

Englewood on the Palisades Charter School

Science Curriculum

Grade Seven

Aligned With the 2026 New Jersey Student Learning Standards

The Vision for Science Education in New Jersey

2026 New Jersey Student Learning Standards for Science

The New Jersey Student Learning Standards for Science (NJSLS-S) describe the expectations for what students should know and be able to do as well as promote three-dimensional science instruction across the three science domains (i.e., physical sciences, life science, Earth and space sciences). From the earliest grades, the expectation is that students will engage in learning experiences that enable them to investigate phenomena, design solutions to problems, make sense of evidence to construct arguments, and critique and discuss those arguments (in appropriate ways relative to their grade level).

The foundation of the NJSLS-S reflects three dimensions — science and engineering practices, disciplinary core ideas, and crosscutting concepts. The performance expectations are derived from the interplay of these three dimensions. It is essential that these three components are integrated into all learning experiences. Within each standard document, the three dimensions are intentionally presented as integrated components to foster sensemaking and designing solutions to problems. Because the NJSLS-S is built on the notions of coherence and contextuality, each of the science and engineering practices and crosscutting concepts appear multiple times across topics and at every grade level. Additionally, the three dimensions should be an integral part of every curriculum unit and should not be taught in isolation.

Mission

All students will possess an understanding of scientific concepts and processes required for personal decision-making, participation in civic life, and preparation for careers in STEM fields (for those that chose).

Vision

Prepare students to become scientifically literate individuals who can effectively:

- Apply scientific thinking, skills, and understanding to real-world phenomena and problems;
- Engage in systems thinking and modeling to explain phenomena and to give a context for the ideas to be learned;
- Conduct investigations, solve problems, and engage in discussions;
- Discuss open-ended questions that focus on the strength of the evidence used to generate claims;

- Read and evaluate multiple sources, including science-related magazine and journal articles and web-based resources to gain knowledge about current and past science problems and solutions and develop well-reasoned claims; and
- Communicate ideas through journal articles, reports, posters, and media presentations that explain and argue.

(NJ DOE, 2022)

New Jersey Legislative Statutes and Administrative Code

Science

Amistad Law: *N.J.S.A. 18A 52:16A-88*

[African Americans in Science](#)
[8 Amazing Black Scientists and How They Changed History](#)
[African American Scientists and Inventors](#)

Holocaust Law: *N.J.S.A. 18A:35-28*

[Georg Bredig: Scientist, Humanist, and Holocaust Survivor](#)

LGBT and Disabilities Law: *N.J.S.A. 18A:35-4.35*

<https://prideinstem.org/>
[LGBTQ+ Scientists Through History](#)
[Celebrating Scientists With Disabilities](#)

Diversity & Inclusion: *N.J.S.A. 18A:35-4.36a*

Ada Twist, Scientist by Andrea Beaty [Ada Twist, Scientist Activities](#)

How Many Stars in the Sky by Lenny Hort [How Many Stars in the Sky? | RIF.org](#)

Mae Among the Stars by Roda Amhed [Mae Among the Stars STEM Activity](#)

The Outdoor Scientist by Temple Grandin

7th Grade Science Curriculum

Scientific and technological advancements have expanded significantly, now influencing nearly every part of life in the 21st century. It is becoming ever more crucial for everyone in society to have an understanding of scientific and engineering concepts and processes. In this course students will learn to construct scientific explanations and design evidence-based solutions equips students with the skills to think critically about personal and societal issues. This knowledge enables them to contribute effectively to decision-making processes, including discussions on climate change, new health care methods, and innovative solutions to both local and global challenges.

This 7th-grade science curriculum aligns with the New Jersey Student Learning Standards (NJSLS) and provides young learners with a solid foundation in scientific inquiry skills and early understanding of key science concepts. Throughout the year, the curriculum should incorporate hands-on activities, observations, and exploration to engage 7th-grade students and make learning science interactive and fun. Formative assessments, observations, and ongoing progress monitoring should be used to ensure that students are meeting the learning objectives. The curriculum should be flexible and adaptable to meet the individual needs and learning styles of the students.

Grade Seven Units and Pacing	
Unit 1: Characteristics of Life	6 weeks
Unit 2: Inheritance and Variation of Traits	6 weeks
Unit 3: Selection and Adaptation	6 weeks

Unit 4: Growth, Development and Reproduction of Organisms	6 weeks
Unit 5: Organization for Matter and Energy Flow in Organisms	6 weeks
Unit 6: Interdependent Relationships in Ecosystems	6 weeks
Total Number of Weeks:	36 weeks

Unit 1 - Characteristics of Life

Unit Goals:

In this unit, students demonstrate age appropriate abilities to plan and carry out investigations to develop evidence that living organisms are made of cells. Students will gather information to explain the relation between structure and function in cells. They will be able to communicate an understanding of the cell theory and use it to develop models of cells. The cross cutting concept of scale, proportion and structure and function provide a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency in planning and carrying out investigations, analyzing and interpreting data and developing models. Students are also expected to use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

Duration: 4 weeks

Essential Questions:

- How do all cells perform the essential functions for life?
- How do the organelles of cells carry out the essential functions of life?
- How do cells produce, modify and transport proteins?
- What are the major structural differences in animal, plant cells and fungal cells?

Enduring Understandings:

- Cell structure is related to cell function.
- Cell parts are interdependent.

- Cells take in nutrients to grow, divide, and make needed materials.

Key NJSLS Strands:

- MS-LS1-1: Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
- MS-LS1-2: Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.
- MS-LS1-3: Use arguments supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
- MS-LS1-8: Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

Science & Engineering Practices	Disciplinary Core Ideas	Cross-cutting Concepts
Develop and use a model to describe the function of a cell as a whole. • Develop and use a model to describe how parts of cells contribute to the cell's function. • Develop and use models to describe the relationship between the structure and function of the cell wall and cell membrane. Planning and Carrying Out Investigations • Conduct an investigation to produce data to serve as the basis for evidence that	LS1.A: Structure and Function All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1) Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2) In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs	Scale, Proportion, and Quantity Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-1) Connections to Engineering, Technology and Applications of Science Interdependence of Science, Engineering, and Technology Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-LS1-1) Systems and System Models

meet the goals of an investigation. (MS-LS1-1) Obtaining, Evaluating, and Communicating Information ● Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-LS1-8) Engaging in Argument from Evidence Use an oral and written argument supported by evidence to support or refute an explanation or a model for a phenomenon. (MS-LS1-3) Developing and Using Models Develop a model to describe phenomena. (MS-LS1-2)	that are specialized for particular body functions. (MS-LS1-3) LS1.D: Information Processing Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1-8)	Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. (MS-LS1-3) Cause and Effect Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS1-8) Structure and Function Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS1-2) Connections to Nature of Science Science is a Human Endeavor Scientists and engineers are guided by habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas. (MS-LS1-3)
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Interdisciplinary Connections
English Language Arts ● SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-LS1-2), (MS-LS1-7)

- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-LS1-3), (MS-LS1-4),(MS-LS1-5), (MS-LS1-6)
- RI.6.8 Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not. (MSLS1-3), (MS-LS1-4)
- WHST.6-8.1 Write arguments focused on discipline content. (MS-LS1-3), (MS-LS1-4)
- WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-LS1-1)
- WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-LS1-8)

Math

- 6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (MS-LS1-1), (MS-LS1-2), (MS-LS1-3), (MS-LS1-6)

21st-Century Skills

- 9.4.8.CI.4 Explore the role of creativity and innovation in career pathways and industries.
- 9.4.8.CT.2 Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g. 6.1.8.CivicsDP.1).

Career Ready Practices

- CRP2. Apply appropriate academic and technical skills
- CRP4. Communicate clearly and effectively and with reason

Technology Integration

- 8.1.8.A.4 Graph and calculate data within a spreadsheet and present a summary of the results.

Skills	Instructional Topics	Assessment	Resources	Vocabulary
Identify the characteristics shared by all living things: • Made of cells • Reproduce • Grow and develop • Use energy • Respond to surroundings • Made of chemicals of life (carbohydrates, proteins, lipids, nucleic acids) Distinguish between living (biotic) and non-living (abiotic) things based on the characteristics of life Cells are the smallest unit of life that can be said to be alive. Conduct an investigation to explain the components of cell	Characteristics of Life Cell History/Parts & Function Cell Processes Cellular Organization	Formative Assessments: Lab Reports/CER Responses Lab Skills Rubric Lesson Quizzes Lesson Self-assessment Teacher Observations Class Discussions Classwork/ Homework Exit Slips/Google Form Summative Assessments: Topic/Unit Assessments Constructed Response Questions Projects Cumulative Tests Performance Assessments	Materials: Diagrams of bacteria cells, animal cells, and plant cells Coloring supplies (colored pencils, markers, or crayons) Microscopes Prepared slides of various cells Materials for making cell models (e.g., clay, playdough, or other craft supplies) Computers or tablets with internet access Google Slides or similar presentation software Scenario cards or descriptions for the Lost at Sea activity	Metabolism Homeostasis Growth Reproduction Response to stimuli Adaptation Cellular organization Biotic Abiotic Cell Cell theory Unicellular Multicellular Differentiation specialization Organelle Nucleus

theory Conduct an investigation to produce data supporting the concept that living things may be made of one cell or many and varied cells. Observe different types of cells that can be found in the makeup of living things. Develop and use a model to describe the function of a cell as a whole. Develop and use a model to describe how parts of cells contribute to the cell's function. Develop and use a model to show cell reproduction Observe cells at		Alternate and Benchmark Assessments: Progress Monitoring Assessments Cumulative/Benchmark Assessments	Flipbook templates or blank paper for creating flipbooks Stopwatches or timers Data recording sheets or lab notebooks Heart rate monitors or manual pulse-taking instructions Materials for simulating homeostasis (e.g., ice water, warm water) Stimulus-response testing materials (e.g., rulers, objects to drop) Historical cell theory reference materials Basic cell substances research materials Lab equipment for lipid and chemical	Cytoplasm Cell membrane Cell wall Mitochondria Chloroplast Ribosome Endoplasmic reticulum Golgi apparatus Vacuole Lysosome Prokaryote Eukaryote Spontaneous generation Microscope Magnification Resolution Specimen
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different intervals during the reproduction process Develop and use models to describe the relationship between the structure and function of the cell wall and cell membrane.			identification tests (e.g., test tubes, reagents) Food samples for CSI Food Analysis Lab Microscopes and slides for Life Under the Microscope reading Worksheets or activities for cell types Bacteria characteristics reference charts BrainPop access or similar educational video platform Materials for creating a wanted poster or flipbook for prokaryotes Lab supplies for cell structure activities Comparison charts or templates for cell comparison activities	Observation Function Structure Replication Mitosis Cytokinesis Interphase Prophase Metaphase Anaphase Telophase
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			Notes or lab sheets for microscope use Reference materials for cell organelles (animal and plant) Materials for creating flipbooks for plant vs. animal cells Lab supplies for cell process experiments (e.g., Why are Cells So Small? lab) Project materials for Battle for Planet Earth activity Reading materials on cell functions Demonstration supplies for Smell Test/Membrane Lab Diffusion and osmosis experiment supplies (e.g., dialysis tubing, solutions)	
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			Flipbook templates or graphic organizers for respiration Virtual lab access for cell energy cycles Supplies for plants and snails virtual lab Fermentation lab supplies (e.g., yeast, sugar solutions) Materials for creating a flipbook on cell mitosis Lab supplies for cell division activities Word dissection worksheets or activities for human body vocabulary Reading materials for The Human Body: The Insiders Look Activities/Links:	
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			Label and color code diagrams of a bacteria cell, animal cell and plant cell Observe Cells with a Microscope lab Cell Model lab Google Slide Cell Organelle Comparison Project Lost at Sea Activity Characteristics of Life Flipbook Homeostasis Lab - Heart Rate Human Homeostasis Activity Response to Stimuli Lab Sight vs. Sound Reaction History of the Cell Theory Flipbook &	
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			Basic Cell Substances Research Lipids Lab/Chemical Identification Tests CSI Food Analysis Lab Life Under the Microscope Reading Cell Types Activity Bacteria Characteristics Chart & Diagram/Name that Bacteria! Activity BrainPop: Antibiotics Prokaryote Wanted Project Bacteria Flipbook/Instagerm Project Cell Structure Activity Cell Comparison Activity Microscope Madness Notes/Lab	
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			Cell Organelles - Animal or Plant? Plant VS Animal Cell Flipbooks Cell Processes: Why are Cells So Small? Lab Battle for Planet Earth: The Structure & Function of Cells Project What do Cells do Anyway? Reading Smell Test Demo/Moving Across a Membrane Lab Application Scenarios + Effects of Osmosis on Cells Chart Diffusion & Osmosis Activity Respiration Flipbook/Graphic Organizer	
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			Cell Energy Cycle Virtual Lab Plants and Snails Virtual Lab Lactic Acid Fermentation Lab Yeast on the Rise Lab Cell Mitosis: Flipping Out Over Cell Division Cell Division Activity Human Body Word Dissections The Human Body: The Insiders Look Reading Mentor Texts: <i>Cells: Experience Life at Its Tiniest</i> by Janet Slingerland <i>The Cell: A Visual Tour of the Building Block of Life</i> by Jack Challoner	
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			<i>Exploring Cells: The Basic Units of Life</i> by Gina Hagler <i>Cell Biology for Kids</i> by Renae B. Torres <i>Understanding Cells: A Closer Look at Cells and Cell Functions</i> by Rebecca Harman <i>Cell Division: Mitosis and Meiosis Explained</i> by Ethan Jacobson <i>Cell Structures and Functions</i> by Michael Windelspecht	
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Modifications and Accommodations	
Tier II and III Strategies	Small group instruction (Tier II) ● Explicit instruction ● Schema-based instruction ● Use visuals ● Use manipulatives ● Use a multi-sensory approach ● Guided notes and/or scaffold outline for written assignments ● Introduce key vocabulary before lesson

	● Lesson taught again using a differentiated approach Small group or Individual instruction (Tier III) ● Intensive instruction ● Practice fact retrieval ● Lesson taught again using a differentiated approach ● Allow answers to be given orally or dictated ● Use visuals / Anchor Charts
Students with IEPs and 504 Plans	● Follow all the IEP/504 plan modifications ● Allow extra time to complete assignments or tests ● Guided notes and/or scaffold outline for written assignments ● Work in a small group ● Solidify and refine concepts through repetition ● Allow answers to be given orally or dictated ● Use multi-sensory teaching approaches ● Utilize assistive technology and materials ● Use large print books, Braille, or books on CD (digital text) ● Text to speech/audio recorded selections ● Amplification system as needed ● Leveled texts according to ability ● Fine motor skill stations embedded in rotation as needed ● Modified or constrained spelling word lists ● Provide anchor charts with high frequency words and phonemic patterns ● Students might need guidance as to what actions happen during partner work time. Invite students to discuss what it looks like when they are working with their partner while exploring the connecting cubes. Generate a list of shared expectations for partner work. ● Invite students to plan a strategy before they begin working. If time allows, invite students to share their plan with a partner. ● Some students may benefit from feedback that emphasizes effort and time on

	task. For example, moving counters in the squares of the 5-frame or filling the 5-frame with one counter in each square.
Multi-language Learners	• Work toward longer passages as skills in English increase • Use visuals • Introduce/highlight key vocabulary before lesson • Teacher models reading aloud daily • Provide peer tutoring • Utilize translation supports including bilingual dictionary, translation device, assistive technology, and peers • Guided notes and/or scaffold outline for written assignments • Provide students with English Learner leveled readers • Support recommended by the grade specific “can do” list outlined by WIDA, including Key Uses Edition and Descriptor Name Charts • As students share ideas, include a drawing or annotation to illustrate connections. • Invite students to use gestures as they count.
Accelerating Students	• Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles) • Provide options, alternatives and choices to differentiate and broaden the curriculum • Organize and offer flexible small group learning activities • Provide whole group enrichment explorations • Teach cognitive and methodological skills • Use center, stations, or contracts • Organize integrated problem-solving simulations • Propose interest-based extension activities • Expose students to beyond level texts.

Unit 2: Inheritance and Variation of Traits

Unit Goals:

- Students develop and use models to describe how gene mutations and sexual reproduction contribute to genetic variation.
- Students understand how genetic factors determine the growth of an individual organism. They also demonstrate understanding of the genetic implications of sexual and asexual reproduction.
- The crosscutting concepts of cause and effect and structure and function provide a framework for understanding how gene structure determines differences in the functioning of organisms.
- Students are expected to demonstrate proficiency in developing and using models.
- Students use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

Duration: 5 weeks

Essential Questions:

- How do structural changes to genes (mutations) located on chromosomes affect proteins or affect the structure and function of an organism?
- How do asexual reproduction and sexual reproduction affect the genetic variation of offspring?
- How do living organisms pass traits from one generation to the next?

Enduring Understandings:

- All life is based on the same genetic code.
- The instructions for forming species' characteristics are carried in DNA.
- DNA determines traits and traits are inherited.
- Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA.
- Reproduction is essential to the continuation of a species.
- Multiple genetic and/or environmental factors often play a role in the expression of a trait.

Key NJSLS Strands:

- MS-LS3-1: 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.
- MS-LS3-2: 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.

Science & Engineering Practices	Disciplinary Core Ideas	Cross-cutting Concepts
Developing and Using Models Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. ● Develop and use a model to describe phenomena. (MS-LS1-2)	LS1.B: Growth and Development of Organisms ● Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. (secondary to MS-LS3-2) LS3.A: Inheritance of Traits ● Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the trait of the individual. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. (MS-LS3-1) ● Variations of inherited traits between parent and offspring arise from genetic	Structure and Function ● Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS3-1) Cause and Effect ● Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS3-2)

	differences that result from the subset of chromosomes (and therefore genes) inherited. (MS-LS3-2) LS3.B: Variation of Traits • In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other. (MS-LS3-2) • In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism. (MS-LS3-1)	
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Interdisciplinary Connections
English Language Arts • RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. • RST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

- RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
- SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

Math

- MP.4 Model with mathematics.
- 6.SP.B.5 Summarize numerical data sets in relation to their context

21st-Century Skills

- 9.2.8.CAP.8 Compare education and training requirements, income potential, and primary duties of at least two jobs of interest.
- 9.4.8.DC.2 Analyze the resource citations in online materials for proper use.
- 9.4.8.DC.1 Provide appropriate citation and attribution elements when creating media products.
- 9.4.8.GCA.2 Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.
- 9.4.8.IML.1 Critically curate multiple resources to assess the credibility of sources when searching for information.
- 9.4.8.IML.3 Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping.
- 9.4.8.IML.12 Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience.
- 9.4.8.TL.3 Select appropriate tools to organize and present information digitally.

Career Ready Practices

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Technology Integration

- 8.1.8.DA.1 Organize and transform data collected using computational tools to make it usable for a specific purpose.

Skills	Instructional Topics	Assessment	Resources	Vocabulary
● 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. ● Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information; develop and use a model to describe why sexual reproduction results in offspring with genetic variation; and, use models such as Punnett squares, diagrams, and simulations to	Probability and Heredity Inheritance Understanding Mutations and Their Effects Reproduction and Genetic Variation Cause-and-Effect Relationship of Gene Transmission	Formative Assessments: Lab Reports/CER Responses Lab Skills Rubric Lesson Quizzes Lesson Self-assessment Teacher Observations Class Discussions Classwork/ Homework Exit Slips/Google Form Summative Assessments: Topic/Unit Assessments Constructed Response Questions Projects Cumulative Tests Performance Assessments	Materials: Vocabulary foldables Paper models of DNA sequences (templates can be printed or drawn) Markers/colored pencils Scissors Reference materials on genetic mutations Diagrams of cellular processes (mitosis, meiosis) Punnett square templates Reference materials on reproduction and genetics Punnett square grids Dice	Gene Allele Dominant Recessive Genotype Phenotype Purebred Hybrid Homozygous Heterozygous Probability

describe the cause-and effect-relationship of gene transmission from parent(s) to offspring and resulting genetic variation.		Alternate and Benchmark Assessments: Progress Monitoring Assessments Cumulative/Benchmark Assessments	Reference materials on inheritance patterns Activities/Links: Modeling Gene Mutations Comparing Asexual and Sexual Reproduction** Punnett Square Simulation Game Karyotyping to show genetic disorders/chromosomal abnormalities Case studies of different mutation examples of beneficial, harmful, neutral Birdbeak Toothpick Lab Mutation Nation and Bird Beak Adaptations Masters of Disguise and Camouflage	
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			Mentor Texts:	
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Modifications and Accommodations	
Tier II and III Strategies	Small group instruction (Tier II) ● Explicit instruction ● Schema-based instruction ● Use visuals ● Use manipulatives ● Use a multi-sensory approach ● Guided notes and/or scaffold outline for written assignments ● Introduce key vocabulary before lesson ● Lesson taught again using a differentiated approach Small group or Individual instruction (Tier III) ● Intensive instruction ● Practice fact retrieval ● Lesson taught again using a differentiated approach ● Allow answers to be given orally or dictated ● Use visuals / Anchor Charts
Students with IEPs and 504 Plans	● Follow all the IEP/504 plan modifications ● Allow extra time to complete assignments or tests ● Guided notes and/or scaffold outline for written assignments ● Work in a small group ● Solidify and refine concepts through repetition ● Allow answers to be given orally or dictated

	● Use multi-sensory teaching approaches ● Utilize assistive technology and materials ● Use large print books, Braille, or books on CD (digital text) ● Text to speech/audio recorded selections ● Amplification system as needed ● Leveled texts according to ability ● Fine motor skill stations embedded in rotation as needed ● Modified or constrained spelling word lists ● Provide anchor charts with high frequency words and phonemic patterns ● Students might need guidance as to what actions happen during partner work time. Invite students to discuss what it looks like when they are working with their partner while exploring the connecting cubes. Generate a list of shared expectations for partner work. ● Invite students to plan a strategy before they begin working. If time allows, invite students to share their plan with a partner. ● Some students may benefit from feedback that emphasizes effort and time on task. For example, moving counters in the squares of the 5-frame or filling the 5-frame with one counter in each square.
Multi-language Learners	● Work toward longer passages as skills in English increase ● Use visuals ● Introduce/highlight key vocabulary before lesson ● Teacher models reading aloud daily ● Provide peer tutoring ● Utilize translation supports including bilingual dictionary, translation device, assistive technology, and peers ● Guided notes and/or scaffold outline for written assignments ● Provide students with English Learner leveled readers ● Support recommended by the grade specific “can do” list outlined by WIDA, including Key Uses Edition and Descriptor Name Charts ● As students share ideas, include a drawing or annotation to illustrate connections.

	• Invite students to use gestures as they count.
Accelerating Students	• Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles) • Provide options, alternatives and choices to differentiate and broaden the curriculum • Organize and offer flexible small group learning activities • Provide whole group enrichment explorations • Teach cognitive and methodological skills • Use center, stations, or contracts • Organize integrated problem-solving simulations • Propose interest-based extension activities • Expose students to beyond level texts.

Unit 3: Selection and Adaptation

Unit Goals:

- Students develop and use models to describe how gene mutations and sexual reproduction contribute to genetic variation. Students understand how genetic factors determine the growth of an individual organism. They also demonstrate understanding of the genetic implications of sexual and asexual reproduction. The crosscutting concepts of cause and effect and structure and function provide a framework for understanding how gene structure determines differences in the functioning of organisms. Students are expected to demonstrate proficiency in developing and using models. Students use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.
- Students construct explanations based on evidence to support fundamental understandings of natural selection and evolution. They will use ideas of genetic variation in a population to make sense of how organisms survive and reproduce, thus passing on the traits of the species. The crosscutting concepts of patterns and structure and function are called out as organizing concepts that students use to describe biological evolution. Students use the practices of constructing explanations, obtaining, evaluating, and communicating information, and using mathematical and computational thinking. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Duration: 6 weeks		
Essential Questions: • How can changes to the genetic code increase or decrease an individual's chances of survival? • How can the environment affect natural selection? • How do genetic variations of traits in a population increase or decrease some individuals' probability of surviving and reproducing in a specific environment? • How can mathematical representations be used to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time? • How have technologies changed the way humans influence the inheritance of desired traits in organisms?		
Enduring Understandings: • Natural selection leads to the predominance of certain traits in a population, and the suppression of others. • In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. • Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. • Biological evolution can occur through mutation, migration, genetic drift, and natural selection. • Two processes, speciation and extinction, combine to produce the diversity of life on Earth.		
Key NJSLS Strands: • MS-LS4-4: 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. • MS-LS4-6: Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. • MS-LS4-1: 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 on Earth under the assumption that natural laws operate today as in the past. • MS-LS4-2: 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. • MS-LS4-3: Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-cutting Concepts

Constructing Explanations and Designing Solutions - Construct an explanation that includes qualitative or quantitative relationships between variables that describe phenomena. (MS-LS4-4) Obtaining, Evaluating, and Communicating Information - Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-LS4-5) Using Mathematics and Computational Thinking - Use mathematical representations to support scientific conclusions and design solutions. (MS-LS4-6)	LS4.B: Natural Selection - Natural selection leads to the predominance of certain traits in a population, and the suppression of others. (MS-LS4-4) In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed onto offspring (MS-LS4-5) LS4.C: Adaptation - Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes. (MS-LS4-6)	Cause and Effect - Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS4-4), (MS-LS4-5), (MS-LS4-6) Connections to Engineering, Technology, and Applications of Science Interdependence of Science, Engineering, and Technology - Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-LS4-5) Connections to Nature of Science Science Addresses Questions About the Natural and Material World - Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-LS4-5)
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Interdisciplinary Connections

English Language Arts

- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions (MS-LS4-1),(MS-LS4-2),(MS-LS4-3),(MS-LS4-4)(MS-LS4-5) RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-LS4-3),(MS-LS4-4)
- WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS4-2),(MS-LS4-4)
- WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-LS4-5)
- WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. (MS-LS4-2),(MS-LS4-4)
- SL.8.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, teacher-led) with diverse partners on grade-level topics, texts, and issues, building on others' ideas and expressing their own clearly. (MS-LS4-2),(MS-LS4-4)
- SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation. (MS-LS4-2),(MS-LS4-4)

Math

- MP.4 Model with mathematics. (MS-LS4-6) 6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (MS-LS4-4),(MS-LS4-6)
- 6.SP.B.5 Summarize numerical data sets in relation to their context. (MS-LS4-4),(MS-LS4-6) 7.RP.A.2 Recognize and represent proportional relationships between quantities. (MS-LS4-4),(MS-LS4-6)

21st-Century Skills

- 9.4.8.DC.2: Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).

Career Ready Practices

- CRP4. Communicate clearly and effectively and with reason

Technology Integration

- 8.1.8.A.1 Demonstrate knowledge of a real world problem using digital tools

Skills	Instructional Topics	Assessment	Resources	Vocabulary
Construct an explanation that includes probability statements regarding variables and proportional reasoning of how genetic variations of traits in a population increase some individuals' probability surviving and reproducing in a specific environment. Use probability to describe some cause-and-effect relationships that can be used to explain why some individuals survive and reproduce in a	The Diversity of Living Things Evidence of Evolution Natural Selection in a Population Genetic Change and Traits	Formative Assessments: Lab Reports/CER Responses Lab Skills Rubric Lesson Quizzes Lesson Self-assessment Teacher Observations Class Discussions Classwork/ Homework Exit Slips/Google Form Summative Assessments: Topic/Unit Assessments	Materials: Diagrams and illustrations of Lamarck's and Darwin's giraffe theories Rock pocket mouse specimens or images Bird beak models (e.g., tweezers, pliers, chopsticks) Toothpicks Materials for simulating mutations (e.g., colored beads, markers) Bird beak adaptation notes and worksheets	Probability Variables Proportional reasoning Genetic variation Traits Population Survival Reproduction Environment Cause-and-effect Natural selection Increase Decrease

specific environment. Explain some causes of natural selection and the effect it has on the increase or decrease of specific traits in populations over time. Use mathematical representations to support conclusions about how natural selection may lead to increases and decreases of genetic traits in populations over time. Gather, read, and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms (artificial selection) from multiple appropriate sources. Describe how information from		Constructed Response Questions Projects Cumulative Tests Performance Assessments Alternate and Benchmark Assessments: Progress Monitoring Assessments Cumulative/Benchmark Assessments	Images or videos of camouflaged chameleons Fossil samples or replicas Tools for fossil dating (e.g., rulers, calipers) Whale evolution charts and diagrams Hominid skull replicas or 3D models Measurement tools (e.g., calipers, rulers) Embryo development stages illustrations or models Lab notebooks or data recording sheets Magnifying glasses or microscopes Reference books or articles on evolution and adaptation	Mathematical representation Conclusion Genetic traits Artificial selection Inheritance Desired traits Organisms Technology Human influence Information synthesis Publications Credibility Accuracy Bias Methods Gathering information
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publications about technologies and methods that have changed the way humans influence the inheritance of desired traits in organisms (artificial selection). Assess the credibility, accuracy, and possible bias of publications and the methods they used when gathering information about technologies that have changed the way humans influence the inheritance of desired traits in organisms (artificial selection).			Computers or tablets for research and digital activities Worksheets and activity guides Markers, colored pencils, or crayons for coloring activities Vocabulary foldables Activities/Links: Lamarck vs. Darwin giraffe activity Rock Pocket Mouse Activity Bird beak Toothpick Lab Mutation Nation and Bird Beak Adaptations Notes/Activity Masters of Disguise and Camouflage: Chameleons	
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			How Old Is That Fossil? Lab Evolution of Whales Hominid Skull Comparisons Lab Embryology Lab Natural Selection Webquest Evidence of Evolution Reading/Questions	
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Modifications and Accommodations	
Tier II and III Strategies	Small group instruction (Tier II) ● Explicit instruction ● Schema-based instruction ● Use visuals ● Use manipulatives ● Use a multi-sensory approach ● Guided notes and/or scaffold outline for written assignments ● Introduce key vocabulary before lesson ● Lesson taught again using a differentiated approach Small group or Individual instruction (Tier III) ● Intensive instruction ● Practice fact retrieval

	● Lesson taught again using a differentiated approach ● Allow answers to be given orally or dictated ● Use visuals / Anchor Charts
Students with IEPs and 504 Plans	● Follow all the IEP/504 plan modifications ● Allow extra time to complete assignments or tests ● Guided notes and/or scaffold outline for written assignments ● Work in a small group ● Solidify and refine concepts through repetition ● Allow answers to be given orally or dictated ● Use multi-sensory teaching approaches ● Utilize assistive technology and materials ● Use large print books, Braille, or books on CD (digital text) ● Text to speech/audio recorded selections ● Amplification system as needed ● Leveled texts according to ability ● Fine motor skill stations embedded in rotation as needed ● Modified or constrained spelling word lists ● Provide anchor charts with high frequency words and phonemic patterns ● Students might need guidance as to what actions happen during partner work time. Invite students to discuss what it looks like when they are working with their partner while exploring the connecting cubes. Generate a list of shared expectations for partner work. ● Invite students to plan a strategy before they begin working. If time allows, invite students to share their plan with a partner. ● Some students may benefit from feedback that emphasizes effort and time on task. For example, moving counters in the squares of the 5-frame or filling the 5-frame with one counter in each square.
Multi-language Learners	● Work toward longer passages as skills in English increase ● Use visuals

	● Introduce/highlight key vocabulary before lesson ● Teacher models reading aloud daily ● Provide peer tutoring ● Utilize translation supports including bilingual dictionary, translation device, assistive technology, and peers ● Guided notes and/or scaffold outline for written assignments ● Provide students with English Learner leveled readers ● Support recommended by the grade specific “can do” list outlined by WIDA, including Key Uses Edition and Descriptor Name Charts ● As students share ideas, include a drawing or annotation to illustrate connections. ● Invite students to use gestures as they count.
Accelerating Students	● Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles) ● Provide options, alternatives and choices to differentiate and broaden the curriculum ● Organize and offer flexible small group learning activities ● Provide whole group enrichment explorations ● Teach cognitive and methodological skills ● Use center, stations, or contracts ● Organize integrated problem-solving simulations ● Propose interest-based extension activities ● Expose students to beyond level texts.

Unit 4: Growth, Development and Reproduction of Organisms

Unit Goals:

- Students use data and conceptual models to understand how the environment and genetic factors determine the growth of an individual organism. They connect this idea to the role of animal behaviors in animal reproduction and to the dependence of some plants on animal behaviors for their reproduction.
- Students provide evidence to support their understanding of the structures and behaviors that increase the likelihood of successful reproduction by organisms. The crosscutting concepts of cause and effect and structure and function provide a framework for understanding the disciplinary core ideas.
- Students demonstrate grade-appropriate proficiency in analyzing and interpreting data, using models, conducting investigations, and communicating information.
- Students are also expected to use these practices to demonstrate understanding of the core ideas.

Duration: 6 weeks

Essential Questions:

- How do characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants?
- How do environmental and genetic factors influence the growth of organisms?

Enduring Understandings:

- Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction.
- Specialized structures for plants affect their probability of successful reproduction.
- Animals engage in characteristic behaviors that affect the probability of successful reproduction.
- Successful reproduction of animals and plants may have more than one cause, and some cause and effect relationships in systems can only be described using probability.
- Genetic factors as well as local conditions affect the growth of organisms. (plant and animals).

Key NJSLS Strands:

MS-LS1-4: 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.

MS-LS1-5: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

MS-LS3-1: 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.

MS-LS3-2: 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.
 MS-LS4-5: Gather and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms.

Science & Engineering Practices	Disciplinary Core Ideas	Cross-cutting Concepts
Engaging in Argument from Evidence • Use an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-LS1-4) Constructing Explanations and Designing Solutions • Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-LS1-5)	LS1.B: Growth and Development of Organisms • Animals engage in characteristic behaviors that increase the odds of reproduction. (MS-LS1-4) • Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. (MS-LS1-4) • Genetic factors as well as local conditions affect the growth of the adult plant. (MS-LS1-5)	Cause and Effect • Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS1-8) • Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS1-4), (MS-LS1-5) Structure and Function • Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function Structure and Function Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function (MS-LS1-4), (MS-LS1-5)

Interdisciplinary Connections

English Language Arts

- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.
- RST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
- RI.6.8 Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.
- WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
- WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.

Math

- 6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.

21st-Century Skills

- 9.4.8.GCA.1: Model how to navigate cultural differences with sensitivity and respect (e.g., 1.5.8.C1a)
- 9.4.8.DC.8: Explain how communities use data and technology to develop measures to respond to effects of climate change (e.g., smart cities).

Career Ready Practices

- CRP-2: Students use knowledge and skills through their lab work. CPR-5: Students will have an increased awareness of how the human population can affect the environment. CRP-12: Students work productively in collaborative groups using culturally global competence.

Technology Integration

- 8.1.8 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

Skills	Instructional Topics	Assessment	Resources	Vocabulary
Investigate how genetic factors influence an organism's traits. Describe how asexual reproduction results in offspring with identical genetic information and how sexual reproduction results in offspring with genetic variation. Explain how genetic and environmental factors affect the growth and reproduction of plants. Explain how an animal's behavior influences its reproductive success and survival.	Reproduction Heredity Cells and Heredity Growth	Formative Assessments: Lab Reports/CER Responses Lab Skills Rubric Lesson Quizzes Lesson Self-assessment Teacher Observations Class Discussions Classwork/ Homework Exit Slips/Google Form Summative Assessments: Topic/Unit Assessments Constructed Response Questions Projects Cumulative Tests Performance Assessments	Materials: Plant samples Reproduction observation tools (e.g., magnifying glasses, microscopes) Lab notebooks or data sheets Crickets or other small animals Live cam footage or videos of animal behavior Materials for creating ethograms (e.g., observation sheets, stopwatches) Graph paper or graphing software Tools for measuring plant growth and conditions (e.g., rulers,	Asexual reproduction Sexual reproduction Pollination Fertilization Germination Ethogram Conditions Environment Growth Survival Plant growth Animal behavior Species Habitat Interaction Adaptation Ecosystem Data interpretation

		Alternate and Benchmark Assessments: Progress Monitoring Assessments Cumulative/Benchmark Assessments	thermometers, soil pH testers) Materials for creating Venn diagrams (e.g., large paper, markers, compasses) Honeybee colony loss data Computers or tablets for research and graphing Colored pencils or markers Reference books or articles on plant and animal behavior Worksheets and activity guides Activities/Links: Lab identifying different methods of plant reproduction Lab observing and collecting data on	Trends Statistical analysis Experimental design Control group Independent variable Dependent variable Sampling Biodiversity Natural selection Behavioral ecology Reproductive strategy Mate selection
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			animal behavior, such as creating ethograms (live crickets, live cam footage of animals, etc.) Collect data in order to create graphs of plants in different areas/conditions; students determine what allows them to survive. Venn Diagram comparing the two types of reproduction Model the Growth of an Animal Lab Graphing Activity - Calculate the Rate of Asexual Reproduction My Parents Wrecked My Favorite Genes Reading/Questions Oh Me, Oh Mei-osis notes, Just Like Me and	
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			Game of Chance Activities Phenylthiocarbamide Says What?! Genetics of Taste Lab	
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Modifications and Accommodations	
Tier II and III Strategies	Small group instruction (Tier II) ● Explicit instruction ● Schema-based instruction ● Use visuals ● Use manipulatives ● Use a multi-sensory approach ● Guided notes and/or scaffold outline for written assignments ● Introduce key vocabulary before lesson ● Lesson taught again using a differentiated approach Small group or Individual instruction (Tier III) ● Intensive instruction ● Practice fact retrieval ● Lesson taught again using a differentiated approach ● Allow answers to be given orally or dictated ● Use visuals / Anchor Charts
Students with IEPs and 504 Plans	● Follow all the IEP/504 plan modifications ● Allow extra time to complete assignments or tests ● Guided notes and/or scaffold outline for written assignments ● Work in a small group

	● Solidify and refine concepts through repetition ● Allow answers to be given orally or dictated ● Use multi-sensory teaching approaches ● Utilize assistive technology and materials ● Use large print books, Braille, or books on CD (digital text) ● Text to speech/audio recorded selections ● Amplification system as needed ● Leveled texts according to ability ● Fine motor skill stations embedded in rotation as needed ● Modified or constrained spelling word lists ● Provide anchor charts with high frequency words and phonemic patterns ● Students might need guidance as to what actions happen during partner work time. Invite students to discuss what it looks like when they are working with their partner while exploring the connecting cubes. Generate a list of shared expectations for partner work. ● Invite students to plan a strategy before they begin working. If time allows, invite students to share their plan with a partner. ● Some students may benefit from feedback that emphasizes effort and time on task. For example, moving counters in the squares of the 5-frame or filling the 5-frame with one counter in each square.
Multi-language Learners	● Work toward longer passages as skills in English increase ● Use visuals ● Introduce/highlight key vocabulary before lesson ● Teacher models reading aloud daily ● Provide peer tutoring ● Utilize translation supports including bilingual dictionary, translation device, assistive technology, and peers ● Guided notes and/or scaffold outline for written assignments ● Provide students with English Learner leveled readers ● Support recommended by the grade specific “can do” list outlined by WIDA,

	including Key Uses Edition and Descriptor Name Charts ● As students share ideas, include a drawing or annotation to illustrate connections. ● Invite students to use gestures as they count.
Accelerating Students	● Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles) ● Provide options, alternatives and choices to differentiate and broaden the curriculum ● Organize and offer flexible small group learning activities ● Provide whole group enrichment explorations ● Teach cognitive and methodological skills ● Use center, stations, or contracts ● Organize integrated problem-solving simulations ● Propose interest-based extension activities ● Expose students to beyond level texts.

Unit 5: Organization for Matter and Energy Flow in Organisms

Unit Goals:

In this unit, Students provide a mechanistic account for how cells provide a structure for the plant process of photosynthesis in the movement of matter and energy needed for the cell. Students use conceptual and physical models to explain the transfer of energy and cycling of matter as they construct explanations for the role of photosynthesis in cycling matter in ecosystems. They construct scientific explanations for the cycling of matter in organisms and the interactions of organisms to obtain matter and energy from an ecosystem to survive and grow. They understand that sustaining life requires substantial energy and matter inputs, and that the structure and functions of organisms contribute to the capture, transformation, transport, release, and elimination of matter and energy. The crosscutting concepts of matter and energy and structure and function provide a framework for understanding of the cycling of matter and energy flow into and out of organisms. Students are also expected to demonstrate proficiency in developing and using models. Students use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

Duration: 6 weeks		
Essential Questions: • What is the role of photosynthesis in the cycling of matter and flow of energy into and out of an organism? • How is food rearranged through chemical reactions to form new molecules that support growth and/or release energy as this matter moves through an organism? • How do some organisms turn electromagnetic radiation into matter and energy? • How do organisms obtain and use matter and energy?		
Enduring Understandings: • The energy released from food was once energy from the sun that was captured by plants in the chemical process that forms plant matter. • Plants get the material they need for growth mainly from air and water. • Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.		
Key NJSLS Strands: • MS-LS1-6: 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. • MS-LS1-7: Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-cutting Concepts
Constructing Explanations and Designing Solutions • Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past	Disciplinary Core Ideas Crosscutting Concepts LS1.C: Organization for Matter and Energy Flow in Organisms • Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of	Energy and Matter • Within a natural system, the transfer of energy drives the motion and/or cycling of matter. (MS-LS1-6) • Matter is conserved because atoms are conserved in physical and chemical processes. (MS-LS1-7)

and will continue to do so in the future. (MS-LS1-6) Developing and Using Models • Use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-7)	photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. (MS-LS1-6) • Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (MS-LS1-7) PS3.D: Energy in Chemical Processes and Everyday Life • The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen. (secondary to MS-LS1-6) • Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (secondary to MS-LS1-7)	Connections to Nature of Science • Scientific Knowledge is Based on Empirical Evidence Science knowledge is based upon logical connections between evidence and explanations. (MS-LS1-6)
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Interdisciplinary Connections
English Language Arts ● RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-LS1-3), (MS-LS1-4), (MS-LS1-5), (MS-LS1-6) ● RST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. (MS-LS1-5), (MS-LS1-6) ● WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS1-5), (MS-LS1-6) ● WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. (MS-LS1-5), (MS-LS1-6) ● SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-LS1-2), (MS-LS1-7) Math ● MP.2 Reason abstractly and quantitatively. ● 6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (MS-LS1-1), (MS-LS1-2), (MS-LS1-3), (MS-LS1-6)
21st-Century Skills
● 9.4.8.CT.1: Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).
Career Ready Practices
● CRP4. Communicate clearly and effectively and with reason
Technology Integration

- 8.1.8.A.1 Demonstrate knowledge of a real world problem using digital tools

Skills	Instructional Topics	Assessment	Resources	Vocabulary
Construct a scientific explanation for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms based on valid and reliable evidence obtained from sources, including the students' own experiments. Construct a scientific explanation for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms based on the assumption that theories and laws that describe the natural world operate today	The role of photosynthesis in the cycling of matter and flow of energy into and out of an organism. How food is rearranged through chemical reactions.	Formative Assessments: Lab Reports/CER Responses Lab Skills Rubric Lesson Quizzes Lesson Self-assessment Teacher Observations Class Discussions Classwork/ Homework Exit Slips/Google Form Summative Assessments: Topic/Unit Assessments Constructed Response Questions	Materials: Infographic creation tools (e.g., paper, markers, digital design software) Role-play costumes or props (e.g., sun, water molecules, carbon dioxide, chloroplasts) Spinach leaves Rubbing alcohol Microscopes Observation sheets Timeline creation materials (e.g., large paper, markers, digital tools)	Photosynthesis chlorophyll Light energy Carbon dioxide Water Oxygen Glucose Chloroplast Thylakoid Stroma Cellular respiration Glycolysis Krebs cycle

as they did in the past and will continue to do so in the future. Develop and use a model to describe how food is rearranged through chemical reactions.		Projects Cumulative Tests Performance Assessments Alternate and Benchmark Assessments: Progress Monitoring Assessments Cumulative/Benchmark Assessments	Board game materials (e.g., game board, pieces, cards, dice) Yeast Sugar Water Balloons Fermentation lab containers Concept map materials (e.g., large paper, sticky notes, markers) Mini-terrarium supplies (e.g., jars, soil, small plants, small animals/insects) Comic strip templates or blank paper Colored pencils or markers	Electron transport chain ATP Mitochondria Aerobic Anaerobic Fermentation Carbon cycle Energy transfer Concept map Ecosystem Interaction Interdependence Inputs Outputs Experiment Data analysis Variables Light intensity
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			Experimental design materials (e.g., plants, light sources, thermometers, carbon dioxide sensors) Graph paper or graphing software Computer simulation software Debate preparation materials (e.g., research articles, note cards) Interactive notebook supplies (e.g., notebooks, colored paper, glue, scissors) Data collection tools (e.g., rulers, timers, measurement tools) Chlorophyll extraction tools (e.g., containers, filters)	Temperature Rate Simulation Debate Public service announcement Infographic Role-play Timeline Board game Fermentation lab Mini-terrarium Comic strip Interactive notebook Foldable diagrams Comparison charts Public awareness Education Scientific findings
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			Observation and recording sheets Presentation materials (e.g., posters, slides) Vocabulary foldables Activities/Links: Create a model of photosynthesis HHMI Photosynthesis Gizmo: Photosynthesis Lab Create a model of cellular respiration Create a model of the interaction between photosynthesis and cellular respiration Design a Photosynthesis Infographic Photosynthesis Role-Play Activity	Observation Extraction Pigment Modeling Synthesis Experimental design Data collection Analysis Presentation Argument Significance Context
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			Chlorophyll Extraction and Observation Lab Interactive Photosynthesis Timeline Build a Cellular Respiration Board Game Respiration in Action: Yeast Fermentation Lab Respiration and Photosynthesis Concept Map Ecosystem in a Jar: Mini-Terrarium Project Photosynthesis and Cellular Respiration Comic Strip Design an Experiment: Investigating Photosynthesis Rates Energy Flow Simulation	
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			Photosynthesis and Cellular Respiration Debate Interactive Notebook: Photosynthesis vs. Cellular Respiration	
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Modifications and Accommodations	
Tier II and III Strategies	Small group instruction (Tier II) • Explicit instruction • Schema-based instruction • Use visuals • Use manipulatives • Use a multi-sensory approach • Guided notes and/or scaffold outline for written assignments • Introduce key vocabulary before lesson • Lesson taught again using a differentiated approach Small group or Individual instruction (Tier III) • Intensive instruction • Practice fact retrieval • Lesson taught again using a differentiated approach • Allow answers to be given orally or dictated • Use visuals / Anchor Charts
Students with IEPs and 504 Plans	• Follow all the IEP/504 plan modifications

	● Allow extra time to complete assignments or tests ● Guided notes and/or scaffold outline for written assignments ● Work in a small group ● Solidify and refine concepts through repetition ● Allow answers to be given orally or dictated ● Use multi-sensory teaching approaches ● Utilize assistive technology and materials ● Use large print books, Braille, or books on CD (digital text) ● Text to speech/audio recorded selections ● Amplification system as needed ● Leveled texts according to ability ● Fine motor skill stations embedded in rotation as needed ● Modified or constrained spelling word lists ● Provide anchor charts with high frequency words and phonemic patterns ● Students might need guidance as to what actions happen during partner work time. Invite students to discuss what it looks like when they are working with their partner while exploring the connecting cubes. Generate a list of shared expectations for partner work. ● Invite students to plan a strategy before they begin working. If time allows, invite students to share their plan with a partner. ● Some students may benefit from feedback that emphasizes effort and time on task. For example, moving counters in the squares of the 5-frame or filling the 5-frame with one counter in each square.
Multi-language Learners	● Work toward longer passages as skills in English increase ● Use visuals ● Introduce/highlight key vocabulary before lesson ● Teacher models reading aloud daily ● Provide peer tutoring ● Utilize translation supports including bilingual dictionary, translation device, assistive technology, and peers

	● Guided notes and/or scaffold outline for written assignments ● Provide students with English Learner leveled readers ● Support recommended by the grade specific “can do” list outlined by WIDA, including Key Uses Edition and Descriptor Name Charts ● As students share ideas, include a drawing or annotation to illustrate connections. ● Invite students to use gestures as they count.
Accelerating Students	● Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles) ● Provide options, alternatives and choices to differentiate and broaden the curriculum ● Organize and offer flexible small group learning activities ● Provide whole group enrichment explorations ● Teach cognitive and methodological skills ● Use center, stations, or contracts ● Organize integrated problem-solving simulations ● Propose interest-based extension activities ● Expose students to beyond level texts.

Unit 6: Interdependent Relationships in Ecosystems

Unit Goals:

In this unit, students build on their understandings of the transfer of matter and energy as they study patterns of interactions among organisms within an ecosystem. They consider biotic and abiotic factors in an ecosystem and the effects these factors have on a population. They construct explanations for the interactions in ecosystems and the scientific, economic, political, and social justifications used in making decisions about maintaining biodiversity in ecosystems. The crosscutting concept of stability and change provides a framework for understanding the disciplinary core ideas. This unit includes a two-stage engineering design process. Students first evaluate different engineering ideas that have been proposed using a systematic method, such as a tradeoff matrix, to determine which solutions are most promising. They then test different solutions, and combine the best ideas into a new solution that may be better than any of the preliminary ideas. Students demonstrate grade appropriate proficiency in asking

questions, designing solutions, engaging in argument from evidence, developing and using models, and designing solutions. Students are also expected to use the practices to demonstrate understanding of the core ideas.

Duration: 6 weeks

Essential Questions:

- How do organisms interact with the living and nonliving environments to obtain matter and energy?
- How do matter and energy move through an ecosystem?
- What happens to ecosystems when the environment changes?
- How do organisms interact in groups to benefit individuals?
- What can be done to protect the earth and the survival of future generations?

Enduring Understandings:

- Living things interact with and depend on each other and on the nonliving things in an ecosystem.
- A community contains many populations that interact in their energy roles and in their competition for resources.
- Populations can increase, decrease and move, affecting the community.
- Each of Earth's land biomes and aquatic ecosystems is characterized by distinct environments and organisms. Biomes and ecosystems change by natural processes of ecological succession and by human activities.
- Earth has many resources; factors such as pollution and climate change affect the survival of many species and future generations.

Key NJSLS Strands:

- MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
- MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
- MS-ETS1-1 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.
- MS-ETS1-3 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.

Science & Engineering Practices

Disciplinary Core Ideas

Cross-cutting Concepts

Engaging in Argument from Evidence • Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-LS2-4) • Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (MS-LS2-5) Asking Questions and Defining Problems • Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. (MS-ETS1-1) Developing and Using Models • Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs. (MS-ETS1-4) Analyzing and Interpreting Data • Analyze and interpret data to determine similarities and differences in findings. (MS-ETS1-3)	LS2.C: Ecosystem Dynamics, Functioning, and Resilience • Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4) • Biodiversity describes the variety of species found in Earth’s terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem’s biodiversity is often used as a measure of its health. (MS-LS2-5) LS4.D: Biodiversity and Humans • Changes in biodiversity can influence human’s resources, such as food, energy, and medicines, as well as ecosystem services than humans rely on—for example, water purification and recycling. (secondary to MS-LS2-5) ETS1.B: Developing Possible Solutions • There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (secondary to MS-LS2-5) ETS1.A: Defining and Delimiting Engineering Problems	Stability and Change • Small changes in part of a system might cause large changes in another part. (MS-LS2-4), (MS-LS2-5) Connections to Engineering, Technology and Application of Science Influence of Science, Engineering, and Technology on Society and the Natural World • The use of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time. (MS-LS2-5) Connections to Nature of Science Scientific Knowledge Assumes an Order and Consistency in Natural Systems • Science assumes that objects and events in natural systems occur inconsistent patterns that are understandable through measurement and observation. (MS-LS2-3) Scientific Knowledge is Based on Empirical Evidence
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	• The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. (MS-ETS1-1) ETS1.B: Developing Possible Solutions • A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (MS-ETS1-4) • There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2), (MS-ETS1-3) • Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. (MS-ETS1-3) • Models of all kinds are important for testing solutions. (MS-ETS1-4) ETS1.C: Optimizing the Design Solution • Although one design may not perform the best across all tests, identifying the	• Science disciplines share common rules of obtaining and evaluating empirical evidence. (MS-LS2-4) Science Addresses Questions About the Natural and Material World • Scientific knowledge can describe the consequences of actions but doesn't necessarily prescribe the decisions that society takes. (MS-LS2-5)
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	characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design. (MS-ETS1-3)	
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Interdisciplinary Connections

English Language Arts

- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.
- RST.6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculation in text.
- RI.8.8 Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims.
- WHST.6-8.1 Write arguments to support claims with clear reasons and relevant evidence.
- WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, an analysis of relevant content.
- RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
- WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
- WHST.6-8.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.
- SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

Math

- MP.2 Reason abstractly and quantitatively.
- MP.4 Model with mathematics.

● 7.EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. ● 6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems.
21st-Century Skills
● 9.4.8.CT.1: Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).
Career Ready Practices
● CRP-2: Students use knowledge and skills through their lab work. ● CRP4. Communicate clearly and effectively and with reason. ● CRP-12: Students work productively in collaborative groups using culturally global competence.
Technology Integration
8.1.8.A.1 Demonstrate knowledge of a real world problem using digital tools

Skills	Instructional Topics	Assessment	Resources	Vocabulary
● Express knowledge of the relationships between plants, animals, and humans' influence on the surrounding	Ecology and the Environment Relationships in Ecosystems	Formative Assessments: Lab Reports/CER Responses Lab Skills Rubric	Materials: Poster paper Markers	Biodiversity Carbon cycle Competition

environment. ● Analyze the impact of predation, competition, and interdependence among living things. ● Develop a model to describe the cycling of matter among living and nonliving parts of an ecosystem. ● Develop a model to describe the flow of energy among living and nonliving parts of the ecosystem. Track the transfer of energy as energy flows through an ecosystem. ● Observe and measure patterns of objects and events in ecosystems. ● Construct an argument to support or refute an explanation for the		Lesson Quizzes Lesson Self-assessment Teacher Observations Class Discussions Classwork/ Homework Exit Slips/Google Form Summative Assessments: Topic/Unit Assessments Constructed Response Questions Projects Cumulative Tests Performance Assessments Alternate and Benchmark Assessments: Progress Monitoring Assessments	Digital design software Role-play costumes or props (e.g., sun, water molecules, carbon dioxide, chloroplasts) Spinach leaves Rubbing alcohol Microscopes Observation sheets Timeline creation materials (e.g., large paper, markers, digital tools) Board game materials (e.g., game board, pieces, cards, dice) Yeast Sugar Water Balloons	Commensalism Conservation Consumer Decomposition Deforestation Denitrification Ecosystem Energy flow Evaporation Food chain Food web Habitat Herbivory Human impact Invasive species Mutualism Natural disaster Nitrification Nitrogen cycle
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changes to populations in an ecosystem caused by disruptions to a physical or biological component of that ecosystem. ● Empirical evidence and scientific reasoning must support the argument. ● Use scientific rules for obtaining and evaluating empirical evidence. ● Recognize patterns in data and make warranted inferences about changes in populations. ● Evaluate empirical evidence supporting arguments about changes to ecosystems. ● Construct a convincing argument that supports or refutes claims for		Cumulative/Benchmark Assessments	Fermentation lab containers Concept map materials (e.g., large paper, sticky notes, markers) Mini-terrarium supplies (e.g., jars, soil, small plants, small animals/insects) Comic strip templates or blank paper Colored pencils or markers Experimental design materials (e.g., plants, light sources, thermometers, carbon dioxide sensors) Graph paper or graphing software Computer simulation software	Oxygen Photosynthesis Pollination Predation Producer Resource allocation Respiration Seasonal changes Solar energy Species distribution Symbiosis Trophic level Urbanization Water cycle Biogeochemical cycles Calorimetry Biomass analysis Phenology
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solutions about the natural and designed world(s). • Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs.			Debate preparation materials (e.g., research articles, note cards) Interactive notebook supplies (e.g., notebooks, colored paper, glue, scissors) Public service announcement creation tools (e.g., video recording equipment, poster board, digital presentation software) Data collection tools (e.g., rulers, timers, measurement tools) Chlorophyll extraction tools (e.g., containers, filters) Presentation materials (e.g., posters, slides) Research articles on natural disasters Invasive species case study resources	Migration Hibernation Habitat fragmentation Ecological recovery Restoration efforts Pollution Overfishing Statistical methods Peer review Causal relationships Correlation Scientific principles Predictive tools Ecological data Population growth Population decline Ecological stability Causation
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			Pollution experiment materials (e.g., water samples, pollutants) Habitat fragmentation modeling supplies (e.g., maps, markers) Biodiversity and conservation poster materials Symbiotic relationships chart supplies Carbon cycle model kits Nitrogen cycle game components Water cycle diorama materials (e.g., clay, paints) Solar energy project supplies (e.g., solar cells, light meters) Seasonal changes journal notebooks	Environmental interventions Environmental engineering Climate change Habitat restoration Resource management Sustainability Technology Policy decisions Conservation strategies Environmental policies Ecological models Inputs Outputs Feedback Iterative design
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			Ecosystem observation tools (e.g., field guides, binoculars) Food web construction materials (e.g., animal cards, strings) Predator-prey dynamics simulation kits Plant growth experiment supplies (e.g., seeds, pots, soil types) Human impact research project materials Energy transfer diagram tools (e.g., colored pencils, large paper) Chlorophyll chromatography experiment supplies (e.g., chromatography paper, solvents) Debate preparation materials (e.g., research articles, note cards)	Interdisciplinary approaches Scientific communication Empirical evidence Scientific reasoning Experimental design Data analysis Data collection Long-term research Natural events Ecological impact Ecological monitoring Trophic pyramid Energy transfer Biomass Modeling Scientific argument Evidence evaluation
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			Photosynthesis and cellular respiration modeling materials Gizmo access for virtual lab simulation Ethogram observation tools (e.g., video footage, live animals) Honeybee colony loss data and graphing tools Ecosystem disruption argument materials (e.g., case studies, evidence charts) Empirical evidence evaluation resources Aquatic systems experiment materials Conservation strategy presentation supplies Ecological recovery simulation kits	
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			Urbanization impact research tools Climate change modeling materials (e.g., polar bear models, climate data) Sustainable farming plan development tool Plant reproduction observation tools Venn diagram creation supplies (e.g., large paper, markers) Migration pattern tracking tools (e.g., maps, GPS data) Calorimetry equipment Plant growth graphing materials Peer review form Ecological study mapping tools	
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			Population change graphing tools Digital timeline creation software Ecosystem interdependence role-play props Successful conservation efforts case study materials Habitat restoration project data Environmental management technology resources Vocabulary foldables Activities/Links: Ecological survey of local community Analyze Population Growth Data Create a model to show the movement of energy	
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			through a food web in specific ecosystem Wolves of Yellowstone Case Study (observations, data, analysis) Ecology Disrupted (observations, data, analysis) Benefit of large biodiversity card activity Research-based project on a case study of specific ecosystem and its changes (incorporate mini lessons about research, credible sources, works cited) Interactions Within the Environment Reading/Review Questions	
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			Food Chain/Food Web Ecology Project Predator-Prey Relationships Activity Threats to my Ecosystem Research Activity	
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Modifications and Accommodations	
Tier II and III Strategies	Small group instruction (Tier II) ● Explicit instruction ● Schema-based instruction ● Use visuals ● Use manipulatives ● Use a multi-sensory approach ● Guided notes and/or scaffold outline for written assignments ● Introduce key vocabulary before lesson ● Lesson taught again using a differentiated approach Small group or Individual instruction (Tier III) ● Intensive instruction ● Practice fact retrieval ● Lesson taught again using a differentiated approach ● Allow answers to be given orally or dictated ● Use visuals / Anchor Charts
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	● Allow extra time to complete assignments or tests ● Guided notes and/or scaffold outline for written assignments ● Work in a small group ● Solidify and refine concepts through repetition ● Allow answers to be given orally or dictated ● Use multi-sensory teaching approaches ● Utilize assistive technology and materials ● Use large print books, Braille, or books on CD (digital text) ● Text to speech/audio recorded selections ● Amplification system as needed ● Leveled texts according to ability ● Fine motor skill stations embedded in rotation as needed ● Modified or constrained spelling word lists ● Provide anchor charts with high frequency words and phonemic patterns ● Students might need guidance as to what actions happen during partner work time. Invite students to discuss what it looks like when they are working with their partner while exploring the connecting cubes. Generate a list of shared expectations for partner work. ● Invite students to plan a strategy before they begin working. If time allows, invite students to share their plan with a partner. ● Some students may benefit from feedback that emphasizes effort and time on task. For example, moving counters in the squares of the 5-frame or filling the 5-frame with one counter in each square.
Multi-language Learners	● Work toward longer passages as skills in English increase ● Use visuals ● Introduce/highlight key vocabulary before lesson ● Teacher models reading aloud daily ● Provide peer tutoring ● Utilize translation supports including bilingual dictionary, translation device, assistive technology, and peers

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Accelerating Students	● Create an enhanced set of introductory activities (e.g. advance organizers, concept maps, concept puzzles) ● Provide options, alternatives and choices to differentiate and broaden the curriculum ● Organize and offer flexible small group learning activities ● Provide whole group enrichment explorations ● Teach cognitive and methodological skills ● Use center, stations, or contracts ● Organize integrated problem-solving simulations ● Propose interest-based extension activities ● Expose students to beyond level texts.

Prepared by Julie Lang, MA

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