Bedminster Township School District
Subject Area: General Science
Grade Level: MS Grade 5

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 that have one independent variable, one dependent variable, and several 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**

Introduction to Science and Technology **Resources:** 1. Science Fusion Textbook: Introduction to Science and Technology 2. Teacher-created ActivInspire presentations (for use with Interactive Activboard/Smartboard/etc.) 3. Google Classroom and Google Docs / Slides as created by teacher and students 4. Science Writing Infusion 5. *IXL Science* 6. *BrainPOP Science* 7. *Various YouTube videos as selected and previewed by the teacher* 8. *Newsela* 9. PhET Interactive Simulations	**NJSLS-CS-8.1.5.1** Laptop used daily to organize data and share information / activity results (as needed) Google Classroom utilized, Google Docs / Sheets / Slides / Forms depending on task. Research conducted via internet resources. - Digital form for "Big Experiment" project utilized - Scientific Attitudes Research assignment on Google Docs - Quizlet utilized for studying and reviewing terms - Student-created study guides made digitally via Google Docs - Digital versions of teacher-made presentations available via Google Classroom - Warm-up assignments compiled on one Google Doc per student **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)	***Formative Assessment:*** Pre-test (on paper, multiple choice) Scientific Method Quiz prior to project Modifications: • General Education (GenEd) Standard/Full version of test • IEP / 504 - Limited multiple choice selections, choice of long-response essay, word bank for fill-ins • G&T - Extension questions, additional writing tasks, greater depth • At-Risk - Limit scope or number of higher-order thinking questions • MLL - Translate function available on Chromebook ***Major Project / Summative Assessment for part 1:*** Students created their own scientific experiment to prove mastery of the Scientific Method of Inquiry (followed rubric) Modifications: • IEP/504/At-Risk/MLL students given a fill-in-the-blank experiment or offered verbal response with time to construct response piece-by-piece ***Benchmark Assessment:*** Written assessment on metric units and their application Modifications: • General Education (GenEd) Standard/Full version of test • IEP / 504 - Limited multiple choice selections, choice of long-response essay, word bank for fill-ins • G&T - Extension questions, additional writing tasks, greater depth

		- Pass/Fail option on some assignments - May waive "enrichment" assignments such as the "bonus measurement-based scientific investigation" project ***ELL/MLL modifications:*** Utilize native language terms that relate to a current topic as being studied in this course (such as measurement). English-language terms are posted on Quizlet, on printed or digital note sheets, and on teacher-created presentations which are posted for students on Google Classroom. Students may use Google Translate to find native-language terms if they can not produce them based on context, pictures, or demonstrations from class. **G + T Students:** In-depth research assignments or extension activities • Measurement of school facility such as the gymnasium for square footage and volume • Discuss climate impact of heating and cooling such spaces ***Visual observation:*** Demonstrated proficiency in measurement while conducting lab activity (Measurement: Mass, Volume, and Density Lab)

Standards Addressed

Earth and Space Science (ESS)

1. **MS-ESS1: Earth's Place in the Universe**

3. **8.1.8.B.1**
   Synthesize and publish information about a local or global issue or event (e.g., using a blog, podcast, or video) with peers and experts, using digital tools.
4. **8.1.8.C.1**
   Collaborate to develop and publish work that provides information or solutions to a problem, using digital tools and resources.
5. **8.1.8.D.1**
   Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
6. **8.1.8.D.2**
   Demonstrate the application of appropriate citations to digital content.
7. **8.1.8.D.3**
   Demonstrate an understanding of fair use and Creative Commons to intellectual property.
8. **8.1.8.E.1**
   Gather and analyze findings using data collection technology to produce a possible solution for a content-related problem or issue.
9. **8.1.8.F.1** Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.
10. **8.1.8.IC.1**: Analyze the impact of computing technologies on culture and society.
11. **8.1.8.AP.2**: Create programs that use algorithms to solve a given problem.
12. **8.1.8.DA.1**: Explain the importance of data collection and analysis in the real world.
13. **8.1.8.DA.2**: Organize and present data in a way that can be interpreted by others.
14. **8.1.8.NI.1**: Identify potential cybersecurity threats and ways to protect against them.

8.2 Design Thinking:

- **8.2.8.ED.1**: Define a design problem and identify criteria and constraints.
- **8.2.8.ED.2**: Develop and test a model of a proposed solution.
- **8.2.8.ETW.1**: Compare how different technologies impact the environment.
- **8.2.8.EC.1**: Explain how ethics influence design and engineering decisions.

NJ Student Learning Standards for mathematics:

8.EE.B.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. Calculating human population growth rate and graphing population data.

Financial Literacy: NJSLS Career Readiness, Life Literacies, and Key Skills

9.1 Personal Financial Literacy:

- **9.1.8.PB.1**: Relate the concept of financial choices to personal financial well-being.

- Using strategies for managing stress and overcoming challenges.

3. Social Awareness

- Showing understanding and empathy for others.
- Understanding social norms for behavior.
- Recognizing family, school, and community resources and supports.
- Respecting others and appreciating diversity in terms of cultural and social differences.
- Demonstrating consideration for and respecting others' perspectives.

4. Relationship Skills

- Establishing and maintaining healthy and rewarding relationships with diverse individuals and groups.
- Communicating, listening actively, and cooperating with others.
- Resisting inappropriate social pressure, negotiating conflict constructively, and seeking and offering help when needed.
- Developing positive peer relationships and resolving interpersonal conflicts constructively.

5. Responsible Decision-Making

- Making constructive and respectful choices about personal behavior and social interactions based on ethical standards, safety concerns, and social norms.
- Evaluating the consequences of one's actions and considering the well-being of oneself and others.
- Developing problem-solving skills and critical thinking.
- Reflecting on experiences and learning from them.

LGBTQ Awareness Infusion:

Discuss scientific research as non-discriminate toward anyone's gender, sexual preference, etc. Always let the data tell the story- all viewpoints are accepted!

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	**Major project** requires 3 weeks of class time (includes design, experimentation, conclusion, and presentation of findings).

ESSENTIAL QUESTIONS:

Unit 1:

1. *What are waves?*
2. *How can we describe a wave?*

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 an 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 how 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 about light and mechanical waves. Utilize our classroom aquarium setup to model refraction, diffraction, and diffusion of waves throughout the medium (water)..

6. *Various YouTube videos as selected and previewed by the teacher* 7. *Newsela* 8. PhET Interactive Simulations	project - Quizlet utilized for studying and reviewing terms - Digital versions of teacher-made presentations available via Google Classroom - Student-created study guides made digitally via Google Docs - All warm-up assignments compiled on one central Google Doc per student **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, spectroscopes, telescopes, and lenses **NJSLS-CLKS-9.1.5.CAP.1** - Students examined the meaning of careers in: Audiology, Instrumental / Vocal Musician, and Optometry	Modifications: • General Education (GenEd) Standard/Full project requirements • IEP / 504 - Simplified project requirements / frequent project check-ins to document progress • G&T - Greater depth / additional components to project • At-Risk - Simplified project requirements / frequent project check-ins to document progress • MLL - Translate function available on Chromebook, word bank of cognates / similar native language words provided / project directions ***Benchmark Assessment:*** Written assessment: Wave types and uses Modifications: • General Education (GenEd) Standard/Full version of the test • IEP / 504 - Limited multiple choice selections, choice of long-response essay, word bank for fill-ins • G&T - Extension questions, additional writing tasks, greater depth • At-Risk - Limit scope or number of higher-order thinking questions • MLL - Translate function available on Chromebook ***Summative Assessment:*** Comprehensive Unit Test Modifications: • General Education (GenEd) Standard/Full version of the test • IEP / 504 - Limited multiple choice selections, choice of long-response essay, word bank for fill-ins / • G&T - Extension questions, additional writing tasks, greater depth • At-Risk - Limit scope or number of higher-order thinking questions,

		produce them based on context, pictures, or demonstrations from class. **G + T Students:** In-depth research assignments or extension activities • Cochlear implants or vision-altering glasses / corneal/retinal surgeries ***Visual observation:*** Demonstrated proficiency in identifying types of lenses while conducting lab activity (Concave and Convex lens lab)

Standards Addressed

5-PS1: Matter and Its Interactions

- **5-PS1-1:** Develop a model to describe that matter is made of particles too small to be seen.
- **5-PS1-2:** Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.
- **5-PS1-3:** Make observations and measurements to identify materials based on their properties.
- **5-PS1-4:** Investigate to determine whether the mixing of two or more substances results in new substances.

Earth and Space Science (ESS)

Earth and Space Science

1. **5-ESS1: Earth's Place in the Universe**
    - **5-ESS1-1**: Support an argument that the apparent brightness of the sun and stars is due to their relative distances from Earth.
2. **5-ESS3: Earth and Human Activity**

- **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.
- **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).

RST.6-8.8: Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

Technology: NJSLS Computer Science and Design Thinking

8.1 Computer Science and Design Thinking Standards (Grades 6-8)

1. **8.1.8.A.1**
   Demonstrate knowledge of a real-world problem using digital tools.
2. **8.1.8.A.2**
   Create a document (e.g., newsletter, reports, flyers) that includes text, graphics, and other digital elements using word processing software.
3. **8.1.8.B.1**
   Synthesize and publish information about a local or global issue or event (e.g., using a blog, podcast, or video) with peers and experts, using digital tools.
4. **8.1.8.C.1**
   Collaborate to develop and publish work that provides information or solutions to a problem, using digital tools and resources.
5. **8.1.8.D.1**
   Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
6. **8.1.8.D.2**
   Demonstrate the application of appropriate citations to digital content.
7. **8.1.8.D.3**
   Demonstrate an understanding of fair use and Creative Commons to intellectual property.
8. **8.1.8.E.1**
   Gather and analyze findings using data collection technology to produce a possible solution for a content-related problem or issue.
9. **8.1.8.F.1** Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.
10. **8.1.8.IC.1**: Analyze the impact of computing technologies on culture and society.
11. **8.1.8.AP.2**: Create programs that use algorithms to solve a given problem.
12. **8.1.8.DA.1**: Explain the importance of data collection and analysis in the real world.
13. **8.1.8.DA.2**: Organize and present data in a way that can be interpreted by others.

- **9.4.8.GCA.2**: Demonstrate openness to diverse ideas and perspectives through active discussion to achieve a group goal.

Social and Emotional Competencies - activities/topics

1. Self-Awareness

- Recognizing one's emotions and thoughts and their influence on behavior.
- Accurately assessing one's strengths and limitations, with a well-grounded sense of confidence and optimism.
- Identifying and labeling one's emotions.
- Recognizing personal traits, interests, and values.
- A sense of self-efficacy and optimism.

2. Self-Management

- Regulating one's emotions, thoughts, and behaviors in different situations.
- Managing stress, controlling impulses, and motivating oneself.
- Setting and working toward personal and academic goals.
- Demonstrating self-discipline and organizational skills.
- Using strategies for managing stress and overcoming challenges.

3. Social Awareness

- Showing understanding and empathy for others.
- Understanding social norms for behavior.
- Recognizing family, school, and community resources and supports.
- Respecting others and appreciating diversity in terms of cultural and social differences.
- Demonstrating consideration for and respecting others' perspectives.

4. Relationship Skills

- Establishing and maintaining healthy and rewarding relationships with diverse individuals and groups.
- Communicating, listening actively, and cooperating with others.
- Resisting inappropriate social pressure, negotiating conflict constructively, and seeking and offering help when needed.
- Developing positive peer relationships and resolving interpersonal conflicts constructively.

5. Responsible Decision-Making

Bedminster Township School
Subject Area: Environmental Science
Grade Level: MS Grade 5

Unit #3:
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?*

	affect populations.	ecosystems. Collect data from our in-class aquarium to provide evidence that changes to the environment affect the living organism(s) present. This may include temperature, pH, and light conditions.

<u>Simulations</u>	**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) **NJSLS-CLKS-9.1.5.CAP.1 -** Students examined the meaning of a career in Zoology, Environmental Consulting / Wildlife Biology (guest speaker)	project requirements • IEP / 504 - Simplified project requirements / frequent project check-ins to document progress • G&T - Greater depth / additional components to project • At-Risk - Simplified project requirements / frequent project check-ins to document progress • MLL - Translate function available on Chromebook word bank of cognates / similar native language words provided / project directions ***Benchmark Assessment:*** Written assessment: Parts of an Ecosystem <u>Modifications:</u> • General Education (GenEd) Standard/Full version of the test • IEP / 504 - Limited multiple choice selections, choice of long-response essay, word bank for fill-ins • G&T - Extension questions, additional writing tasks, greater depth • At-Risk - Limit scope or number of higher-order thinking questions • MLL - Translate function available on Chromebook ***Summative***

		on some assignments - May waive "enrichment" assignments such as the "aquarium monitoring" bonus assignment (beyond the basic temperature and water clarity that all students participate in) ***At-Risk/Danger of Failing:*** - Pass/Fail option on some assignments - May waive "enrichment" assignments such as the "aquarium monitoring" bonus assignment (beyond the basic temperature and water clarity that all students participate in) ***ELL/MLL modifications:*** Utilize native language terms that relate to a current topic as being studied in this course (such as Ecosystem vocabulary or Food Web vocabulary). English-language terms are posted on Quizlet, on printed or digital note sheets, and on teacher-created presentations which are posted for students on Google Classroom. Students may use

Cross-cutting Concepts and Standards Addressed

5-PS1: Matter and Its Interactions

- **5-PS1-3:** Make observations and measurements to identify materials based on their properties.

Physical Science

5-PS3: Energy

- **5-PS3-1:** Use models to describe that energy in animals' food was once energy from the sun.

Earth and Space Science (ESS)

1. **5-ESS3: Earth and Human Activity**
    - **5-ESS3-1:** Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Life Science

1. **5-LS1: From Molecules to Organisms: Structures and Processes**
    - **5-LS1-1:** Support an argument that plants get the materials they need for growth chiefly from air and water.
2. **5-LS2: Ecosystems: Interactions, Energy, and Dynamics**
    - **5-LS2-1:** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Earth and Space Science (ESS)

1. **MS-ESS2: Earth's Systems**
    - **MS-ESS2-1**: Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
    - **MS-ESS2-2**: Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
2. **MS-ESS3: Earth and Human Activity**

5. **8.1.8.D.1**
   Understand and model appropriate online behaviors related to cyber safety, cyberbullying, cyber security, and cyber ethics including appropriate use of social media.
6. **8.1.8.D.2**
   Demonstrate the application of appropriate citations to digital content.
7. **8.1.8.D.3**
   Demonstrate an understanding of fair use and Creative Commons to intellectual property.
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14. **8.1.8.NI.1**: Identify potential cybersecurity threats and ways to protect against them.

8.2 Design Thinking:

- **8.2.8.ED.1**: Define a design problem and identify criteria and constraints.
- **8.2.8.ED.2**: Develop and test a model of a proposed solution.
- **8.2.8.ETW.1**: Compare how different technologies impact the environment.
- **8.2.8.EC.1**: Explain how ethics influence design and engineering decisions.

NJSLS for Grades 6-8 (Reading Standards for Science and Technical Subjects - RST)

NJSLS.ELA-Literacy.RST.6-8:

- **RST.6-8.1:** Cite specific textual evidence to support analysis of science and technical texts.
- **RST.6-8.2:** Determine a text's central ideas or conclusions; provide an accurate summary distinct from prior knowledge or opinions.
- **RST.6-8.3:** Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- **RST.6-8.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases used in a specific scientific or technical context.

1. Self-Awareness

- Recognizing one's emotions and thoughts and their influence on behavior.
- Accurately assessing one's strengths and limitations, with a well-grounded sense of confidence and optimism.
- Identifying and labeling one's emotions.
- Recognizing personal traits, interests, and values.
- A sense of self-efficacy and optimism.

2. Self-Management

- Regulating one's emotions, thoughts, and behaviors in different situations.
- Managing stress, controlling impulses, and motivating oneself.
- Setting and working toward personal and academic goals.
- Demonstrating self-discipline and organizational skills.
- Using strategies for managing stress and overcoming challenges.

3. Social Awareness

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- Evaluating the consequences of one's actions and considering the well-being of oneself and others.
- Developing problem-solving skills and critical thinking.