Grade 8
Trimester 3
Unit 5 The History of Life on Earth
Unit 6 Evolution
Unit 8 Waves and Information Transfer

New Jersey Student Learning Standards

Established	2016-2017
Revised	2017-2018
Revised	2018-2019
Revised	2019-2020
Revised	2020-2021
Revised	2022-2023
Revised	2023-2024
Revised	2024-2025

Marking Period	Unit Title	Recommended Instructional Days
Trimester 3	Unit 5 The History of Life on Earth Unit 6 Evolution Unit 8 Waves and Information Transfer	**60 Days**

NJSLS - Science: *Title*	NJSLS - Science: *Performance Expectations*	Recommended Activities, Investigations, Interdisciplinary Connections, and/or Student Experiences to Explore NJSLS-S within Unit
MS-LS4: Biological Evolution : Unity and Diversity	**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 **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	**Essential Question/s:** **Unit 5 The History of Life on Earth** 1. What is the geological timescale? 2. What are fossils and how are they created? 3. How can rock strata be used to determine the relative age of a fossil? 4. How can rocks and fossil records be analyzed to divide earth's history into the geologic time scale? 5. How do patterns in the fossil record indicate how living things have changed throughout history? 6. How can comparative anatomy and embryology be indicators of biological evolution? **Unit 6 Evolution** 7. How does DNA replication affect genetic variation? 8. How does genetic variation among organisms in a species affect survival and reproduction? 9. How does genetic variation among organisms in a species affect survival and reproduction? 10. Why are some genetic mutations harmful and some

	not evident in the fully formed anatomy.	helpful? 11. What is evolution and what factors influence change over time? 12. What effect does human activity have on the endangerment and extinction of species? 13. How can environmental and genetic evidence be used to support natural selection? 14. How can artificial selection and genetic engineering alter evolutionary outcomes?
MS-LS3: Heredity: Inheritance and Variation of Traits	**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.	**<u>Unit 8 Waves and Information Transfer</u>** 15. What are the characteristic properties of waves and how can they be used to transfer energy and information?
MS-LS4: Biological Evolution : Unity and Diversity	**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-LS4-5.** Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. **MS-LS4-6.** Use mathematical	16. How do transverse and longitudinal waves compare? 17. How do mechanical waves carry energy as they move through matter? 18. How is the amplitude of a wave related to the energy in a wave? 19. What type of mathematical relationship exists between wavelength, frequency, and energy? 20. How do light waves carry energy as they move through space? 21. How is light energy transmitted, reflected, refracted, or absorbed? 22. What are the advantages of using digitized signals (electromagnetic waves) for communication over analog signals?

Waves and Their Applications in Technologies for Information Transfer	representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. **MS-PS4-1.** Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. **MS-PS4-2.** Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. **MS-PS4-3.** Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	23. Why are electromagnetic waves a more reliable method for transmitting information? 24. How does digital communication of information affect society? **<u>Activity Description:</u>** ❖ Lesson Phenomenon ❖ Unit Opener: Can you Explain it? ❖ "Take it Further" activities <u>Unit 5 The History of Life on Earth</u> ❖ Hands On Lab: Model Fossil Formation ❖ Hands On Lab: Lining Up History: Model the Fossil Record ❖ Hands On Lab: Make Inferences from Evidence ❖ Virtual Lab: Similarities in Animals <u>Unit 6 Evolution</u> ❖ Hands on Lab: Model Protein Folding ❖ Hands on Lab: Model Natural Selection in a Population ❖ Hands on Lab: Analyze Selected Traits in Vegetables ❖ You Solve It: Is Antibiotic Use Related to Antibiotic Resistance in E. coli? ❖ You Solve It: How Can You Engineer Fluorescent Algae? ❖ Virtual Lab: Natural Selection <u>Unit 8 Waves and Information Transfer</u>

FOUNDATION Disciplinary: *Core Idea*	FOUNDATION Disciplinary: *Statement*	
LS4.A: Evidence of Common Ancestry and Diversity	The collection of fossils and their placement in chronological order (e.g., through the location of the sedimentary layers in which they are found or through radioactive dating) is known as the fossil record. It documents the existence, diversity, extinction, and chang of many life forms throughout the history of life on Earth.(MS-LS4-1) Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record, enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent. (MS-LS4-2) Comparison of the embryological development of different species also reveals	❖ Hands On Lab: Model Two Types of Waves ❖ Hands On Lab: Investigate Waves ❖ Hands On Lab: Generate Mechanical Waves ❖ Hands on Lab: Light Up A Wave ❖ Hands on Lab: Encode a Message ❖ Virtual Lab: What Are Waves and How Do They Behave? ❖ You Solve It: How Can We Harvest Energy from Ocean Wave? ❖ You Solve It: How Can You Compare Digital and Analog Communication Signals? **Lab and engineering activities will incorporate these skills:** ● Planning and Organization ● Critical Thinking ● Communication in a group ● Decision Making ● Reflection on activity and participation **Spotlight on scientists and their accomplishments** Examples: Ben Barres - Neurobiologist Dr. Margaret S. Collins - Entomologist Nicholas Steno - Anatomist and Geologist Tracy Heath - Computational Evolutionary Biologist Dr. Nancy Knowlton - Marine Biologist Dr. Lydia Villa-Komaroff - Molecular Biologist

LS4. B: Natural Selection **LS4.C: Adaptation**	similarities that show relationships not evident in the fully-formed anatomy. 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) 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	James West - Research Scientist Dr. Lei Zuo - Mechanical Engineer **Human Impacts on Earth** *Discuss the impact of climate change on organisms in different environments *Demonstrate how thermal energy changes water currents and creates conditions for superstorms which carry more energy that impacts the environment. (Electromagnetic Waves - UV rays) **Interdisciplinary Connection: Content: (NJSLS#)** **Connections to Mathematics:** ● Reason abstractly and quantitatively. **(MP.2)** ● Model with mathematics (**MP4)** ● Reason About And Solve One-Variable Equations And Inequalities. (**6.EE.B)** ● Analyze Proportional Relationships And Use Them To Solve Real-World And Mathematical Problems. **(7.RP.A)** ● Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (**6.RP.A.1)** ● Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about

LS3.A: Inheritance of Traits	less common. Thus, the distribution of traits in a population changes. (MS-LS4-6) (MS-LS3-1) Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited. (MS-LS3-2) 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 traits 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	tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. (**6.RP.A.3)** ● Recognize and represent proportional relationships between quantities. (**7.RP.A.2)** ● Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. (**7.G.B.4)** ● Interpret the equation y=mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. (**8.F.A.3)** **<u>Connections to Language Arts:</u>** ● Cite specific textual evidence to support analysis of science and technical texts. (**RST.6–8.1)** ● 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). (**RST.6–8.7)** ● Draw evidence from informational texts to support analysis, reflection and research. (**WHST.6-8.9)** ● Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly**. (SL.8)**

	from genetic differences that result from the subset of chromosomes (and therefore genes) inherited. (MS-LS3-2)	• Write informative/explanatory tests to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (**WHST.6-8.2)** • Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. (**SL.8.5)** • Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions**. (RST.6–8.2)** • Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (**RST.6–8.9)**
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)	
PS4.A Wave Properties	A simple wave has a repeating	

PS4.B: Electromagnetic Radiation	pattern with a specific wavelength, frequency, and amplitude. (MS-PS4-1) A sound wave needs a medium through which it is transmitted. (MS-PS4-2) When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and frequency (color) of the light. (MS-PS4-2) The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends, (MS-PS4-2) A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media. (MS-PS4-2)	

PS4.C: Information Technologies and Instrumentation	However, because light can travel through space, it cannot be a matter wave, like sound or water waves. (MS-PS4-2) Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information.	
FOUNDATION **Science and Engineering Practices:** ***Core Idea***	**FOUNDATION** **Science and Engineering Practices:** ***Statement***	
Developing and Using Models	Modeling in 6–8 builds on K–5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena design systems.	
Analyzing and Interpreting Data	Analyzing data in 6–8 builds on K–5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.	

Constructing Explanations and Designing Solutions	Constructing explanations and Designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.	
Engaging in Argument from Evidence	Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed worlds.	
Using Mathematics and Computational Thinking	Mathematical and computational thinking at the 6-8 builds on K-5 and progresses to identifying patterns in large data sets and using mathematical concepts to support explanations and arguments.	

Obtaining, Evaluating, and Communicating Information	Obtaining, evaluating, and communicating information in 6–8 builds on K–5 experiences and progresses to evaluating the merit and validity of ideas and methods.	
FOUNDATION **Crosscutting Concepts:** ***Core Idea***	**FOUNDATION** **Crosscutting Concepts:** ***Statement***	
Patterns	Patterns can be used to identify cause and effect relationships. (MS-LS4-2) Graphs, charts, and images can be used to identify patterns in data. (MS-LS4-1), (MS-LS4-3)	
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)	
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-LS1-2) (MS-LS3-1)	
Social and Emotional Learning: ***Competencies***	**Social and Emotional Learning:** ***Sub-Competencies***	
Responsible Decision-Making Relationship Skills Self-Management Social Awareness	● Develop, implement, and model effective problem-solving and critical thinking skills ● Utilize positive communication and social skills to interact effectively with others ● Recognize the skills needed to establish and and achieve personal and educational goals ● Demonstrate an understanding of the need	

Social Awareness	for mutual respect when viewpoints differ. ● Demonstrate an awareness of the expectations for social interactions in a variety of ways. ● Recognize the importance of self-confidence in handling daily tasks and challenges	
Assessments (Formative) ***To show evidence of meeting the standard/s, students will successfully engage within:***		**Assessments (Summative)** ***To show evidence of meeting the standard/s, students will successfully complete:***
Formative Assessments: ● Diagnostic tests used to modify teaching and learning activities to improve student attainment		**Benchmarks:** ● District Assessment **Summative Assessments:** ● End of unit/chapter tests/lesson quizzes

Differentiated Student Access to Content: **Teaching and Learning *Resources/Materials***			
Core Resources	**Alternate Core Resources** ***IEP/504/At-Risk/ESL***	**ELL Core Resources**	**Gifted & Talented Core Resources**
● **Interactive Worktext** ● **Equipment Kits**	● Multilingual Glossary ● Online Science Tools	● Multilingual Glossary ● Online Science Tools	● Online Simulations ● Virtual Labs

• **Online Simulations** • **Lab Safety Handbook**	(Scientific Calculator, Graphing)	(Scientific Calculator, Graphing)	• Webquests • Video-Based Projects • Take It Further • You Solve It ! • Unit Performance Tasks • Unit Projects • Online Science Tools (Scientific Calculator, Graphing)

Supplemental Resources

Technology: 8.1.8.A.1, 8.1.8.A. 2, 8.1.8.A.3, 8.1.8.A. 4, 8.1.8.A. 5

Other: Career Education

- CRP4 Communicate clearly and effectively and with reason.
- CRP6 Demonstrate creativity and innovation
- CRP7 Employ valid and reliable research strategies
- CRP11 Use technology to enhance productivity

Differentiated Student Access to Content:
Recommended Strategies & Techniques

Core Resources	**Alternate Core Resources** ***IEP/504/At-Risk/ESL***	**ELL Core Resources**	**Gifted & Talented Core Resources**

• **Large group instruction** • **Small group instruction** • **Think Pair Share** • **Peer editing** • **Cooperative group work** • **Multimedia presentations** • **Choice Boards/Learning Menus** • **Manipulatives**	• Utilize a multi-sensory (VAKT) approach during instruction, provide alternate presentations of skills by varying the method (repetition, simple explanations, additional examples, modeling, etc.), modify test content and/or format, allow students to retake test for additional credit, provide additional times and preferential seating as needed, review, restate and repeat directions, provide study guides, and/or break assignments into segments of shorter tasks.	• Extend time requirements, preferred seating, positive reinforcement, check often for understanding/review, oral/visual directions/prompts when necessary, supplemental materials including use of an online bilingual dictionary, and modified assessment and/or rubric.	• Create an enhanced set of introductory activities, integrate active teaching/learning opportunities, incorporate authentic components, propose interest-based extension activities, and connect student to related talent development opportunities.

NJSLS CAREER READINESS, LIFE LITERACIES & KEY SKILLS	**Disciplinary Concept: 1.Career Awareness and Planning, 2.Creativity and Innovation, 3.Critical Thinking and Problem Solving, 4.Global and Cultural Awareness 5. Digital Citizenship 6. Information and Media Literacy 7. Technology Literacy**	
	Core Ideas:	**1. There are a variety of resources available to help navigate the career planning process.**

		2. Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking. 3. Multiple solutions often exist to solve a problem. 4. Awareness of and appreciation for cultural differences is critical to avoid barriers to productive and positive interaction. 5. Detailed examples exist to illustrate crediting others when incorporating their digital artifacts in one's own work. 6. Digital tools make it possible to analyze and interpret data, including text, images, and sound. These tools allow for broad concepts and data to be more effectively communicated. 7. Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others
	Performance Expectation/s:	1. 9.2.8.CAP.12: Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential. 2. 9.4.8.CI.1: Assess data gathered on varying perspectives on causes of climate change (e.g., cross cultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4). 3. 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). 4. 9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal. 5. 9.4.8.DC.1: Analyze the resource citations in online materials for proper use. 5. 9.4.8.DC.2: Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).

		6. **9.4.8.IML.4: Ask insightful questions to organize different types of data and create meaningful visualizations.** 7. **9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4).** 7. **9.4.8.TL.2: Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4).**
	Career Readiness, Life Literacies, & Key Skills Practices	
	• **Act as a responsible and contributing community member and employee.** • **Demonstrate creativity and innovation.** • **Utilize critical thinking to make sense of problems and persevere in solving them.** • **Consider the environmental, social and economic impacts of decisions.** • **Use technology to enhance productivity, increase collaboration and communicate effectively.** • **Work productively in teams while using cultural/global competence.**	

New Jersey Legislative Statutes and Administrative Code (place an "X" before each law/statute if/when present within the curriculum map)									
X	Amistad Law: *N.J.S.A. 18A 52:16A-88*		Holocaust Law: *N.J.S.A. 18A:35-28*	X	LGBT and Disabilities Law: *N.J.S.A. 18A:35-4.35*	X	Diversity & Inclusion: *N.J.S.A. 18A:35-4.36a*	X	Standards in Action: *Climate Change*