitatively how these fields exert forces on nearby objects. • I can predict the direction of the force on an object placed within gravitational, magnetic, or electrical fields using models. • I can analyze how different configurations (e.g., point charges, charged plates, bar magnets) affect the field patterns and resulting forces.	• Gravitational field • Magnetic field • Electrical field • Point charge

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.16.4.c Use mathematical representations to provide evidence that describes and predicts relationships between power, current, voltage, and resistance.

Clarification Statement: *Emphasis is on insulators and conductors accounting for Ohm's Law, total resistance for combinations of resistors and P=IV.*

Learning Targets	Academic Vocabulary
• Use Ohm's law to predict the relationships among voltage, current, and resistance. • Use P=IV to predict the relationships among electrical power, current, and voltage.	Power, current, voltage, resistance, Ohm's law

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.16.4.d Evaluate competing design solutions for construction and use of electrical consumer products accounting for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

Clarification Statement: Examples could include efficiency of light bulbs (visible intensity vs. power) and thermal energy limits of wire.

Learning Targets	Academic Vocabulary
• I can identify key constraints such as cost, safety, reliability, aesthetics, and social, cultural, and environmental impacts relevant to electrical consumer products. • I can describe how these constraints influence the design and use of electrical products. • I can analyze and compare competing design solutions based on how well they meet the various constraints. • I can evaluate the trade-offs involved in different design choices, such as efficiency versus cost or safety versus aesthetics. • I can communicate a justified recommendation for the best design solution considering all relevant constraints and impacts.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.16.4.e Obtain and communicate technical information about how some technological devices use alternating current and others use direct current.

Clarification Statement: Examples could include why public utilities use AC while many devices use DC and energy loss in transmission of electricity.

Learning Targets	Academic Vocabulary
• I can identify the basic differences between alternating current (AC) and direct current (DC). • I can explain why public utilities typically use AC for electricity transmission. • I can describe why many technological devices operate using DC instead of AC. • I can obtain and organize technical information about AC and DC uses from credible sources. • I can communicate technical information clearly about the roles of AC and	• Alternating current • Direct current

DC in different devices and systems.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.16.4.f Design a solution to a problem using the fact that an electric current can produce a magnetic field and/or that a changing magnetic field can produce an electric current.

Clarification Statement: Emphasis is on both quantitative and conceptual descriptions of electric and magnetic fields. Examples include designing a generator, motor or transformer. Assessment is limited to systems with two objects.

Learning Targets	Academic Vocabulary
• I can describe how an electric current produces a magnetic field and how a changing magnetic field induces an electric current. • I can explain the relationship between electric and magnetic fields in devices like motors, generators, and transformers. • I can use quantitative and conceptual models to predict the behavior of electric and magnetic fields in a two-object system. • I can design a solution to a problem by applying the principles of electromagnetism, such as creating a model for a simple motor or generator. • I can evaluate and refine my design based on evidence and reasoning about the electric and magnetic interactions in the system.	• Electromagnetic induction

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.16.4.g Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

Clarification Statement: Examples could include analysis of renewable energy systems for electricity generation and the effect of autonomous electric cars on the economy, society and the environment.

Learning Targets	Academic Vocabulary
• I can identify a major global challenge and describe its relevance to society. • I can distinguish between qualitative and quantitative criteria relevant to evaluating solutions for the challenge.	

• I can specify constraints (such as cost, feasibility, environmental impact) that affect potential solutions to the challenge. • I can analyze how societal needs and wants influence the criteria and constraints for addressing the global challenge. • I can develop a comprehensive set of qualitative and quantitative criteria and constraints to guide solution design for the challenge.	

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Chemistry Plus Content Standards

*Indicators for plus content standards do NOT have a requirement to be mastered. Indicators can be chosen based on the level of the course.

Standard
SC.HSP.3 Structure and Properties of Matter **Standard SC.HSP.3.1: Gather, analyze, and communicate evidence of the structure, properties, and interactions of matter.**
Indicator
SC.HSP.3.1.a Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.
Assessment Boundary: *Assessment does not include quantitative understanding of ionization energy beyond relative trends.*

Learning Targets	**Academic Vocabulary**
• Write electron configurations based on the structure of the periodic table. • Predict the number of valence electrons in an atom based on its location on the periodic table and its electron configuration. • Describe how and why elements are arranged the way they are in the periodic table • Predict properties of representative groups of elements • Predict and explain periodic trends in atomic radius, ionization energy, electronegativity, and ionic radius • Predict ionic charge based on periodicity	• Periodicity • Electron configuration Valence electron Periodic trend • Atomic radius Ionization energy Electronegativity • Ionic radius • Ionic charge

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.5.3.b Plan and conduct an investigation to gather evidence to compare the physical properties of substances at the macro scale to infer the strength of electrical forces between particles.

Clarification Statement: Examples of structures to study include molecular compounds, ionic compounds, and covalent network solids. Examples of forces include ionic forces, hydrogen bonds, dipole-dipole forces, and dispersion forces.
Assessment Boundary: *Assessment does not include Raoult's law calculations of vapor pressure.*

Learning Targets	Academic Vocabulary
• Explain how the type of substance dictates the general strength of its interparticle forces and relates to its macroscopic properties. • Compare the relative strengths of different intermolecular forces. • Predict how different intermolecular forces influence macroscopic properties such as boiling point or viscosity. • Plan an investigation into macroscopic properties to help me infer either the type of structure or type of intermolecular force in the substance(s).	• Molecular compound Ionic compound • Covalent network solid • Intramolecular force Intermolecular force Hydrogen bonding Dipole-dipole forces Dispersion forces

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.3.1.c Develop and use models to predict and explain the forces of attraction that exist within molecules (intramolecular forces) and between molecules (intermolecular forces).

Clarification Statement: examples of intramolecular forces are the forces within single, double, and triple covalent bonds and ionic bonds. Examples of intermolecular forces include hydrogen bonds, dipole-dipole forces, and dispersion forces.

Learning Targets	Academic Vocabulary
• Identify general physical properties of ionic and covalent compounds and relate them to bond type. • • Model ionic and covalent compounds using Lewis structures. •	• Ionic • Covalent • VSEPR theory • Polar • Nonpolar

• Apply VSEPR theory to determine molecular geometry • • Identify the polarity of molecules. • • Analyze how molecular polarity affects type and strength of intermolecular force.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.3.3.d Evaluate a solution to a complex, real-world problem based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Clarification Statement: Examples could include the effects of concentration of solutions on the freezing/boiling point (melting of ice on roadways), aspartame and caffeine in beverages, fluoride in drinking water.

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.3.3.e Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.

Assessment Boundary: *Assessment is limited to alpha, beta, and gamma radioactive decays.*

Learning Targets	Academic Vocabulary
• Compare and contrast fission and fusion in words or pictures. • Write balanced nuclear equations for alpha emission, beta emission, and gamma emission • Develop a model to illustrate the changes in mass and energy during nuclear reactions.	• Fission • Fusion • Alpha Emission • Beta Emission • Gamma Emission

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.3.3.f Develop and use models to describe and predict aspects of the quantum mechanical model of the atom.

Clarification Statement: Examples of representation include Aufbau Diagram, Hund's Rule, Pauli Exclusion Principle, and orbital shapes, Hybridization of orbitals, and electron configuration.

Learning Targets	Academic Vocabulary
• Describe atomic orbitals. • Assign the four quantum numbers. • Construct electron configurations using the Aufbau principle and Pauli's exclusion principle. • Construct orbital diagrams using the Aufbau principle, Pauli's exclusion principle, and Hund's rule. • Predict the type(s) of hybrid orbitals in simple covalent compounds.	• Quantized • Electron configuration Aufbau principle • Pauli's exclusion principle • Orbital diagram • Hund's rule • Hybrid orbital.

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.3.3.h Use mathematical representations to quantify matter through the analysis of patterns in chemical compounds at different scales.

Clarification Statement: Emphasis is on the mole concept, empirical formula, molecular formula, percent composition, and law of constant composition.

Learning Targets	Academic Vocabulary
• Describe the mole concept. • Use the mole concept to determine the number of particles and mass. • Calculate percent composition given a chemical formula or mass data. • Calculate empirical formulas given percent composition or mass data. • Calculate molecular formulas given empirical formulas and molar masses. • Describe the law of constant composition.	• Mole • Avogadro's number Percent composition • Empirical formula • Molecular formula • Law of constant composition

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Energy: Chemistry

Standard SC.HSP.4.2: Gather, analyze, and communicate evidence of the interactions of energy within chemical systems.

Indicator

SC.HSP.4.2.a Use statistical and mathematical techniques to describe qualitative and quantitative thermodynamic relationships.

Clarification statement: Thermodynamic relationships may include enthalpy, Hess's Law, Heats of Formation. Examples of data displays or graphs could include energy diagrams to communicate bond energies of products or reactants. Lab investigations may include calorimetry.

Learning Targets	Academic Vocabulary
• Define temperature, thermal energy, heat, and enthalpy. • Distinguish between endothermic and exothermic reactions. • Analyze thermochemical equations. • Calculate the amount of heat released or absorbed from a chemical system based on temperature change and specific heat capacity. • Determine reaction enthalpy based on Hess's law. • Interpret and create reaction energy diagrams. • Plan and conduct a calorimetry experiment to determine the enthalpy of a reaction.	• Temperature • Thermal energy • Heat • Enthalpy • Endothermic • Exothermic • Thermochemical equation • Specific heat capacity Hess's law • Calorimetry

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.4.2.b Plan and conduct an investigation to gather evidence of how the Kinetic Molecular Theory and gas laws are related.

Clarification Statement: Examples include Dalton's Law of partial pressures, Graham's Law of Diffusion and Effusion, and empirical gas laws.

Learning Targets	Academic Vocabulary
• Describe how temperature affects the motion of gas particles • Qualitatively and quantitatively determine and explain the relationships among gas temperature, volume, and pressure	• Kinetic molecular theory • Ideal gas law

• Analyze gas temperature, volume, pressure, and amount using the ideal gas law • Analyze gas mixtures using Dalton's law of partial pressures • Analyze the diffusion and effusion of gases using Graham's law of effusion • Show how the kinetic molecular theory explains the results of gas laws.	• Dalton's law of partial pressures • Graham's law

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.4.2.c Analyze and interpret data to explain changes in energy within a chemical system and/or energy flows in and out of a chemical system.

Clarification Statement: Emphasis is on the use of mathematical expressions to describe the change in energy within the system. Investigations could include electrochemistry (electrolysis).

Learning Targets	Academic Vocabulary
• Define and differentiate between endothermic and exothermic processes based on the direction of energy flow (into or out of the system). • Predict the direction of energy flow for a given chemical system and explain how energy is conserved by describing its exchange between the system and the surroundings. • Analyze an electrochemical setup (or something similar) to explain the necessary energy input required to drive a nonspontaneous chemical change, identifying the energy transformation occurring.	• Endothermic • Exothermic • System • Surroundings

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.4.2.d: Analyze a major global challenge and a potential solution based on care for the common good.

Clarification Statement: Examples could include alternative energies, carbon footprint, and sustainable materials.

Learning Targets	Academic Vocabulary
• Identify a major global challenge. • Ask questions that lead to possible solutions. • Analyze the pros and cons of possible solutions, keeping the common good in mind.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Chemical Reactions

Standard SC.HSP.5.3: Gather, analyze, and communicate evidence of chemical reactions.

Indicator

SC.HSP.5.3.a Plan and conduct an investigation to demonstrate and explain changes in solution chemistry.

Clarification Statement: Examples include titrations, solubility, and Le Chatelier's Principle.

Learning Targets	Academic Vocabulary
• Perform a titration to collect data to calculate the concentration of an unknown acid or base. • Predict the direction chemical equilibrium will shift when subjected to changes in concentration, temperature, or pressure, according to Le Chatelier's Principle. • Analyze experimental data (e.g., from a solubility experiment, titration curve, or equilibrium shift observation) to explain the changes occurring within the chemical solution system.	• Titration • Solubility • Le Chatelier's Principle

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.5.3.b: Use a model to identify electron transfer and balance a redox reaction.

Clarification Statement: Emphasis would be on using half reaction method for balancing equations and understanding electron transfer. Examples include electrochemical cells and electroplating.

Learning Targets	Academic Vocabulary
• Assign oxidation numbers. • Identify half reactions as oxidation or reduction. • Balance redox reactions using the half reaction method.	• Oxidation number • Oxidation • Reduction • Half reaction

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.5.3.c: Use mathematical and/or computational representations to predict and explain relationships within chemical systems.

Clarification Statement: Examples include stoichiometric calculations, gas stoichiometry, limiting reactant, % yield.

Learning Targets	Academic Vocabulary
• Analyze basic reaction stoichiometry given the amount of one reactant or product • Use mathematical and/or computational representations to determine limiting and excess reagents. • Predict theoretical yields using stoichiometric calculations. • Calculate percent yields	• Reactant • Product • Limiting reagent • Excess reagent • Theoretical yield • Percent yield

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.5.3.d Use mathematical representations to analyze the proportion and quantity of particles in solution.

Clarification Statement: Emphasis is on molarity and developing net ionic equations.

Learning Targets	Academic Vocabulary
• Identify the types and relative amounts of particles in a solution of fixed concentration. • Develop net ionic equations. • Analyze the concentration of a solution using the molarity concept. • Use the dilution equation. • Create a method to dilute a solution to a target concentration.	• Solution • Solute • Solvent • Molarity • Ionic equation • Net ionic equation • Dilution

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.5.3.e Plan and conduct an investigation to predict the outcome of a chemical reaction based on patterns of chemical properties.

Clarification Statement: Examples of reaction types could include single replacement, double replacement, etc. Examples of patterns could include the use of solubility rules and activity series.

Learning Targets	Academic Vocabulary

• Plan a laboratory investigation to discover the outcome of a chemical reaction. • Relate the outcomes of chemical reactions to patterns of chemical properties (valence electrons, solubility rules, activity series, etc.)	• Valence electrons • Solubility rules • Activity series

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HS.5.3.f Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.

Clarification Statement: Examples of chemical reactions are synthesis, decomposition, single-replacement, double-replacement, and combustion. Examples of patterns are valence electrons, solubility rules, activity series, etc.

Learning Targets	Academic Vocabulary
• Identify basic types of chemical reactions. • Interpret and balance chemical equations. • Predict the products of basic types of chemical reactions based upon valence electrons, solubility rules, activity series, etc. • Construct and revise an explanation for the outcome of basic chemical reactions.	• Chemical reaction • Chemical equation • Synthesis • Decomposition • Single replacement • Double-replacement • Combustion • Solubility Rules • Activity Series

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Biology Plus Content Standards

*Indicators for plus content standards do NOT have a requirement to be mastered. Indicators can be chosen based on the level of the course.

Standard
Topic Code: Structure and Function **Standard Code: SC.HSP.6.1 Gather, analyze, and communicate evidence of the relationship between structure and function in living things.**
Indicator
SC.HSP.6.1a Construct an explanation based on evidence for how the sequence of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

Learning Targets	Academic Vocabulary
• Define and use the vocabulary words listed • Describe the structure of DNA. Identify the location of DNA in cells. • Draw the components of a nucleotide, identifying their functions • Explain how the nucleotide fits into the model of the double stranded DNA structure. • Interpret a codon chart. • Translate an mRNA sequence into an amino acid sequence. • Sequence the steps of transcription and translation. • Label a diagram depicting translation. • Predict the change (if any) in amino acid sequence when the DNA is mutated in specific places. • Provide differences and similarities in gene expression between cell types. • Give examples of functions different proteins can have and what they would do in different cell types. • Demonstrate the cause-and-effect relationship of how a mutation in a gene resulted in a change in the amino acid	• 5' GTP cap • Alpha-helix • Amino acid • Anticodon • Base • Base pair • Beta-pleated sheet • Central Dogma • Codon • Complementary • Cytoplasm • DNA • Double stranded • Exon • Gene • Gene expression • Gene regulation • Genetic code

sequence of the resultant protein, which then, in turn, resulted in the loss of function of that protein and a loss of function of the specialized cells in which it is expressed and a deleterious effect on the organism. DNA->protein->specialized cell->tissue type->functioning of the whole organism. ● Construct an explanation for gene expression which includes regions of DNA called genes determine the structure of proteins, which carry out the essential functions of life through systems of specialized cells.	● Genotype ● Intron ● Messenger RNA (mRNA) ● Mutation ● Nucleus ● Peptide bond ● Phenotype ● Phosphate group ● Polypeptide ● PolyA tail ● Post-transcriptional modifications ● Primary/secondary/tertiary/quaternary protein structure ● Promoter ● Protein ● Protein synthesis ● Ribosome ● Ribosomal RNA (rRNA) ● RNA polymerase ● Specialized cell ● Splicing ● Start codon ● Stop codon ● Sugar ● Template ● Termination ● Terminator ● Trait ● Transfer RNA (tRNA) ● Transcription ● Transcription factor ● Translation

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.1b Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper

amount of blood within the circulatory system.
Assessment Boundary: *Assessment does not include interactions and functions at the molecular level.*

Learning Targets	Academic Vocabulary
	• Differentiation • Cell • Specialized • Tissue • Organ • Organ system

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.1c Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Clarification Statement: Examples of investigations could include heart rate response to exercise, stomata response to moisture and temperature, and root development in response to water levels.

Learning Targets	Academic Vocabulary
	• Homeostasis • positive feedback • negative feedback • feedback loop

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.1d Use a model to illustrate the role of cells in producing signals which maintain cellular function within organisms.

Clarification Statement: Emphasis is on conceptual understanding of the types of cell signals, signal reception, signal transduction, and types of cellular responses.

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator	
SC.HSP.6.1e Construct an explanation based on evidence that plants have structures that function to support survival, growth, behavior, and reproduction.	
Clarification Statement: Emphasis is on plant structure, growth, and development, nutrient uptake and transport, plant reproduction, and plant responses to internal and external stimuli.	
Learning Targets	**Academic Vocabulary**
Resources	
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/	
Indicator	
C.HSP.6.1f Construct an explanation based on evidence that animals have structures that function to support survival, growth, behavior, and reproduction.	
Clarification Statement: Emphasis is on the basic principles of animal form and functions. Examples of basic principles could include animal nutrition, circulation, gas exchange, immunity, osmoregulation and excretion, hormonal and endocrine control, reproduction, development, neural control systems, and animal behavior.	
Learning Targets	**Academic Vocabulary**
Resources	
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/	
Indicator	
C.HSP.6.1g Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	
Learning Targets	**Academic Vocabulary**
Resources	
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/	

Standard

Topic Code: Interdependent Relationships in Ecosystems

Standard SC.HSP.7.2: Gather, analyze, and communicate evidence of interdependent relationships in ecosystems.

Indicator

SC.HSP.7.2.a: Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

Clarification Statement: Emphasis is on quantitative analysis and comparison of the relationships among interdependent factors including boundaries, resources, climate and competition. Examples of mathematical comparisons could include graphs, charts, histograms, and population changes gathered from simulations or historical data sets.
Assessment Boundary: *Assessment does not include deriving mathematical equations to make comparisons.*

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.7.2.b: Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

Clarification Statement: Examples of mathematical representations include finding the average, determining trends, and using graphical comparisons of multiple sets of data.
Assessment Boundary: *Assessment is limited to provided data.*

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.7.2.c: Evaluate the claims, evidence, and reasoning related to the principle that complex

interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
Clarification Statement: Examples of changes in ecosystem conditions could include modest biological or physical changes, such as moderate hunting or a seasonal flood; and extreme changes, such as volcanic eruption or sea level rise.

Learning Targets	Academic Vocabulary

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator
SC.HSP.7.2.d: Design, evaluate, and refine a solution for increasing the positive impacts of human activities on the environment and biodiversity.
Clarification Statement: Examples of human activities can include habitat development and restoration, supporting native pollinators, reducing consumption, rotating crops, using integrated pest management.

Learning Targets	Academic Vocabulary

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator
SC.HSP.7.2.e: Create or revise a solution to mitigate the impacts of human activity on biodiversity.
Clarification Statement: Emphasis is on testing solutions for a proposed problem related to threatened or endangered species, or to genetic variation of organisms for multiple species.

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.7.2.f: Evaluate evidence for the role of behavior on individual and species' chances to survive and reproduce.

Clarification Statement: Emphasis is on: (1) distinguishing between group and individual behavior, (2) identifying evidence supporting the outcomes of group behavior, and (3) developing logical and reasonable arguments based on evidence. Examples of behaviors could include fixed action patterns, imprinting, kinesis, taxis, hibernation, estivation, habituation, spatial learning, associative learning, cognition, foraging behavior, agonistic behavior, altruism, social learning, flocking, schooling, herding, and cooperative behaviors such as hunting, migrating, and swarming.

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Standard SC.HSP.8.3 Gather, analyze, and communicate evidence of the flow of energy and cycling of matter in organisms and ecosystems.

Indicator

SC.HSP.8.3a Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

Clarification Statement: Emphasis is on illustrating inputs and outputs of matter and the transfer and transformation of energy in photosynthesis by plants and other photosynthesizing organisms. Examples of models could include diagrams, chemical equations, and conceptual models.

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.8.3b Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other molecules to form amino acids and/or other large carbon-based molecules.

Clarification Statement: Emphasis is on using evidence from models and simulations to support explanations.

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

C.HSP.8.3c Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.

Clarification Statement: Emphasis is on the conceptual understanding of the steps or specific processes involved in cellular respiration.

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

C.HSP.8.3d Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

Clarification Statement: Emphasis is on conceptual understanding of the role of metabolism in different environments.

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.8.3e Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

Clarification Statement: Emphasis is on using a mathematical model of stored energy in biomass to describe the transfer of energy from one trophic level to another and that matter and energy are conserved as matter cycles and energy flows through ecosystems. Emphasis is on atoms and molecules such as carbon, oxygen, hydrogen and nitrogen being conserved as they move through an ecosystem.
Assessment Boundary: Assessment is limited to proportional reasoning to describe the cycling of matter and flow of energy.

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.8.3g Use models to illustrate how atomic structure and bonding impact the properties of water and their influence on biological systems.

Clarification Statement: Emphasis is on atomic structure, types of chemical bonds, and properties of water and how those properties influence organisms and ecosystems.

Learning Targets	Academic Vocabulary
	• polar molecule • H-bonding • electronegativity • intermolecular forces • dipole moment • electrostatic forces • surface tension • capillary action • heat capacity • adhesion • cohesion • boiling point • solvent • solute • solution

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.8.3h Construct an explanation based on evidence for how ATP powers cellular work and for how

enzymes affect the rate of, and the amount of energy needed for metabolic reactions.
Clarification Statement: Emphasis is on the structure of ATP and how ATP is used to power cellular work by coupling exergonic and endergonic reactions. Emphasis is on how enzymes speed up and/or lower the activation energy needed for metabolic reactions and how the regulation of enzyme activity helps control metabolism.

Learning Targets	Academic Vocabulary

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard
Standard SC.HSP.9.4 Gather, analyze, and communicate evidence of the inheritance and variation of traits.
Indicator
SC.HSP.9.4a Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

Learning Targets	Academic Vocabulary

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
Indicator C.HSP.9.4b Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. **[Clarification Statement: Emphasis is on using data to support arguments for the way variation occurs.]**

Learning Targets	Academic Vocabulary

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/
Indicator

C.HSP.9.4c Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

Clarification Statement: Emphasis is on the use of mathematics to describe the probability of traits as it relates to genetic and environmental factors in the expression of traits (examples could include Hardy-Weinberg calculations and chi-square calculations.

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

C.HSP.9.4d Evaluate evidence supporting claims that gene regulation can explain the variation and distribution of expressed traits in a population.

Clarification Statement: Emphasis is on the differences in gene expression of multi-cellular organisms, leading to different cell types within organisms and the distribution of traits in a population.

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

C.HSP.9.4e Construct an explanation based on evidence for the role of biotechnology in the research and understanding of biological systems.

Clarification Statement: Emphasis is on the evolution of genomes, how biotechnology allows researchers to study the sequence, expression, and function of genes, and the practical applications of biotechnology.

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Topic Code: Biological Evolution
Standard SC.HSP.10.5: Gather, analyze, and communicate evidence of biological evolution.

Indicator

SC.HSP.10.5.a Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

Clarification Statement: Emphasis is on a conceptual understanding of the role each line of evidence has relating to common ancestry and biological evolution. Examples of evidence could include similarities in DNA sequences, anatomical structures, and order of appearance of structures in embryological development.

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.10.5.b: Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

Clarification Statement: Emphasis is on using evidence to explain the influence each of the four factors has on the number of organisms, behaviors, morphology, or physiology in terms of ability to compete for limited resources and subsequent survival of individuals and adaptation of species. Examples of evidence could include mathematical models such as simple distribution graphs and proportional reasoning.

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.10.5.c: Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

Clarification Statement: Emphasis is on analyzing shifts in numerical distribution of traits and using these shifts

as evidence to support explanations. Examples of basic statistical and graphical analysis could include allele frequency calculations.

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.10.5.d: Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

Clarification Statement: Emphasis is on using data to provide evidence for how specific biotic and abiotic differences in ecosystems (such as ranges of seasonal temperature, long-term climate change, acidity, light, geographic barriers, or evolution of other organisms) contribute to a change in gene frequency over time, leading to adaptation of populations.

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.10.5.e: Evaluate evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

Clarification Statement: Emphasis is on determining cause and effect relationships for how changes to the environment such as deforestation, fishing, application of fertilizers, drought, flood, and the rate of change of the environment affect distribution or disappearance of traits in species.

Learning Targets	Academic Vocabulary

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.10.5.f: Develop and use models to illustrate patterns in the evolutionary history of biological diversity.	
Clarification Statement: Emphasis is on how the structure and function of bacteria, archaea, protists, fungi, plants, and animals are used in the tree of life.	
Learning Targets	**Academic Vocabulary**
Resources	
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/	

Anatomy and Physiology Plus Content Standards

*Indicators for plus content standards do NOT have a requirement to be mastered. Indicators can be chosen based on the level of the course.

Standard
Structure and Function: Anatomy and Physiology **Standard Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the integumentary system.**
Indicator
SC.HSP.6.2 Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the integumentary system.

Learning Targets	Academic Vocabulary
• Identify and describe the main structures of the integumentary system (skin, hair, nails, sweat glands, sebaceous glands). • Explain the basic physiological functions of the integumentary system, such as protection, temperature regulation, and sensory reception. • Analyze how the structures of the integumentary system work together to maintain homeostasis. • Gather and interpret data from diagrams, models, or scientific texts to explain how injuries (like burns or cuts) affect the physiological processes of the integumentary system. • Communicate evidence-based explanations (e.g., in writing, presentations, or models) of how the integumentary system interacts with other body systems (e.g., immune or nervous systems). • Evaluate scientific claims about skin products or treatments by comparing them to scientific evidence on integumentary structure and function.	

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard
Standard Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the integumentary system.
Indicator
SC.HSP.6.2.a Plan and conduct an investigation to identify patterns of organization in the integumentary system.
Clarification Statement: Information could be gathered from dissections, models, simulations, and scientific texts.

Learning Targets	Academic Vocabulary
• Identify the major structures and layers of the integumentary system using models, simulations, or texts. • Describe how different structures in the integumentary system are organized and function together. • Plan a scientific investigation using tools like dissections, models, or simulations to study the integumentary system. • Conduct an investigation to collect and record data on the structural patterns of the integumentary system. • Analyze and interpret data from investigations or reliable sources to identify patterns of structure and organization in the integumentary system. • Communicate findings from my investigation using evidence and scientific vocabulary.	

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator
SC.HSP.6.2.b **Ask questions to clarify the role of various structures in integumentary system function.**

Learning Targets	Academic Vocabulary
• Identify major structures of the integumentary system (e.g., skin, hair, nails, glands). • Describe the basic functions of structures in the integumentary system. • Ask questions to better understand how different parts of the integumentary system work together. • Ask scientific questions that clarify how specific structures (e.g., sweat glands, hair follicles) contribute to overall skin function (e.g., protection, temperature regulation). • Evaluate which questions lead to deeper understanding of the relationship between structure and function in the integumentary system.	

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator
SC.HSP.6.2.c Develop and use a model to identify and describe the relationship between the structures and physiological processes of the integumentary system.

Learning Targets	Academic Vocabulary
• Identify the major structures of the integumentary system, including the epidermis, dermis, hair follicles, sweat glands, sebaceous glands, and sensory receptors.	

• Describe the physiological processes of the integumentary system, such as protection, temperature regulation, sensation, excretion, and vitamin D production. • Explain how the structures of the integumentary system contribute to their specific functions. • Interpret diagrams and models to describe how different parts of the integumentary system work together. • Develop and use a model to demonstrate the relationship between the skin's structures and their roles in maintaining homeostasis. • Analyze how injury or disease affects the function of the integumentary system using a model. • Revise a model to better illustrate the structure-function relationships in the integumentary system. • Evaluate the effectiveness of different models in showing how integumentary structures support physiological processes.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.2.d Plan and conduct an investigation to gather evidence that feedback mechanisms in the integumentary system help maintain homeostasis.

Learning Targets	Academic Vocabulary
• Define homeostasis and describe the role of feedback mechanisms in the human body. • Identify components of the integumentary system involved in feedback mechanisms (e.g., sweat glands, sensory receptors, blood vessels). • Describe how the integumentary system responds to changes in the internal or external environment to maintain homeostasis (e.g., sweating in response to heat). • Plan a simple investigation to test how the skin regulates body temperature through feedback mechanisms. • Collect and record data during an investigation to observe the integumentary system's response to temperature changes. • Analyze data from an investigation to explain how feedback mechanisms in the integumentary system support homeostasis. • Justify a conclusion about the integumentary system's role in homeostasis using evidence gathered from an investigation. • Design and revise an investigation that tests feedback mechanisms in the integumentary system under various conditions.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.2.e Engage in arguments from evidence for the role of cell division in integumentary system dysfunction.

Learning Targets	Academic Vocabulary
• Define cell division and explain its role in maintaining healthy skin tissue. • Identify examples of integumentary system dysfunctions related to abnormal cell division (e.g., skin cancer, psoriasis, wounds that don't heal). • Describe how normal and abnormal cell division affect the structure and function of the integumentary system. • Analyze data or case studies that show the effects of abnormal cell division on the integumentary system. • Construct an argument supported by evidence that explains how uncontrolled, or insufficient cell division can lead to integumentary system dysfunction. • Evaluate competing scientific arguments regarding the role of cell division in skin-related disorders and determine which is best supported by evidence. • Use relevant scientific evidence to defend a claim about how treatments or interventions target cell division to manage skin dysfunctions.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.3 Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the skeletal system.

Learning Targets	Academic Vocabulary
• Identify the major structures of the skeletal system, including bones, cartilage, ligaments, and joints. • Describe the physiological functions of the skeletal system, such as support, protection, movement, blood cell production, and mineral storage. • Explain how specific skeletal structures (e.g., spongy bone, compact bone, joints) support specific physiological processes. • Gather and interpret data (from models, diagrams, texts, or investigations) to explain how structure and function are related in the skeletal system. • Analyze evidence to determine how the skeletal system maintains homeostasis and supports other systems (e.g., muscular, circulatory). • Communicate findings using appropriate scientific language and visuals to explain the structure-function relationship in the skeletal system. • Evaluate multiple sources of evidence to draw conclusions about skeletal system disorders and how they affect physiological processes.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Standard Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the skeletal system.

Indicator

SC.HSP.6.3.a Plan and conduct an investigation to identify patterns of organization in the skeletal system.

Clarification Statement: Information could be gathered from dissections, models, simulations, and scientific texts.

Learning Targets	Academic Vocabulary
• Identify major parts of the skeletal system, including axial and appendicular regions, bone types, and connective tissues. • Describe the structural organization of bones, joints, and connective tissues within the skeletal system. • Plan an investigation using models, simulations, dissections, or scientific texts to explore how the skeletal system is organized. • Conduct an investigation to gather evidence about patterns of bone structure and organization (e.g., long vs. flat bones, joint locations) • Analyze data collected from models, simulations, or dissections to identify patterns in the skeletal system (e.g., how structure relates to function or region). • Explain patterns of organization in the skeletal system, such as how bones are arranged for movement, protection, and support. • Revise or refine my investigation based on new questions or observations related to skeletal structure and function.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.3.b Develop and use a model to identify and describe the relationship between the structures and physiological processes of the skeletal system.

Learning Targets	Academic Vocabulary
• Identify the major structures of the skeletal system, including bones, joints, cartilage, and ligaments. • Describe the physiological processes of the skeletal system, such as support, movement, protection, mineral storage, and blood cell formation. • Explain how different skeletal structures contribute to specific physiological functions (e.g., how joint types allow movement). • Interpret a model to describe how the structure of the skeletal system supports its various functions. • Develop and use a model to demonstrate how bone structures are organized to support movement, protection, and homeostasis.	

• Analyze a model to identify how changes in skeletal structures (e.g., injury or disease) affect physiological processes. • Revise a model to improve its accuracy in showing the structure-function relationships within the skeletal system. • Evaluate the effectiveness of different models in representing the relationship between skeletal system structures and functions.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.3.c Obtain, evaluate, and communicate information that feedback mechanisms in the skeletal system help maintain homeostasis.

Learning Targets	Academic Vocabulary
• Define homeostasis and explain the concept of feedback mechanisms in biological systems. • Identify feedback mechanisms related to the skeletal system, such as calcium regulation through bone remodeling. • Describe how the skeletal system participates in maintaining calcium balance and overall homeostasis. • Obtain information from texts, models, or experiments about how bones respond to changes in calcium levels through feedback loops. • Evaluate data or evidence that demonstrates the role of skeletal feedback mechanisms in regulating mineral balance and bone density. • Communicate findings clearly, using scientific language and visuals, to explain how feedback mechanisms in the skeletal system maintain homeostasis. • Design an explanation or presentation that integrates multiple sources of evidence on skeletal system feedback and homeostasis.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.3.d Develop and use a model to explain the order of events necessary for bone formation.

Learning Targets	Academic Vocabulary
• Identify the key stages involved in bone formation, including ossification, calcification, and remodeling. • Describe the roles of different cell types in bone formation, such as osteoblasts, osteoclasts, and osteocytes. • Explain the sequential order of events during bone formation from initial cartilage model to mature bone. • Interpret a model or diagram that illustrates the stages of bone formation and the functions of involved cells.	

• Develop and use a physical or digital model to demonstrate the process and order of bone formation events. • Analyze how disruptions in specific stages of bone formation affect overall bone development and health. • Revise my model to improve accuracy in representing the bone formation sequence and related cellular activities. • Evaluate different models of bone formation to determine which best represents the chronological order and biological accuracy.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.3.e Engage in arguments from evidence to support claims about the causes of dysfunction in the skeletal system.

Clarification Statement: Evidence could include data obtained from case studies.

Learning Targets	Academic Vocabulary
• Define common skeletal system dysfunctions, such as osteoporosis, fractures, arthritis, and bone infections. • Identify possible causes of skeletal system dysfunctions, including genetic factors, injuries, infections, and nutritional deficiencies. • Analyze case study data to recognize patterns or evidence related to skeletal system dysfunction. • Explain how specific causes lead to particular dysfunctions in the skeletal system. • Construct an evidence-based argument that supports a claim about the cause of a skeletal dysfunction using case study data. • Evaluate the quality and relevance of evidence from multiple case studies to strengthen or refute claims about skeletal dysfunction causes. • Communicate and defend my argument clearly, using scientific evidence to support claims about skeletal system dysfunction.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

SC.HSP.6.4 Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the muscular system.

Learning Targets	Academic Vocabulary

• Identify the major structures of the muscular system, including skeletal, smooth, and cardiac muscles. • Describe key physiological processes of the muscular system, such as contraction, relaxation, and energy use. • Explain how muscle structure (e.g., muscle fibers, myofibrils, sarcomeres) relates to muscle function. • Gather data from models, diagrams, or experiments that show how muscles contract and generate force. • Analyze evidence to explain how muscular system structures support physiological processes like movement and posture. • Communicate findings using scientific language, diagrams, and models to explain the structure-function relationship in the muscular system. • Evaluate different sources of evidence to draw conclusions about muscle disorders and their impact on physiological processes.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.4.a Plan and conduct an investigation to identify patterns of organization in the muscular system.

Clarification Statement: Information could be gathered from dissections, models, simulations, and scientific texts.

Learning Targets	Academic Vocabulary
• Identify the major muscle groups and types (skeletal, smooth, cardiac) in the muscular system. • Describe the structural organization of muscles, including muscle fibers, fascicles, and connective tissues. • Plan an investigation using dissections, models, simulations, or scientific texts to explore muscular system organization. • Conduct an investigation to collect data on muscle structure and arrangement. • Analyze patterns of muscle organization, such as the arrangement of muscle fibers or the relationship between muscle groups and their functions. • Explain how the organization of muscles supports their physiological roles in movement and stability. • Revise my investigation plan based on new findings or questions about muscular system organization.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.4.b Develop and use a model to identify and describe the relationship between the structures and

physiological processes of the muscular system.

Learning Targets	Academic Vocabulary
• Identify the major structures of the muscular system, including muscle types, fibers, and connective tissues. • Describe key physiological processes of the muscular system such as muscle contraction, relaxation, and energy use. • Explain how muscle structures relate to their physiological functions (e.g., how sarcomere arrangement enables contraction). • Interpret models to describe how muscle structures support processes like movement and force generation. • Develop and use a model (physical, digital, or conceptual) to demonstrate the relationship between muscular structures and their functions. • Analyze how changes in muscular structure (due to injury or disease) affect physiological processes using my model. • Revise my model to improve its accuracy in showing the relationship between muscular system structures and physiological processes. • Evaluate different models to determine which best represents the muscular system's structure-function relationships.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.4.c Engage in arguments from evidence that muscle contraction is the result of biochemical reactions.

Learning Targets	Academic Vocabulary
• Recall the basic biochemical components involved in muscle contraction, such as ATP, actin, myosin, and calcium ions. • Describe the biochemical process of muscle contraction, including the sliding filament theory. • Gather and analyze scientific evidence that explains how ATP hydrolysis powers muscle contraction. • Construct an evidence-based argument to explain that muscle contraction results from specific biochemical reactions. • Evaluate multiple sources of evidence to support or challenge claims about the biochemical basis of muscle contraction. • Communicate my argument clearly, using scientific terminology and evidence from biochemical studies of muscle contraction.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.4.d Obtain, evaluate, and communicate that feedback mechanisms in the muscular system help maintain homeostasis.

Learning Targets	Academic Vocabulary
• Define homeostasis and explain the concept of feedback mechanisms in biological systems. • Identify feedback mechanisms involving the muscular system, such as muscle response to stimuli and regulation of muscle activity. • Describe how feedback mechanisms regulate muscle function to maintain body stability and respond to changes. • Obtain information from scientific texts, experiments, or models about muscular system feedback mechanisms. • Evaluate evidence showing how muscular feedback mechanisms contribute to maintaining homeostasis during activities like exercise or temperature regulation. • Communicate my findings using scientific language and visuals to explain how muscular feedback mechanisms help maintain homeostasis. • Design a presentation or report that integrates multiple sources of evidence on muscular system feedback and homeostasis.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.4.e Engage in arguments from evidence to support claims about the causes of dysfunction in the muscular system. Evidence could include data obtained from case studies.

Learning Targets	Academic Vocabulary
• Identify common muscular system dysfunctions, such as muscular dystrophy, cramps, strains, and myopathies. • Recognize potential causes of muscular system dysfunctions, including genetic factors, injury, overuse, and nutritional deficiencies. • Analyze case study data to identify evidence related to muscular system dysfunctions. • Explain how specific causes lead to particular muscular dysfunctions using evidence from case studies. • Construct an evidence-based argument to support claims about the causes of muscular system dysfunction using case study data. • Evaluate the credibility and relevance of evidence from different case studies to strengthen or challenge claims. • Communicate and defend my argument clearly, using scientific evidence to support claims about muscular system dysfunction.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Topic Code:
Standard Code: Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the nervous system.

Indicator

SC.HSP.6.5 Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the nervous system.

Learning Targets	Academic Vocabulary
• Identify the major structures of the nervous system, including neurons, synapses, brain regions, and spinal cord. • Describe key physiological processes in the nervous system, such as nerve impulse transmission, synaptic signaling, and reflex arcs. • Explain how the structure of neurons and synapses supports their physiological functions like signal transmission. • Gather data from models, diagrams, simulations, or experiments that demonstrate nervous system processes. • Analyze evidence to explain the relationship between nervous system structures and physiological functions such as sensory input, integration, and motor output. • Communicate findings using scientific language, models, and visuals to explain the structure-function relationships in the nervous system. • Evaluate different sources of evidence, such as research studies or case reports, to draw conclusions about nervous system disorders and their impact on physiological processes.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.5.a Plan and conduct an investigation to identify patterns of organization in the nervous system. Information could be gathered from dissections, models, simulations, and scientific texts.

Learning Targets	Academic Vocabulary
• Identify the main structural components of the nervous system, including the central and peripheral nervous systems. • Describe the hierarchical organization of nervous system structures, such	

as neurons, nerve bundles, and brain regions. ● Plan an investigation using dissections, models, simulations, or scientific texts to explore the organization of the nervous system. ● Conduct an investigation to collect data on nervous system structures and their organization. ● Analyze patterns of organization in the nervous system, including the relationship between structure and function. ● Explain how the organization of the nervous system supports its physiological roles such as signal transmission and processing. ● Revise my investigation plan or analysis based on new findings or questions about nervous system organization.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.5.b Develop and use a model to identify and describe the relationship between the structures and physiological processes of the nervous system.

Learning Targets	Academic Vocabulary
● Identify the key structures of the nervous system, including neurons, synapses, brain regions, and spinal cord. ● Describe essential physiological processes such as nerve impulse transmission, synaptic signaling, and reflexes ● Explain how specific nervous system structures support their physiological functions (e.g., how the neuron's structure facilitates signal transmission). ● Interpret existing models to illustrate the relationship between nervous system structures and physiological processes. ● Develop a model (physical, digital, or conceptual) to demonstrate how nervous system structures interact to carry out physiological functions. ● Use my model to analyze and explain the effects of changes or damage to nervous system structures on physiological processes. ● Revise and improve my model based on new information or feedback to better represent the nervous system's structure-function relationship. ● Evaluate different models of the nervous system to determine which best represents the connection between structure and physiological function.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.5.c Engage in arguments from evidence that production of a nerve impulse is the result of biochemical reactions.

Learning Targets	Academic Vocabulary

• Recall the key biochemical components involved in nerve impulse production, such as ions (Na^+, K^+), ion channels, and neurotransmitters. • Describe the biochemical processes underlying the generation and propagation of nerve impulses, including the role of membrane potential and ion movement. • Analyze scientific evidence that explains how changes in ion concentration and membrane permeability result in nerve impulses. • Construct an evidence-based argument that nerve impulse production results from specific biochemical reactions and ion exchanges. • Evaluate and compare different scientific sources of evidence to support or challenge claims about the biochemical basis of nerve impulses. • Communicate my argument clearly using scientific terminology and data related to the biochemical mechanisms of nerve impulses.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.5.d Obtain, evaluate, and communicate evidence that feedback mechanisms in the nervous system help maintain homeostasis.

Learning Targets	Academic Vocabulary
• Define homeostasis and explain the role of feedback mechanisms in biological systems. • Identify feedback mechanisms involving the nervous system, such as reflex arcs and neural regulation of body functions. • Obtain information from scientific texts, experiments, or models about nervous system feedback mechanisms. • Evaluate evidence showing how nervous system feedback mechanisms regulate body functions to maintain homeostasis (e.g., temperature regulation, blood pressure control). • Communicate my findings clearly using scientific language, diagrams, or presentations to explain how feedback in the nervous system maintains homeostasis. • Integrate multiple sources of evidence to construct a comprehensive explanation of nervous system feedback mechanisms in homeostasis.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.5.e Engage in arguments from evidence to support claims about the causes of dysfunction in the nervous system. Evidence could include data obtained from case studies.

Learning Targets	Academic Vocabulary

• Identify common nervous system dysfunctions, such as multiple sclerosis, Parkinson's disease, and nerve injuries. • Recognize potential causes of nervous system dysfunctions, including genetic factors, infections, trauma, and degenerative diseases. • Analyze case study data to identify evidence related to nervous system dysfunctions. • Explain how specific causes lead to particular nervous system dysfunctions using evidence from case studies. • Construct an evidence-based argument to support claims about the causes of nervous system dysfunction using case study data. • Evaluate the credibility and relevance of evidence from different case studies to strengthen or challenge claims. • Communicate and defend my argument clearly, using scientific evidence to support claims about nervous system dysfunction.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Topic Code:

Standard Code: Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the cardiovascular/respiratory systems.

Indicator

SC.HSP.6.6 Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the cardiovascular/respiratory systems.

Learning Targets	Academic Vocabulary
• Identify the major structures of the cardiovascular system (heart, blood vessels) and respiratory system (lungs, trachea, alveoli). • Describe key physiological processes such as blood circulation and gas exchange. • Explain how the structures of the heart and blood vessels support their function in circulating blood. • Explain how the structures of the respiratory system facilitate gas exchange and oxygen delivery to the blood. • Gather data from experiments, models, or texts to analyze the interaction between the cardiovascular and respiratory systems. • Analyze evidence to describe how the cardiovascular and respiratory systems work together to maintain oxygen supply and remove carbon dioxide. • Communicate findings using scientific language, diagrams, and presentations to explain the integrated function of these systems. • Evaluate multiple sources of evidence to understand how dysfunctions in	

one system affect the other.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.6.a Plan and conduct an investigation to identify patterns of organization in the cardiovascular/respiratory systems. Information could be gathered from dissections, models, simulations, and scientific texts.

Learning Targets	Academic Vocabulary
• Identify and describe the main structures of the cardiovascular and respiratory systems, including the heart, blood vessels, lungs, and airways. • Explain the hierarchical organization of these systems, such as chambers of the heart, types of blood vessels, and branching of the respiratory tree. • Plan an investigation using dissections, models, simulations, or scientific texts to explore the organization of the cardiovascular and respiratory systems. • Conduct the investigation to gather data about the structures and organization patterns of these systems. • Analyze data to identify patterns of organization and relationships between structures within and between the cardiovascular and respiratory systems. • Explain how the patterns of organization support the functions of the cardiovascular and respiratory systems, including efficient blood flow and gas exchange. • Refine my investigation or interpretations based on new evidence or questions about system organization.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.6.b Develop and use a model to identify and describe the relationship between the structures and physiological processes of the cardiovascular/respiratory systems.

Learning Targets	Academic Vocabulary
• Identify the key structures of the cardiovascular and respiratory systems, including the heart, blood vessels, lungs, and alveoli. • Describe essential physiological processes such as blood circulation, oxygen transport, and gas exchange. • Explain how specific structures in these systems support their physiological functions (e.g., how alveoli facilitate gas exchange). • Interpret existing models (physical, digital, or conceptual) to illustrate the	

relationships between system structures and physiological processes. ● Develop a model that demonstrates how the cardiovascular and respiratory systems work together to transport oxygen and remove carbon dioxide. ● Use my model to analyze how changes in structure or function might affect overall system performance. ● Revise and improve my model based on new information or feedback to better represent the systems' structure-function relationships. ● Evaluate different models to determine which best explains the integrated functions of the cardiovascular and respiratory systems.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.6.c
Obtain, evaluate and communicate evidence that feedback mechanisms in the cardiovascular/respiratory systems help maintain homeostasis.

Learning Targets	Academic Vocabulary
● Define homeostasis and explain the concept of feedback mechanisms in biological systems. ● Identify feedback mechanisms involving the cardiovascular and respiratory systems, such as regulation of heart rate and breathing rate. ● Obtain information from scientific texts, experiments, or models about feedback mechanisms in these systems. ● Evaluate evidence showing how cardiovascular and respiratory feedback mechanisms regulate variables like blood pressure, oxygen, and carbon dioxide levels. ● Communicate findings clearly using scientific language, diagrams, or presentations to explain how feedback maintains homeostasis in these systems. ● Integrate multiple sources of evidence to develop a comprehensive explanation of feedback mechanisms in the cardiovascular and respiratory systems.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.6.d Engage in arguments from evidence to support claims about the causes of dysfunction in the cardiovascular/ respiratory systems. Evidence could include data obtained from case studies.

Learning Targets	Academic Vocabulary
● Identify common dysfunctions of the cardiovascular and respiratory	

systems, such as hypertension, atherosclerosis, asthma, and chronic obstructive pulmonary disease (COPD). ● Recognize possible causes of these dysfunctions, including lifestyle factors, genetic predisposition, infections, and environmental influences. ● Analyze case study data to identify evidence related to dysfunctions in the cardiovascular and respiratory systems. ● Explain how specific causes lead to dysfunctions using evidence from case studies and scientific sources. ● Construct evidence-based arguments to support claims about the causes of dysfunction in these systems. ● Evaluate the strength and relevance of evidence from different case studies to support or challenge claims about causes of dysfunction. ● Communicate and defend my arguments clearly using scientific terminology and data.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Standard Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the digestive system.

Indicator

SC.HSP.6.7 Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the digestive system.

Learning Targets	Academic Vocabulary
● Identify the major structures of the digestive system, including the mouth, esophagus, stomach, intestines, liver, pancreas, and gallbladder. ● Describe the key physiological processes involved in digestion, such as mechanical breakdown, chemical digestion, absorption, and elimination. ● Explain how specific digestive structures contribute to physiological processes (e.g., how the stomach acid aids digestion). ● Gather data from experiments, models, or scientific texts to analyze how digestive structures function together to process food. ● Analyze evidence to describe the relationship between digestive system structures and their physiological roles. ● Communicate findings using appropriate scientific language, diagrams, and presentations to explain how the digestive system works as a whole. ● Evaluate different sources of evidence to deepen understanding of how digestive system dysfunctions impact physiological processes.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.7.a Plan and conduct an investigation to identify patterns of organization in the digestive system. Information could be gathered from dissections, models, simulations, and scientific texts.

Learning Targets	Academic Vocabulary
• Identify and describe the main structures of the digestive system, such as the mouth, esophagus, stomach, intestines, liver, pancreas, and gallbladder. • Explain the hierarchical organization of the digestive system, including how organs are grouped by function (e.g., mechanical digestion, chemical digestion, absorption). • Plan an investigation using dissections, models, simulations, or scientific texts to explore the organization of the digestive system. • Conduct the investigation to gather data about the structures and organization patterns within the digestive system. • Analyze data to identify patterns of organization and relationships between structures and functions within the digestive system. • Explain how the organization of digestive system structures supports the overall function of processing and absorbing nutrients. • Refine my investigation or interpretations based on new evidence or questions about the system's organization.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.7.b Develop and use a model to identify and describe the relationship between the structures and physiological processes of the digestive system.

Learning Targets	Academic Vocabulary
• Identify the major structures of the digestive system, such as the mouth, esophagus, stomach, intestines, liver, pancreas, and gallbladder. • Describe the key physiological processes in digestion, including mechanical digestion, chemical digestion, absorption, and elimination. • Explain how specific digestive structures support their physiological functions (e.g., how the stomach secretes acid to break down food). • Interpret existing models (physical, digital, or conceptual) to illustrate the relationship between digestive structures and processes. • Develop a model that demonstrates how digestive structures work together to process and absorb nutrients. • Use my model to analyze how changes or dysfunctions in structure can affect physiological processes.	

• Revise and improve my model based on new evidence or feedback to better explain the digestive system. • Evaluate different models to determine which best explains the relationship between digestive system structures and functions.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.7.c Obtain, evaluate and communicate evidence that feedback mechanisms in the digestive system help maintain homeostasis.

Learning Targets	Academic Vocabulary
• Define homeostasis and explain what feedback mechanisms are in biological systems. • Identify feedback mechanisms in the digestive system, such as regulation of digestive enzyme secretion and stomach acid production. • Obtain information from scientific texts, experiments, or models about digestive feedback mechanisms. • Evaluate evidence showing how feedback mechanisms regulate digestion to maintain stable internal conditions. • Communicate my findings clearly using scientific language, diagrams, or presentations to explain how feedback mechanisms maintain homeostasis in digestion. • Integrate multiple sources of evidence to develop a thorough explanation of feedback mechanisms in the digestive system.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.7.d Engage in arguments from evidence to support claims about the causes of dysfunction in the digestive system. Evidence could include data obtained from case studies.

Learning Targets	Academic Vocabulary
• Identify common dysfunctions of the digestive system, such as acid reflux, ulcers, Crohn's disease, and celiac disease. • Recognize potential causes of digestive system dysfunctions, including infections, autoimmune responses, diet, and lifestyle factors. • Analyze case study data to find evidence related to digestive system dysfunctions. • Explain how specific causes lead to dysfunctions using evidence from case	

studies and scientific research. ● Construct evidence-based arguments to support claims about the causes of dysfunction in the digestive system. ● Evaluate the quality and relevance of evidence from case studies to strengthen or challenge claims about digestive dysfunction causes. ● Clearly communicate and defend my arguments using scientific terminology and data.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Standard Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the urinary system.

Indicator

SC.HSP.6.8 Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the urinary system.

Learning Targets	Academic Vocabulary
● Identify the major structures of the urinary system, including the kidneys, ureters, bladder, and urethra. ● Describe key physiological processes such as filtration, reabsorption, secretion, and excretion. ● Explain how specific urinary system structures contribute to physiological functions (e.g., how nephrons filter blood). ● Gather data from scientific texts, models, or experiments to analyze how urinary structures function together. ● Analyze evidence to describe the relationship between urinary system structures and their physiological processes. ● Communicate findings using scientific language, diagrams, or presentations to explain the urinary system's functions. ● Evaluate different sources of evidence to deepen understanding of urinary system function and dysfunction.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.8.a Plan and conduct an investigation to identify patterns of organization in the urinary system. Information could be gathered from dissections, models, simulations, and scientific texts.

Learning Targets	Academic Vocabulary
• Identify and describe the major structures of the urinary system, such as kidneys, ureters, bladder, and urethra. • Explain the hierarchical organization of the urinary system, including how organs and tissues are organized to perform specific functions. • Plan an investigation using dissections, models, simulations, or scientific texts to explore the organization of the urinary system. • Conduct the investigation to collect data on the structures and organization patterns of the urinary system. • Analyze data to identify patterns in the organization and function of the urinary system. • Explain how the organization of the urinary system supports its function in filtering blood and maintaining homeostasis. • Refine my investigation plan or interpretations based on new evidence or questions that arise during the study.	

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator
SC.HSP.6.8.b Develop and use a model to identify and describe the relationship between the structures and physiological processes of the urinary system.

Learning Targets	Academic Vocabulary
• Identify the major structures of the urinary system, including kidneys, ureters, bladder, and urethra. • Describe the key physiological processes of the urinary system such as filtration, reabsorption, secretion, and excretion. • Explain how specific urinary system structures perform their physiological functions (e.g., how nephrons filter blood to form urine). • Interpret existing models (physical, digital, or conceptual) that show the relationship between urinary structures and physiological processes. • Develop a model that illustrates how the structures of the urinary system work together to maintain fluid balance and remove waste. • Use my model to analyze how changes or dysfunctions in structure affect physiological processes and overall homeostasis. • Refine and improve my model based on new evidence or feedback to better explain the urinary system's function. • Evaluate different models to determine which best represent the relationship between the urinary system's structures and functions.	

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.8.c Obtain, evaluate and communicate evidence that feedback mechanisms in the urinary system help maintain homeostasis.

Learning Targets	Academic Vocabulary
• Define homeostasis and explain what feedback mechanisms are in biological systems. • Identify feedback mechanisms involved in the urinary system, such as regulation of blood pressure and fluid balance by the kidneys. • Obtain information from scientific texts, experiments, or models about feedback mechanisms in the urinary system. • Evaluate evidence showing how feedback mechanisms regulate kidney function to maintain homeostasis. • Communicate findings clearly using scientific language, diagrams, or presentations to explain how feedback mechanisms in the urinary system maintain homeostasis. • Integrate multiple sources of evidence to develop a thorough explanation of feedback mechanisms in the urinary system.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.8.d Engage in arguments from evidence to support claims about the causes of dysfunction in the urinary system. Evidence could include data obtained from case studies.

Learning Targets	Academic Vocabulary
• Identify common dysfunctions of the urinary system, such as kidney stones, urinary tract infections, and chronic kidney disease. • Describe potential causes of urinary system dysfunctions, including infections, blockages, genetic factors, and lifestyle influences. • Analyze data from case studies to identify evidence related to urinary system dysfunctions. • Explain how specific causes lead to dysfunctions in the urinary system using evidence from case studies. • Construct evidence-based arguments to support claims about the causes of dysfunction in the urinary system. • Evaluate the quality and relevance of evidence from case studies to strengthen or challenge claims about urinary system dysfunction causes. • Communicate and defend my arguments clearly using scientific terminology and data.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard

Standard Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the reproductive system.

Indicator

SC.HSP.6.9 Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the reproductive system.

Learning Targets	Academic Vocabulary
• Identify the major structures of the male and female reproductive systems (e.g., testes, ovaries, uterus, vas deferens, fallopian tubes). • Describe key physiological processes such as gamete production, fertilization, hormonal regulation, and pregnancy. • Explain how specific reproductive structures contribute to physiological processes (e.g., how ovaries produce eggs and hormones). • Gather evidence from scientific texts, models, simulations, or experiments that show how reproductive system structures function. • Analyze data and evidence to describe the relationships between reproductive structures and their physiological processes. • Communicate my findings clearly through presentations, reports, or diagrams using appropriate scientific terminology. • Evaluate multiple sources of evidence to deepen understanding of reproductive system function and regulation.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.9.a Plan and conduct an investigation to identify patterns of organization in the reproductive system. Information could be gathered from dissections, models, simulations, and scientific texts.

Learning Targets	Academic Vocabulary
• Identify and describe the major structures of the reproductive system, including organs and tissues involved in male and female reproduction. • Explain the hierarchical organization of the reproductive system, including how organs and tissues work together to perform reproductive functions. • Plan an investigation using dissections, models, simulations, or scientific	

texts to explore the organization of the reproductive system. ● Conduct the investigation to collect data on the structures and organization patterns of the reproductive system. ● Analyze data to identify patterns in the organization and function of the reproductive system. ● Explain how the organization of the reproductive system supports its physiological processes and overall function. ● Refine my investigation plan or interpretations based on new evidence or questions that arise during the study.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.9.b Develop and use a model to identify and describe the relationship between the structures and physiological processes of the reproductive system. Include spermatogenesis, oogenesis, and menstruation.

Learning Targets	Academic Vocabulary
● Identify the major structures of the reproductive system involved in spermatogenesis, oogenesis, and menstruation (e.g., testes, ovaries, uterus). ● Describe the physiological processes of spermatogenesis, oogenesis, and the menstrual cycle. ● Explain how specific structures support these processes, such as how testes produce sperm and ovaries produce eggs. ● Interpret existing models that illustrate the stages of spermatogenesis, oogenesis, and the menstrual cycle. ● Develop a model that shows the relationship between reproductive structures and the physiological processes of gamete production and menstruation. ● Use my model to analyze how disruptions in these processes might affect reproductive health. ● Refine and improve my model based on new evidence or feedback to better explain these reproductive processes. ● Evaluate multiple models to determine which best represent the relationships between reproductive structures and physiological processes.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.6.9.d
Engage in arguments from evidence to support claims about the causes of dysfunction in the reproductive system. Evidence could include data obtained from case studies.

Learning Targets	Academic Vocabulary
• Identify common dysfunctions of the reproductive system, such as polycystic ovary syndrome (PCOS), endometriosis, infertility, and erectile dysfunction. • Describe possible causes of reproductive system dysfunctions, including hormonal imbalances, infections, genetic factors, and lifestyle influences. • Analyze data from case studies related to reproductive system dysfunctions to identify patterns or evidence. • Explain how specific causes lead to dysfunctions in the reproductive system using evidence from case studies. • Construct evidence-based arguments to support claims about the causes of reproductive system dysfunctions. • Evaluate the reliability and relevance of evidence from case studies to strengthen or challenge claims. • Communicate and defend my arguments clearly using scientific terminology and data.	
Resources https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/	

Standard
Standard Gather, analyze, and communicate evidence of the connection between health science careers and engineering.

Indicator
SC.HSP.17.1 Gather, analyze, and communicate evidence of the connection between health science careers and engineering.

Learning Targets	Academic Vocabulary
• Identify different health science careers and engineering fields that collaborate or overlap. • Describe examples of how engineering principles are applied in health science careers (e.g., biomedical engineering, medical device design). • Gather information from articles, interviews, or videos about the roles engineers play in health care settings. • Analyze evidence that shows the impact of engineering innovations on health science outcomes (e.g., prosthetics, imaging technologies). • Communicate findings clearly using reports, presentations, or multimedia to explain the connection between health science careers and engineering. • Evaluate how emerging engineering technologies might influence future health science careers.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.17.1.a Obtain, evaluate, and communicate information related to health science careers and the various roles they fulfill within the healthcare system. Examples include researcher, biomedical engineer, medical professional, technician, manufacturer and distributor, administrator, and data storage and security professional.

Learning Targets	Academic Vocabulary
• Identify different careers within the healthcare system, such as researchers, biomedical engineers, medical professionals, technicians, manufacturers, administrators, and data security professionals. • Describe the primary responsibilities and functions of each health science career role. • Obtain detailed information about specific health science careers using various sources such as websites, interviews, and job descriptions. • Evaluate the importance of each role in supporting the health care system's functioning and patient care. • Communicate clear and organized information about health science careers and their roles using presentations, reports, or visual aids. • Analyze how these careers collaborate and depend on each other to improve health care outcomes.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.17.1.b Design a solution to a complex, real-world problem affecting body systems that can be solved through engineering. Solutions could include prosthetics, mobility enhancement, engineered body parts, treatment processes, and disease control.

Learning Targets	Academic Vocabulary
• Identify and describe real-world problems affecting various body systems that could be addressed by engineering solutions. • Research existing engineering solutions like prosthetics, mobility aids, and engineered tissues to understand their functions and limitations. • Brainstorm and propose possible engineering solutions to a selected complex problem affecting a body system. • Design a detailed plan or model for an engineering solution addressing the chosen problem, including materials, function, and intended impact. • Evaluate my design against criteria such as effectiveness, feasibility, cost,	

and potential impact on health. ● Communicate my proposed solution clearly using drawings, models, presentations, or reports. ● Refine and improve my design based on feedback and additional research to better solve the problem.	

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator
SC.HSP.17.1.c Evaluate a solution to a complex, real-world human health problem based on prioritized criteria constraints that account for interactions within and between systems. Solutions could include the effects on the human body or solutions for environmental public health issues.

Learning Targets	Academic Vocabulary
● Identify criteria and constraints relevant to evaluating solutions for human health problems. ● Describe how solutions may affect different body systems or environmental public health. ● Gather and analyze data about a specific health solution's impact on body systems or the environment. ● Evaluate a solution based on how well it meets prioritized criteria and constraints, considering interactions within and between systems. ● Compare multiple solutions and justify which is the most effective based on evidence and system interactions. ● Communicate my evaluation clearly, supporting my conclusions with data and reasoning. ● Suggest improvements or alternatives to solutions based on my evaluation of their systemic effects.	

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Standard
Standard Gather, analyze, and communicate evidence of the connections between body systems.

Indicator
SC.HSP.18.1 Gather, analyze, and communicate evidence of the connections between body systems.

Learning Targets	Academic Vocabulary

• Identify the major body systems and their primary functions. • Gather information from texts, diagrams, or models that show how body systems interact. • Analyze examples of interactions between two or more body systems (e.g., respiratory and circulatory systems working together). • Describe how the proper functioning of one body system depends on others to maintain overall health and homeostasis. • Communicate my understanding of body system connections using written explanations, diagrams, or presentations. • Evaluate complex scenarios where multiple body systems interact and explain potential effects if one system is disrupted.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.18.1.a
Construct and revise an explanation based on evidence for the cycling of matter and flow of energy within and between body systems.

Learning Targets	Academic Vocabulary
• Identify key processes involved in the cycling of matter (e.g., nutrients, gases) and flow of energy in body systems. • Gather and interpret evidence showing how matter cycles and energy flows within individual body systems, such as digestion or respiration. • Explain how matter and energy transfer between multiple body systems to support overall function and homeostasis. • Construct an explanation using evidence from observations, models, or data about how matter cycles and energy flows within and between body systems. • Revise my explanation based on new evidence or feedback to improve accuracy and depth. • Communicate a clear and detailed explanation of matter cycling and energy flow that connects multiple body systems. • Evaluate alternative explanations and justify my reasoning with evidence related to matter and energy dynamics in body systems.	

Resources

https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Indicator

SC.HSP.18.1.b Develop and use models to explain the interactions between body systems. Emphasis should also include interactions with the endocrine system.

Learning Targets	Academic Vocabulary
• Identify major body systems and describe the basic role of the endocrine system. • Gather information about how the endocrine system communicates with other body systems through hormones. • Develop simple models that show interactions between the endocrine system and other body systems (e.g., nervous, muscular, reproductive). • Explain, using models, how hormone signals from the endocrine system regulate functions in other body systems to maintain homeostasis. • Revise and improve my models based on new evidence or feedback to better represent the complexity of system interactions. • Communicate my models and explanations clearly using diagrams, presentations, or digital tools. • Analyze complex interactions involving the endocrine system and predict potential effects when the endocrine system is disrupted.	

Resources
https://www.education.ne.gov/assessmentold/science-classroom-formative-task-repository-for-grades-5-8/

Appendix

Appendix A: Professional and State Science Organizations

- **National Science Teaching Association (NSTA)** – https://www.nsta.org
- **Nebraska Association of Teachers of Science (NATS)** – https://nebraskascience.org/nats/
- **National Association of Biology Teachers (NABT)** – https://nabt.org
- **American Association of Physics Teachers (AAPT)** – https://aapt.org
- **National Earth Science Teachers Association (NESTA)** – https://nestanet.org
- **Nebraska Science Education** – https://www.education.ne.gov/science/

Appendix B: Catholic Identity in Science

- **Catholic Scientists – Scientists of the Past** – https://catholicscientists.org/scientists-of-the-past/
- **25 Famous Scientists on God** – https://catholiceducation.org/en/science/25-famous-scientists-on-god.html
- **McGrath Institute – Life & Human Dignity Resources** (Catholic perspectives on climate, population, medical ethics) – https://mcgrath.nd.edu/about/centers-initiatives-and-programs/life-human-dignity/resources/
- **Eucharistic Miracles of the World (St. Carlo Acutis)** – https://www.miracolieucaristici.org/en/liste/list.html
- **Educating for Eternity: A Teacher's Companion for Making Every Class Catholic** – Book by Brett Salkeld, Ph.D.

Appendix C: Instructional Frameworks and Strategies (Science)

- **NGSS Science and Engineering Practices (SEPs)** – Eight practices that drive inquiry-based science learning:
    1. Asking questions and defining problems
    2. Developing and using models
    3. Planning and carrying out investigations

4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

(Framework Source: https://www.nextgenscience.org)

- **NSTA Daily Do & Instructional Strategies** – https://www.nsta.org/dailydo
- **STEM Teaching Tools** – https://stemteachingtools.org

Appendix D: Notable Catholic Scientists, Researchers, and Medical Professionals

- Louis Pasteur – Microbiologist; vaccines and pasteurization
- Fr. Gregor Mendel – Father of modern genetics
- St. Albert the Great – Doctor of the Church; natural sciences
- St. Hildegard of Bingen – Polymath and early naturalist
- Venerable Jérôme Lejeune – Geneticist; Down syndrome research
- St. Gianna Beretta Molla – Physician and pro-life advocate
- St. Giuseppe Moscati – Physician and medical school professor
- Bl. Nicolas Steno – Pioneer in geology and stratigraphy
- Fr. Georges Lemaître – Proposed the Big Bang theory
- Sister Miriam Michael Stimson – Chemist; cancer research
- Karin Öberg – Astro chemist; Harvard researcher
- Laura Bassi – Physicist and academic trailblazer
- Maria Agnesi – Mathematician and philosopher
- Nicolaus Copernicus – Astronomer; heliocentric theory
- Fr. Christopher Clavius – Mathematician and astronomer; Gregorian calendar reform

- Fr. Angelo Secchi – Astrophysicist and spectroscopist
- Fr. Henri Breuil – Archaeologist and paleontologist
- Father Léon Provancher – Naturalist and entomologist
- Giovanni Manzolini & Anna Morandi Manzolini – Anatomist

Appendix E:

The following pages are reprinted in full from the Nebraska Department of Education's 2024 Key Instructional Shifts for Science. These instructional shifts offer critical context for effective implementation of Nebraska's College and Career Ready Standards for Science. "Nebraska Science Standards and Supporting Documents" by the Nebraska Department of Education is licensed under CC BY 4.0.

Key Instructional Shifts

Nebraska's 2024 College and Career Ready Standards for Science

Shifting instructional practice to meet the demands of college and career-ready standards is central to improving teaching and learning. Nebraska's College and Career Ready Standards for Science (2017 and 2024) require several key shifts in practice so that phenomena-based three-dimensional science learning comes to life in the classroom. These important shifts, along with thoughtful consideration of curricular materials, are essential in realizing the vision of excellent science instruction. This document provides an overview of the key instructional shifts for science and the roles that teachers, students, and school leaders have in their implementation.

Shift 1: Apply three-dimensional teaching and learning to science instruction.

The **Disciplinary Core Ideas** are the focused, limited set of science ideas necessary for ALL students to achieve scientific literacy. The **Disciplinary Core Ideas**, **Science and Engineering Practices**, and **Crosscutting Concepts** each build coherently K-12 to allow for deeper understanding of science concepts. When the three dimensions are integrated, students gain contextual understanding of how science knowledge is acquired and applied, and how science is connected through a series of concepts, rather than memorizing facts devoid of context.

Teachers...	School leaders...	Students...
■ Engage students with Disciplinary Core Ideas and Integrate Science and Engineering Practices with Crosscutting Concepts ■ Support students in applying knowledge to real-world contexts ■ Evaluate students' contextual application of knowledge beyond memorization	■ Lead the alignment of a district-wide vision for excellent science instruction reflecting the state science vision ■ Promote educator collaboration to create cohesive learning experiences ■ Ensure phenomena based three-dimensional learning at all grade levels ■ Allocate resources to materials and support for effective three-dimensional science instruction.	■ Investigate and make sense of phenomena and solve problems ■ Engage daily in lessons integrating Disciplinary Core Ideas, Science and Engineering Practices, and Crosscutting Concepts ■ Ask questions and participate in discussions to deepen scientific understanding ■ Identify how the three-dimensions of science are connected.

Shift 2: Connect ideas across science domains by explaining natural phenomena and designing solutions to real-world challenges.

The **Crosscutting Concepts** are used to organize and make sense of **Disciplinary Core Ideas**. They serve as tools that bridge domain boundaries and deepen understanding of content. The **Crosscutting Concepts** provide structure for synthesizing knowledge from various fields into a coherent and scientifically based view of the world as students explain natural phenomena and design solutions using the **Science and Engineering Practices**. Natural phenomena serve as the context for the work of both scientists and engineers. In this context, science, engineering, and technology are integrated in instruction; empowering students to apply learning to their everyday lives.

Teachers…	School leaders…	Students…
■ Encourage inquiry through the exploration of real-world phenomena ■ Guide synthesis of knowledge using Crosscutting Concepts for problem-solving ■ Integrate engineering and technology to highlight science's everyday relevance ■ Foster collaboration in designing solutions to real-world challenges	■ Support inquiry-based learning for real-world analysis ■ Partner with local organizations for authentic experiences ■ Evaluate instructional strategies that connect science concepts ■ Advocate for quality instruction and materials	■ Use Disciplinary Core Ideas and Crosscutting Concepts to explain phenomena across science ■ Investigate phenomena to solve real-world problems ■ Engage in hands-on investigations integrating science, engineering, and technology ■ Participate in community research, collecting data for real-world studies

Shift 3: Use overlapping skills to investigate, evaluate, and reason scientifically across disciplines.

The **Science and Engineering Practices** are used by students to demonstrate understanding of the **Disciplinary Core Ideas** and **Crosscutting Concepts**. The **Science and Engineering Practices** connect science with mathematics, English Language Arts, and other disciplines through meaningful and substantive overlapping skills and knowledge. This affords all students equitable access to learning and ensures all students are prepared for college, career, and citizenship.

Teachers…	School leaders…	Students…
■ Implement inquiry-based lessons integrating science, math, ELA, and social studies ■ Foster a classroom that prioritizes student discourse and collaboration. ■ Use high-quality texts to promote disciplinary literacy ■ Employ assessments that integrate knowledge from multiple areas	■ Advocate for a curriculum that features three-dimensional instruction. ■ Support authentic assessments reflecting real-world skills ■ Provide professional development on disciplinary literacy and student discourse ■ Ensure equitable access to diverse resources for interdisciplinary learning	■ Engage in discussions using scientific reasoning and knowledge from math and ELA ■ Collaborate on interdisciplinary activities applying integrated skills ■ Demonstrate connections among science, math, and ELA in discourse ■ Seek resources to enhance scientific literacy across content areas

Appendix F:

“Topic Progression” from Nebraska College and Career Ready Standards for Science (2024), Nebraska Department of Education. Used with permission. Licensed under CC BY 4.0.

TOPIC/GRADE	K	1	2	3	4	5	6	7	8	HS
1. Forces & Interactions	SC.K.1			SC.3.1					SC.8.1	SC.HS.1
2. Waves & Electro-magnetic Radiation		SC.1.2			SC.4.2				SC.8.2	SC.HS.2
3. Structure & Properties of Matter			SC.2.3			SC.5.3		SC.7.3		SC.HS.3
4. Energy					SC.4.4		SC.6.4		SC.8.4	SC.HS.4
5. Chemical Reactions								SC.7.5		SC.HS.5
6. Structure & Function		SC.1.6			SC.4.6		SC.6.6			SC.HS.6
7. Inter-dependent Relationships in Ecosystems	SC.K.7		SC.2.7	SC.3.7				SC.7.7		SC.HS.7
8. Matter & Energy in Organisms & Ecosystems						SC.5.8		SC.7.8		SC.HS.8
9. Heredity: Inheritance & Variation of Traits				SC.3.9			SC.6.9		SC.8.9	SC.HS.9
10. Biological Evolution									SC.8.10	SC.HS.10
11. Space Systems		SC.1.11				SC.5.11			SC.8.11	SC.HS.11
12. Weather & Climate	SC.K.12			SC.3.12			SC.6.12			SC.HS.12
13. Earth's Systems			SC.2.13		SC.4.13	SC.5.13	SC.6.13	SC.7.13		SC.HS.13
14. History of Earth								SC.7.14	SC.8.14	SC.HS.14
15. Sustainability										SC.HS.15

Appendix G:

The Nebraska Department of Education (NDE) offers a variety of critical tools and supports to help educators implement science standards effectively. Explore two key resource hubs below:

1. Standards & Supporting Documents

Link: education.ne.gov/science/standards-and-supporting-documents

Includes:

- Full standards in multiple formats (PDF and web)
- 2024 Science Standards Crosswalk (excel)
- 2024 Key Instructional Shifts for Science
- 2024 Science Standards Importable File (excel)
- 2024 Science Standards Teacher Guides

2. Science Resources

Link: education.ne.gov/science/resources

Provides:

- Standards Support
- Science Education Visioning
- Curricular Supports
- Three-Dimensional Assessment
- School Safety

Please take a moment to provide feedback on this guide: SCIENCE STANDARDS GUIDE FEEDBACK FORM