

Bedminster Township School District
Subject Area: Life Science NJLS-S
Grade Level: MS Grade 5

Revised

Unit #: 1

Introduction to Science & Technology

Timeframe: September - November

OVERVIEW: After completing this unit, students should be able to use the Scientific Method to design scientific experiments which have one independent variable, one dependent variable, and a number of constants. Students should also be able to measure using the metric system and design appropriate data collection forms/tables.

BIG IDEAS:

Unit 1: Scientists use careful observations and clear reasoning to understand processes and patterns in nature.

Unit 2: Scientists use tools to collect, organize, and analyze data while conducting investigations.

Unit 3: Humans design and use systems, products, and processes to meet a variety of needs.

ESSENTIAL QUESTIONS:

Unit 1:

- 1. What are the characteristics of science?*
- 2. How do scientists discover things?*
- 3. What are the types of Scientific Knowledge?*
- 4. How does science affect our lives?*

Unit 2:

- 1. How do scientists show the results of investigations?*
- 2. What are the tools and units used in scientific investigations?*
- 3. How do scientists use models and simulations?*

Unit 3:

- 1. What is the design process?*
- 2. How can we evaluate technology?*
- 3. What are technological systems?*
- 4. How do engineers use materials and tools?*
- 5. How is engineering related to life science?*
- 6. How are engineering and society related?*

SEL Goals for this unit:

- **Goal 1 - Become comfortable and confident with your classmates and teacher**

- Goal 2 - Feel confident in your abilities to solve problems and collect data in any setting; especially the classroom

TARGET STANDARDS: (NGSS aka NJSLS-S)

STANDARD	NGSS / NJSLS-S	Student Learning Objectives
3-5-ETS1-1.	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	Students use given scientific information and information about a situation or phenomenon to define a simple design problem that includes responding to a need or want.
3-5-ETS1-2.	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	The problem students define is one that can be solved with the development of a new or improved object, tool, process, or system.
3-5-ETS1-3.	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	Design and complete a scientific experiment.

Unit Name and Resources	Additional NJSLS Addressed (Cross-Curricular: 21st Century Skills, Technology, Financial Literacy, and Career Awareness Standards)	Outcomes, Assessments, and Modifications
<p>Introduction to Science and Technology</p> <p>Resources:</p> <ol style="list-style-type: none"> 1. Science Fusion Textbook: Introduction to Science and 	<p>NJSLS-CS-8.1.5.1</p> <p>Laptop used daily to organize data and to share information / activity results (as needed) Google Classroom utilized as well as Google</p>	<p>Formative Assessment:</p> <p>Pre-test (on paper, multiple choice)</p> <p>Scientific Method Quiz prior to project</p> <p>Major Project / Summative Assessment for part 1:</p> <p>Students created their own scientific experiment to prove mastery of the</p>

<p>Technology</p> <p>2. Teacher-created ActivInspire presentations (for use with Promethian Activboard/Smartboard/etc.)</p> <p>3. Google Classroom and Google Docs / Slides as created by teacher and students</p>	<p>Docs/Sheets/Slides/Forms depending on task at hand. Research also conducted via internet resources.</p> <p>NJSLS-CLKS-9.1.5.PB.1 Examined the cost of lab supplies for each major lab activity and the process used to obtain lab supplies (especially during measurement unit)</p> <p>NJSLS-CLKS-9.2.5.CA P.1 - Taught the meaning of a career in: Medical Science / Pharmacology (essentially a scientific problem solver!)</p> <p>9.4</p>	<p>Scientific Method of Inquiry (followed rubric)</p> <p>Benchmark Assessment: Written assessment on metric units and their application</p> <p>Summative Assessment: Measurement unit: Students completed a Performance Assessment regarding measurement of mass, volume, and density of various objects / substances</p> <p>Assessment modifications: Students were given a formula sheet which included helpful formulas such as how to calculate volume of rectangular solids, how to determine mass, etc.</p> <p><u>Modifications for Select Groups</u></p> <p>IEP/504/At-Risk/Danger of Failing:</p> <ul style="list-style-type: none"> - Pass/Fail option on some assignments - May waive "enrichment" assignments <p>ELL modifications: Utilize native language terms that relate to a current topic as being studied in this course (such as measurement).</p> <p>G + T Students: In-depth research assignments or extension activities</p> <ul style="list-style-type: none"> ● Measurement of school facility such as the gymnasium for square footage and volume ● Discuss climate impact of heating and cooling such spaces <p>Visual observation: Demonstrated proficiency in measurement while conducting lab</p>
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		activity (Measurement: Mass, Volume, and Density Lab)
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Cross-Curricular Standards Addressed

STANDARD	NGSS / NJSLS-S	Student Learning Objectives
NJSLSA.R1	Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.	Students use a variety of texts to synthesize arguments and claims and defend them in an informal debate-like conversation or in essay form
NJSLSA.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.	Utilize a multitude of sources to present information on a topic; choose sources carefully to encourage only unbiased, reliable information is presented
NJSLSA.R8	Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence	C-E-R practice and mastery
NJSLSA.R10	Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.	Utilize non-fiction (informational) texts to augment comprehension and understanding of topics in Science class

Pacing Breakdown:

Portion of Unit / Timeframe	Standards Addressed:	Notes:
Part 1: Scientific Attitudes and the Scientific Method Sept / October (6 weeks)	3-5-ETS1-1. 3-5-ETS1-2. 3-5-ETS1-3. 8.1 9.1	Major project requires 3 weeks of class time (includes design, experimentation, conclusion, and presentation of findings).

<p>Part 2: Measurement and Laboratory Skills October / November (6 weeks)</p>	<p>3-5-ETS1-1. 3-5-ETS1-2. 3-5-ETS1-3. 8.1 9.1 9.2</p>	<p>Summative (final) assessment for this unit is completed by performing the laboratory investigation, the "Super Bouncy Ball" lab. Students are graded on their application of all skills and standards. Grade is calculated as 50% laboratory performance (subjective rating from teacher observation) and 50% laboratory documentation (lab reporting).</p>
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<p>Subject Area: Life Science NJSL-S Grade Level: MS</p>	<p>Bedminster Township School</p>
<p>Unit: Sound and Light</p>	
<p>PACING: December - mid March</p>	
<p>OVERVIEW: After completing this unit, students should be able to understand how waves transfer energy from place to place, and that waves take many forms. Sound, Light, and Electromagnetic energy are all waves which transfer energy but are vastly different in nature. Students should understand that all waves have properties which are measurable and distinguishable. Understanding these waves allows them to be used in a multitude of ways, some of which are extremely important to humans.</p>	
<p>BIG IDEAS: <i>Unit 1: Waves transfer energy and interact in predictable ways.</i> <i>Unit 2: Sound waves transfer energy through vibrations.</i> <i>Unit 3: Visible light is the small party of the electromagnetic spectrum that is essential for human vision.</i></p>	
<p>ESSENTIAL QUESTIONS: <i>Unit 1:</i> 1. <i>What are waves?</i> 2. <i>How can we describe a wave?</i></p>	

Unit 2:

1. *What is sound?*
2. *How do sound waves travel and interact?*
3. *How does sound technology work?*

Unit 3:

1. *What is the relationship between various EM waves?*
2. *How does light interact with matter?*
3. *How do mirrors and lenses work?*
4. *How do people see?*
5. *How can light be used?*

SEL Goals for this unit:

- **Goal 1:** Use social-awareness and interpersonal skills to establish and maintain positive relationships.
- **Goal 2:** Work with classmates in conjunction with science supplies / tools to develop understanding of scientific principles and concepts

TARGET STANDARDS:

STANDARD	NGSS / SJSLS-S	Student Learning Objectives
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.	Emphasis is on describing waves with both qualitative and quantitative thinking. Assessment does not include electromagnetic waves and is limited to standard repeating waves.
MS-PS4-2.	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions. Assessment is limited to qualitative applications pertaining to light and mechanical waves.
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.	Emphasis is on a basic understanding that waves can be used for communication purposes. Examples could include using fiber optic cable to transmit light pulses, radio wave pulses in wifi devices, and conversion of stored binary patterns to make sound or text on a computer screen. Assessment does not include binary counting. Assessment does not include the

		specific mechanism of any given device.
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Unit Name and Resources	Additional NJSL Addressed (Cross-Curricular: 21st Century Skills, Technology, Financial Literacy, and Career Awareness Standards)	Outcomes, Assessments, and Modifications
<p>Sound and Light</p> <p>Resources:</p> <ol style="list-style-type: none"> 1. Science Fusion Textbook: Sound and Light 2. Teacher-created ActivInspire presentations (for use with Promethian Activboard/Smartboard/etc.) 3. Google Classroom and Google Docs / Slides as created by teacher and students 	<p>NJSLS-CS-8.1.5.1 Laptop used daily to organize data and to share information / activity results (as needed) Google Classroom utilized as well as Google Docs/Sheets/Slides/Forms depending on task at hand. Research also conducted via internet resources.</p> <p>NJSLS-CLKS-9.1.5.PB.1 Examined the cost of lab supplies for each major lab activity and the process used to obtain lab supplies such as microscopes, spectrosopes, telescopes, and lenses</p> <p>NJSLS-CLKS-9.1.5.CA P.1 - Students examined the meaning of careers in: Audiology, Instrumental / Vocal Musician, and Optometry</p>	<p>Formative Assessment: Google Form-based preliminary assessment (Pre-Test) at beginning of unit (prior knowledge check); Checkpoint Quiz given after week 1 of instruction</p> <p>Major Project: Students created their own musical instrument to demonstrate understanding of how sounds are made and how sound quality can be improved</p> <p>Benchmark Assessment: Written assessment: Wave types and uses</p> <p>Summative Assessment: Comprehensive Unit Test</p> <p>Modifications/Accommodations: Students may be permitted to verbally respond to open-ended and short answer questions; multiple choice questions have one less response option (3) than the typical amount (4).</p> <p>IEP/504/At-Risk/Danger of Failing:</p> <ul style="list-style-type: none"> - Pass/Fail option on some assignments - May waive "enrichment" assignments <p>ELL modifications: Utilize native</p>

		<p>language terms that relate to a current topic as being studied in this course (such as sound / hearing / physiology).</p> <p>G + T Students: In-depth research assignments or extension activities</p> <ul style="list-style-type: none"> • Cochlear implants or vision-altering glasses / corneal / retinal surgeries <p>Visual observation: Demonstrated proficiency in identifying types of lenses while conducting lab activity (Concave and Convex lens lab)</p>
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Cross-Curricular Standards Addressed

STANDARD	NGSS / NJSLA-S	Student Learning Objectives
NJLSA.R1	Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.	Students use a variety of texts to synthesize arguments and claims and defend them in an informal debate-like conversation or in essay form
NJLSA.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.	Utilize a multitude of sources to present information on a topic; choose sources carefully to encourage only unbiased, reliable information is presented
NJLSA.R8	Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence	C-E-R practice and mastery
NJLSA.R10	Read and comprehend complex literary and informational texts	Utilize non-fiction (informational) texts to augment comprehension and

	independently and proficiently with scaffolding as needed.	understanding of topics in Science class
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Pacing Breakdown:

<i>Portion of Unit / Timeframe</i>	<i>Standards Addressed:</i>	<i>Notes:</i>
<i>Part 1: Introduction to waves and wave properties December (2 weeks)</i>	MS-PS4-1. 8.1 9.1	<i>Pre-test</i> given prior to start of unit <i>Formative Assessment</i> (Checkpoint Quiz) given after week 1 of instruction
<i>Part 2: Sound and other Mechanical Waves January (4 weeks)</i>	MS-PS4-2. 8.1 9.1 9.2	Final <i>assessment</i> for this portion of the unit is completed by creating a functional musical instrument. A <i>comprehensive rubric</i> is used to assess the students' mastery of the concepts of sound creation and transmittal as well as sound quality / acoustics.
<i>Part 3: Electromagnetic Waves February / March (5 weeks)</i>	MS-PS4-2. MS-PS4-3. 8.1 9.1 9.2	<i>Student research project</i> used to examine the uses of electromagnetic waves and compare analog vs. digital transmission as well as energy levels and safety of specific electromagnetic waves (part of <i>Summative Assessment</i>) <i>Modifications for research project:</i> Students given Checklist/Research guide + research questions that they should examine

Subject Area: Life Science NJSL-S
Grade Level: MS

Bedminster Township
School

Unit: Environmental Science / Ecology & the Environment

PACING: Mid-March- June

OVERVIEW: After completing this unit, students should be able to understand how all things, living and non-living, interact within an ecosystem. The conditions of the abiotic factors, such as availability of water, sunlight, temperature, soil, etc. dictate what living organisms can survive in a location. The balance of the natural system is vital to the ecosystem; upsetting this balance can cause major effects on the ecosystem as a whole.

BIG IDEAS:

Unit 1: Organisms interact with each other and with the nonliving parts of their environment.

Unit 2: Matter and energy together support life within an environment.

Unit 3: Humans depend on natural resources for materials and for energy.

Unit 4: Humans and population growth affect the environment.

ESSENTIAL QUESTIONS:

Unit 1:

- 1. How are different parts of the environment connected?*
- 2. How does energy flow through an ecosystem?*
- 3. What determines a population's size?*
- 4. How do organisms interact?*

Unit 2:

- 1. What are land biomes?*
- 2. What are aquatic ecosystems?*
- 3. How do energy and matter move through ecosystems?*
- 4. How do ecosystems change?*
- 5. How do human activities affect ecosystems?*

Unit 3:

- 1. How can Earth support life?*
- 2. What are Earth's natural resources?*
- 3. How do we use nonrenewable resources?*
- 4. How do humans use renewable resources?*
- 5. Why should natural resources be managed?*

Unit 4:

- 1. What impact can human activities have on water resources?*
- 2. What impact can human activities have on land resources?*
- 3. How do humans impact Earth's atmosphere?*
- 4. How can Earth's resources be used wisely?*

SEL Goals:

- **Goal 1: Demonstrate decision-making skills and responsible behaviors in personal, school, and community contexts.**
- **Goal 2: Develop or foster a caring attitude and feeling of responsibility regarding wildlife and Earth's natural systems (be an Environmental Steward!)**

TARGET STANDARDS:

STANDARD	NGSS / NJSLS-S	Student Learning Objectives
MS-LS2-1.	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem	Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.
MS-LS2-3.	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem	Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system. Assessment does not include the use of chemical reactions to describe the processes.
MS-LS2-4.	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.

Unit Name and Resources	Additional NJSLS Addressed (Cross-Curricular: 21st Century Skills, Technology, Financial Literacy, and Career Awareness Standards)	Outcomes, Assessments, and Modifications

<p>Ecology and the Environment</p> <p>Resources:</p> <ol style="list-style-type: none"> 1. Science Fusion Textbook: Ecology and the Environment 2. Teacher-created ActivInspire presentations (for use with Promethian Activboard/Smartboard/etc.) 3. Google Classroom and Google Docs / Slides as created by teacher and students 	<p>NJSLS-CS-8.1.5.1 Laptop used daily to organize data and to share information / activity results (as needed) Google Classroom utilized as well as Google Docs/Sheets/Slides/Forms depending on task at hand. Research also conducted via internet resources.</p> <p>NJSLS-CLKS-9.1.5.PB.1 Examined the cost of caring for animals: focused on our classroom pet, Turbo the Eastern Painted Turtle; Examined the cost and feasibility of eliminating invasive species from an area (plant species as well as animal species)</p> <p>NJSLS-CLKS-9.1.5.CAP.1 - Students examined the meaning of a career in: Zoology, Environmental Consulting / Wildlife Biology (guest speaker)</p>	<p>Formative Assessment: Google Form-based assessment after beginning 2 lessons of unit</p> <p>Major Project: Student groups investigated one particular invasive species that is plaguing North America and/or New Jersey and explained what native species it has affected and also how to possibly control or eliminate such species</p> <p>Benchmark Assessment: Written assessment: Parts of an Ecosystem</p> <p>Summative Assessment: Unit Test (15 multiple choice, 5 matching, 5 short-answer, 2 extended-response questions)</p> <p>Modifications/Accommodations: Students may be permitted to verbally respond to open-ended and short answer questions; multiple choice questions have one less response option (3) than the typical amount (4).</p> <p>IEP/504/At-Risk/Danger of Failing:</p> <ul style="list-style-type: none"> - Pass/Fail option on some assignments - May waive "enrichment" assignments <p>ELL modifications: Utilize native language terms that relate to a current topic as</p>
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		<p>being studied in this course (such as Ecosystem vocabulary or Food Web vocabulary).</p> <p>G + T Students: In-depth research assignments or extension activities</p> <ul style="list-style-type: none"> ● Effect of climate change on populations of specific animals or plants ● Plant growth study: isolate soil temperature as an independent variable and experiment to determine if warmer soil temperatures mean more plant growth <p>Visual observation / Field Proficiency Study: Identified invasive species of plant and animal on the school campus and surrounding areas</p> <p>Modifications for Field Study: Students can choose to ID species in the wild or from samples (leaf and branch) brought into the classroom</p>
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Cross-Curricular Standards Addressed

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	relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.	conversation or in essay form
NJSLSA.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.	Utilize a multitude of sources to present information on a topic; choose sources carefully to encourage only unbiased, reliable information is presented
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NJSLSA.R10	Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.	Utilize non-fiction (informational) texts to augment comprehension and understanding of topics in Science class

Pacing Breakdown:

<i>Portion of Unit / Timeframe</i>	<i>Standards Addressed:</i>	<i>Notes:</i>
<i>Part 1: Ecosystems/Biotic and Abiotic Factors, Cycles of Matter March/April (6 weeks)</i>	MS-LS2-1. MS-LS2-3. 8.1 9.1	Pre-test given prior to start of unit Formative Assessment (Checkpoint Quiz) given after week 2 of instruction
<i>Part 2: Populations and Communities of Organisms May-June (6 weeks)</i>	MS-LS2-4.. 8.1 9.1 9.2	Final assessment for this portion of the unit is completed by completing a Post-Test as well as a Field Study on Identifying native/invasive plants and animals. A comprehensive rubric is used to assess the students' mastery of the effects of invasive species on the environment (for use in assessing the research project detailed below)

		Student research project used to examine the effects of invasive plant or animal species on the populations of the native ecosystem (part of Summative Assessment)
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