

COURSE TITLE

Science 1

LENGTH

Full Year

DEPARTMENT

STEM Department

SCHOOL

Lincoln School
Washington School

DATE

September 10, 2018

Science 1

I. Introduction/Overview/Philosophy

The best way for students to appreciate the scientific enterprise, learn important scientific concepts, and develop the ability to think well is to actively construct ideas through their own inquiries, investigations, and analyses. Science is an active enterprise, made active by our human capacity to think. Scientific knowledge advances when scientists observe objects and events, think about how they relate to what is known, test their ideas in logical ways, and generate explanations that integrate the new information into the established order. Thus the scientific enterprise is both what we know (content) and how we come to know it (process).

The performance expectations in first grade help students formulate answers to questions such as: “What happens when materials vibrate? What happens when there is no light? What are some ways plants and animals meet their needs so that they can survive and grow? How are parents and their children similar and different? What objects are in the sky and how do they seem to move?” (NGSS).

II. Objectives

Course Outline:

1. Plants and Animals
 - a. Structure and Survival
 - b. Parents and Offspring Survival
 - c. Inheritance and Variation of Traits
 - d. Plants and Engineering
2. Lights and Sounds
 - a. Sounds and Vibrations
 - b. Light, Materials, Transparent & Opaque
 - c. Illumination
 - d. Engineering and Communication
 - e. Lights, Sounds, and Communication
3. Space
 - a. Sun, Shadows, and Daily Patterns
 - b. Daylight Patterns
 - c. Stars and their Daily/Seasonal Patterns

Student Outcomes:

After successfully completing this course, the student will:

- Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
- Make observations to construct an evidence-based account that objects can be seen only when illuminated.
- Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.

- Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.
- Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.
- Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.
- Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.
- Use observations of the sun, moon, and stars to describe patterns that can be predicted.
- Make observations at different times of year to relate the amount of daylight to the time of year.

New Jersey Student Learning Standards

CAREER READY PRACTICES

CRP1 Act as a responsible and contributing citizen and employee.

Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

CRP2 Apply appropriate academic and technical skills.

Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation

CRP4 Communicate clearly and effectively and with reason.

Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

CRP6. Demonstrate creativity and innovation.

Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

CRP7. Employ valid and reliable research strategies.

Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate

the validity of sources when considering the use and adoption of external information or practices in their workplace situation.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

CRP11. Use technology to enhance productivity.

Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks—personal and organizational—of technology applications, and they take actions to prevent or mitigate these risks.

CRP12. Work productively in teams while using cultural global competence.

Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

TECHNOLOGY

Standard 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

Strand B. Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.

8.1.2.B.1- Illustrate and communicate original ideas and stories using multiple digital tools and resources.

Strand C. Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

8.1.2.C.1- Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media.

Strand E: Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.

8.1.2.E.1- Use digital tools and online resources to explore a problem or issue.

Standard 8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming:

All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Strand A. The Nature of Technology: Creativity and Innovation Technology systems impact every aspect of the world in which we live.

8.2.2.A.1- Define products produced as a result of technology or of nature.

8.2.2.A.2- Describe how designed products and systems are useful at school, home and work.

8.2.2.A.3- Identify a system and the components that work together to accomplish its purpose.

Strand B. Technology and Society: Knowledge and understanding of human, cultural and societal values are fundamental when designing technological systems and products in the global society.

8.2.2.B.1- Identify how technology impacts or improves life.

8.2.2.B.3- Identify products or systems that are designed to meet human needs.

8.2.2.B.4- Identify how the ways people live and work has changed because of technology.

Strand C. Design: The design process is a systematic approach to solving problems.

8.2.2.C.1- Brainstorm ideas on how to solve a problem or build a product.

Strand D. Abilities for a Technological World: The designed world is the product of a design process that provides the means to convert resources into products and systems.

8.2.2.D.1- Collaborate and apply a design process to solve a simple problem from everyday experiences.

21ST CENTURY LIFE AND CAREERS

9.2 Career Awareness, Exploration, and Preparation

Strand A: Career Awareness

9.2.4.A.1 Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

9.2.4.A.4 Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

NEW JERSEY STUDENT LEARNING STANDARDS- SCIENCE

1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

1-PS4-2. Make observations to construct an evidence-based account that objects can be seen only when illuminated.

1-PS4-3. Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.

1-PS4-4. Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.

1-LS1-1. Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.*

1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

1-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted.

1-ESS1-2. Make observations at different times of year to relate the amount of daylight to the time of year.

K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

III. Proficiency Levels

This is a full year course for Grade 1 students.

IV. Methods of Assessment

Student Assessment

Even though at this level students are not formally assessed in science, progress is monitored both formatively and summatively. Scientific questioning about what they see and experience allows both student and teacher to monitor their understanding of science concepts. Journal writing is introduced to record student progress.

Curriculum/Teacher Assessment

The teacher will provide the subject area supervisor with suggestions for changes on an ongoing basis.

V. Grouping

This is a required Grade 1 full year course.

VI. Articulation/Scope & Sequence/Time Frame

Course length is one year.

VII. Resources

Texts/Supplemental Reading/References

Resources may include but are not limited to:

Resources

1. www.mysteryscience.com
2. Bill Nye Videos
3. <https://newsela.com/>
4. www.brainpop.com
5. Science World Magazine

VIII. Suggested Activities

Appropriate activities are listed in the curriculum map.

IX. Methodologies

Appropriate methodologies include hands-on active learning, inquiry, integration of disciplines and content areas, and multi-sensory methods. Lessons created by the elementary science specialist serve to coordinate with and enhance the content area topics. Technology plays an important part in learning science as well.

X. Interdisciplinary Connections

At this grade level, connections to many other disciplines are appropriate and natural. Reading and writing become an integral part of the science process. Connections with mathematics are frequent throughout the curricula.

XI. Differentiating Instruction for Students with Special Needs: Students with Disabilities, Students at Risk, English Language Learners, and Gifted & Talented Students

Differentiating instruction is a flexible process that includes the planning and design of instruction, how that instruction is delivered, and how student progress is measured. Teachers recognize that students can learn in multiple ways as they celebrate students' prior knowledge. By providing appropriately challenging learning, teachers can maximize success for all students.

Differentiating in this course includes but is not limited to:

Differentiation for Support (ELL, Special Education, Students at Risk)

- Peer mentoring on problems
- Differentiated teacher feedback on assignments
- Modeling out problems on whiteboard
- Visual aids as we project problems on whiteboard
- Study guides
- Tiered assignments
- Scaffolding of materials and assignments
- Re-teaching and review
- Guided note taking
- Exemplars of varied performance levels
- Multi-media approach to accommodating various learning styles

Differentiation for Enrichment

- Supplemental reading material for independent study
- Flexible grouping
- Tiered assignments
- Topic selection by interest
- Enhanced expectations for independent study
- Elevated questioning techniques using Webb's Depth of Knowledge matrix

XII. Professional Development

The teacher will continue to improve expertise through participation in a variety of professional development opportunities.

XII. Curriculum Map/Pacing Guide

Unit Topic	Time Allocated	Differentiating Instruction for Students with Disabilities, Students at Risk, English Language Learners, & Gifted & Talented Students	Standards	Assessments
Plants and Animals <ul style="list-style-type: none"> • Structure and Survival • Parents and Offspring Survival • Inheritance and Variation of Traits • Plants and Engineering 	13 weeks	<p><i>For Support:</i></p> <ul style="list-style-type: none"> • Introduce nonfiction literature to increase background knowledge • Use picture sorts to match structure/function and parent/offspring relationships • Incorporate cooperative learning opportunities • Preteach vocabulary <p><i>For Enhancement:</i></p> <ul style="list-style-type: none"> • Provide opportunities to explore additional animals • Create diagrams of living things with labels of external parts that aide in survival • Plant seeds to observe growth and importance of external parts for survival • Incorporate written responses and/or observation logs for activities 	1-LS1-1 1-LS1-2 1-LS3-1 K-2-ETS1-2 K-2-ETS1-3 CRP1,2,4,6,7,8,11,12 8.1.2.B.1, 8.1.2.C.1, 8.1.2.E.1 8.2.2.A.1, 8.2.2.A.2, 8.2.2.A.3, 8.2.2.B.1, 8.2.2.B.3, 8.2.2.B.4, 8.2.2.C.1, 8.2.2.D.1, 8.2.2.E.1 9.2.4.A.4	<ul style="list-style-type: none"> • Identify animal structures that help them to survive in their habitats • Identify ways animal and human parents help their offspring survive • Identify patterns of shared characteristics between parents and offspring • Identify external parts of plants that help them to survive

Unit Topic	Time Allocated	Differentiating Instruction for Students with Disabilities, Students at Risk, English Language Learners, & Gifted & Talented Students	Standards	Assessments
Lights and Sounds <ul style="list-style-type: none"> • Sounds and Vibrations • Light, Materials, Transparent & Opaque • Illumination • Engineering and Communication • Lights, Sounds, and Communication 	13 weeks	<i>For Support:</i> <ul style="list-style-type: none"> • Introduce nonfiction literature to increase background knowledge • Provide opportunities for students to observe sound vibrations • Incorporate cooperative learning opportunities • Preteach vocabulary <i>For enhancement:</i> <ul style="list-style-type: none"> • Create own instrument and identify where the sound and vibration come from • Incorporate written responses and/or observation logs for explorations 	1-PS4-1 1-PS4-2 1-PS4-3 K-2-ETS1-2 CRP1,2,4,6,7,8,11,12 8.1.2.B.1, 8.1.2.C.1, 8.1.2.E.1 8.2.2.A.1, 8.2.2.A.2, 8.2.2.A.3, 8.2.2.B.1, 8.2.2.B.3, 8.2.2.B.4, 8.2.2.C.1, 8.2.2.D.1, 8.2.2.E.1 9.2.4.A.4	<ul style="list-style-type: none"> • Identify cause and effect relationships between vibrations and sounds • Sort transparent, translucent, and opaque materials • Create a light signal to communicate a message • Identify real world examples of lights and sounds that are used to communicate a message

Unit Topic	Time Allocated	Differentiating Instruction for Students with Disabilities, Students at Risk, English Language Learners, & Gifted & Talented Students	Standards	Assessments
Space <ul style="list-style-type: none"> • Sun, Shadows, and Daily Patterns • Daylight Patterns • Stars and their Daily/Seasonal Patterns 	13 weeks	<i>For Support:</i> <ul style="list-style-type: none"> • Introduce nonfiction literature to increase background knowledge • Incorporate models to explain movement of earth around sun • Incorporate cooperative learning opportunities • Label classroom with cardinal directions • Preteach vocabulary <i>For Enhancement:</i> <ul style="list-style-type: none"> • Collect data on hours of sunlight over course of unit • Introduce additional constellations • Incorporate written responses and/or observation logs for activities 	1-ESS1-1 1-ESS1-2 CRP1,2,4,6,7,8,11,12 8.1.2.B.1, 8.1.2.C.1, 8.1.2.E.1 8.2.2.A.1, 8.2.2.A.2, 8.2.2.A.3, 8.2.2.B.1, 8.2.2.B.3, 8.2.2.B.4, 8.2.2.C.1, 8.2.2.D.1, 8.2.2.E.1 9.2.4.A.4	<ul style="list-style-type: none"> • Identify the cause and effect relationship between the height of the sun in the sky and a shadow's length • Identify season when there is more/less hours of daylight • Identify the movement of the sun from east west across the sky each day • Identify the cause and effect relationship between the sun's brightness and visibility of the stars • Identify cardinal directions • Identify the Big Dipper and North Star