Fairfield Public School

Science Curriculum
K-6

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West Essex Consortium Curriculum
Essex Fells, Fairfield, North Caldwell, Roseland
Science Department

I. COURSE NAME: Science

II. GRADE LEVEL(S): K-2

III. COURSE DESCRIPTION: The performance expectations in K-2 help students formulate answers to questions such as: “What happens if you push or pull an object harder?” Students in K are able to apply an understanding of the effects of different strengths or different directions of pushes and pulls on the motion of an object to analyze a design solution. “What happens when materials vibrate?” Students in 1 are expected to develop understanding of the relationship between sound and vibrating materials. “What are different kinds of land and bodies of water?” Students in 2 are able to use information and models to identify and represent the shapes and kinds of land and bodies of water in an area and where water is found on Earth. K-2 performance expectations include PS1, PS2, PS3, PS4, LS1, LS2, LS3, LS4, ESS1, ESS2, ESS3 and ESS4. The crosscutting concepts of patterns; cause and effect; energy and matter; structure and function; stability and change; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas.

IV. COURSE OBJECTIVES: In the K-2 performance expectations, students are expected to demonstrate grade-appropriate proficiency in asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of the core ideas.

V. TEXTS/RESOURCES

A. **https://www.wastatelaser.org/science-notebooks/**

B. www.NSTA.org

C. www.nextgenscience.org

D. www.njctl.org

E. www.eie.org Engineering is Elementary

VII. EVALUATIONS/ASSESSMENTS

A combination of formative and summative assessments will be utilized in this course including, but not limited to teacher observations, student work and reflections, projects, quizzes and tests, and writing tasks.

VIII. SCOPE AND SEQUENCE (see table below)

This course has been designed with respect to and in compliance with the expectations set forth in the state-approved standards.

IX. Interdisciplinary Connections

Science, engineering, and technology influence and permeate every aspect of modern life. Some knowledge of science and engineering is required to engage with the major public policy issues of today as well as to make informed everyday decisions. In addition, understanding science and the extraordinary insights it has produced can be meaningful and relevant on a personal level, opening new worlds to explore and offering lifelong opportunities for enriching people's lives. In these contexts, learning science is important for everyone, even those who eventually choose careers in fields other than science or engineering.

Science, math, and language arts should complement each other as often as possible. Students will benefit from this cross-curricular relationship as they learn more about the world through exploration, experimentation, and collaboration.

X. Integration of the Computer Science & Design Thinking

New approaches necessary for solving the critical challenges that we face as a society will require harnessing the power of technology and computing. Rapidly changing technologies and the proliferation of digital information have permeated and radically transformed learning, working, and everyday life. To be well-educated, global-minded individuals in a computing-intensive world, students must have a clear understanding of the concepts and practices of computer science. As education systems adapt to a vision of students who are not just computer users but also computationally literate creators who are proficient in the concepts and practices of computer science and design thinking, engaging students in computational thinking and human-centered approaches to design through the study of computer science and technology serves to prepare students to ethically produce and critically consume technology.

Intent and Spirit

All students receive computer science and design thinking instruction from Kindergarten through grade 12. The study of these disciplines focuses on deep understanding of concepts that enable students to think critically and systematically about leveraging technology to solve local and global issues. Authentic learning experiences that enable students to apply content knowledge, integrate concepts across disciplines, develop computational thinking skills, acquire and incorporate varied perspectives, and communicate with diverse audiences about the use and effects of computing prepares New Jersey students for college and careers.

Mission

Computer science and design thinking education prepares students to succeed in today's knowledge-based economy by providing equitable and expanded access to high-quality, standards-based computer science and technological design education.

Vision

All students have equitable access to a rigorous computer science and design thinking education. Students will benefit from opportunities to engage in high-quality technology programs that foster their ability to:

- Develop and apply computational and design thinking to address real-world problems and design creative solutions;
- Engage as collaborators, innovators, and entrepreneurs on a clear pathway to success through postsecondary education and careers;
- Navigate the dynamic digital landscape to become healthy, productive, 21st century global-minded individuals; and
- Participate in an inclusive and diverse computing culture that appreciates and incorporates perspectives from people of different genders, ethnicities, and abilities.

Please note that the concepts and skills previously included in 8.1 Educational Technology of the 2014 NJSLS — Technology have been expanded and integrated across multiple disciplinary concepts in the 2020 NJSLS — Career Readiness, Life Literacies, and Key Skills standard 9.4. Given the ubiquity of technology, our students will continue to be required to demonstrate increasing levels of proficiency to access, manage, evaluate, and synthesize information in their personal, academic, and professional lives. Therefore, the standards that were housed in one discipline have been enhanced and restructured to reflect the continued need for student learning in technology literacy, digital citizenship, and information and media literacy.

The K–12 Computer Science Framework, led by the Association for Computing Machinery, Code.org, Computer Science Teachers Association, Cyber Innovation Center, and National Math and Science Initiative in partnership with states and districts, informed the development of the NJSLS — Computer Science and Design Thinking.

XI. Integration of Career Readiness, Life Literacies and Key Skills

Intent and Spirit

The NJSLS-CLKS provide a framework of concepts and skills to be integrated into the foundational, academic and technical content areas to prepare students to engage in the postsecondary options of their choice. Though the standard for 9.3 Career and Technical Education remains unchanged for now, 9.1 Personal Financial Literacy and 9.2 Career Awareness, Exploration, Preparation, and Training have been revised based on the feedback provided by New Jersey educators.

The personal financial literacy standard promotes not only the exploration of money management but also the psychology of spending and saving that influences decisions related to finances. From discovering the concept and forms of money to exploring lines of credit and types of insurance, these standards ensure a robust and comprehensive education in financial literacy from early elementary grades through high school. A new standard, 9.4 Life Literacies and Key Skills, has been added to ensure our students are prepared with the necessary knowledge, skills and dispositions to thrive in an interconnected global economy. These standards provide students with a guide to interact in life and work regardless of the setting or context.

Mission

Career readiness, life literacies and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.

Vision

An education in career readiness, life literacies, and key skills fosters a population that:

- Continually self-reflects and seeks to improve the essential life and career practices that lead to success;

- Uses effective communication and collaboration skills and resources to interact with a global society;
- Possesses financial literacy and responsibility at home and in the broader community;
- Plans, executes, and alters career goals in response to changing societal and economic conditions; and
- Seeks to attain skill and content mastery to achieve success in a chosen career path.

For students to be college and career ready they must have opportunities to understand career concepts and financial literacy. This includes helping students make informed decisions about their future personal, educational, work, and financial goals. By integrating Standard 9 into instruction, New Jersey students will acquire the necessary academic and life skills to not only achieve individual success but also to contribute to the success of our society. For example: Career Day event, exposure to a variety of careers in the science field, exploration of technology career options, school-wide science fair and science related field trips (e.g. Liberty Science Center, Buehler Science Center and Environmental Centers)
The Standards: Standard 9 is composed of the Career Ready Practices and Standard 9.1, 9.2, and 9.3 which are outlined below:

- The 12 Career Ready Practices

These practices outline the skills that all individuals need to have to truly be adaptable, reflective, and proactive in life and careers. These are researched practices that are essential to career readiness.

- 9.1 Personal Financial Literacy

This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

- 9.2 Career Awareness, Exploration, and Preparation

This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

- 9.3 Career and Technical Education

This standard outlines what students should know and be able to do upon completion of a CTE Program of Study. For students to be college and career ready they must have opportunities to understand career concepts and financial literacy. This includes helping students make informed decisions about their future personal, educational, work, and financial goals. By integrating Standard 9 into instruction, New Jersey students will acquire the necessary academic and life skills to not only achieve individual success but also to contribute to the success of our society.

XII. Integrated accommodations and modifications for students with: IEP and 504:

(For students with disabilities, appropriate accommodations, instructional adaptations, and/or modifications should be determined by the IEP or 504 team)

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Give repetition and practice exercises
- Model skills/techniques to be mastered
- Give extended time to complete class work
- Provide copy of class notes
- Determine if preferential seating would be beneficial

- Provide access to a computer
- Provide copies of textbooks for home
- Provide access to books on tape/CD/digital media, as available and appropriate
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/school communication

Modifications for Homework and Assignments

- Provide extended time to complete assignments
- Break down assignments
- Provide the student with clearly stated (written) expectations and grading criteria for assignments
- Implement RAFT activities as they pertain to the types/modes of communication (role, audience, format, topic)

Modifications for Assessments

- Provide extended time on classroom tests and quizzes
- Provide alternate setting as needed
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests
- Establish procedures for accommodations /modifications for assessments

High Enrichment Program:

- Allow students to pursue independent projects based on their individual interests
- Provide enrichment activities that include more advanced material
- Allow team-teaching opportunities and collaboration
- Set individual goals
- Conduct research and provide presentation of appropriate topics
- Design surveys to generate and analyze data to be used in discussion.
- Use Higher-Level Questioning Techniques
- Provide assessments at a higher level of thinking

English Language Learners: Modifications for Classroom

- Pair visual prompts with verbal presentations
- Provide repetition and practice
- Model skills/techniques to be mastered

Modifications for Homework/Assignments

- Provide Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary)
- Provide extended time for assignment completion as needed
- Highlight key vocabulary
- Use graphic organizers

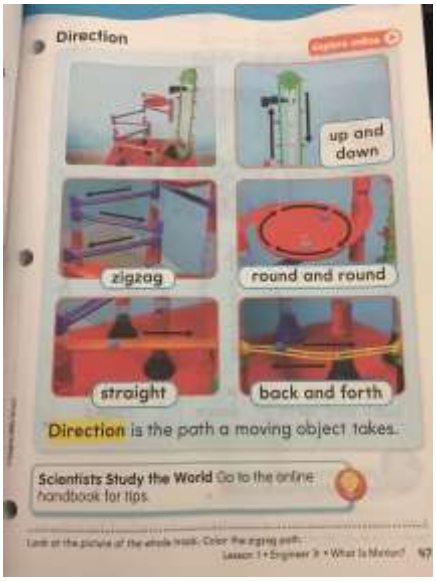
Scope and Sequence of Content and Skills for Science K

Unit Name K1	Motion and Stability: Forces and Interactions
Estimated Timeline	October-May

NGSS	K-PS2-1 K-PS2-2
Student Learning Objectives	• Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object. • Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull. • Define push, pull, direction, and change
Suggested projects, activities, labs used to support content, and resources	• Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other. Push and pull races. Limit assessment to different relative strengths or different directions, but not both at the same time. Mouse Trap game. Design a track (marbles) • Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, and knock down other objects. (Dominoes) • Examples of solutions could include tools such as a ramp to increase the speed of the object and a structure that would cause an object such as a marble or ball to turn. Design a ramp and comparing heights for speed. • Design a roller coaster
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • journal entries • response sheets
Suggested Resources	• http://www.nextgenscience.org/ • http://www.brainpopjr.com • http://www.learn360.com • Foss online: http://www.fossweb.com • https://www.teachingchannel.org • Foss kit: Materials and Motions https://www.fossweb.com/delegate/ssi-wdf-ucm-webContent?dDocName=G3932058 • Scholastic News (w/ online resource) • Science Spin (w/ online resource) • The Boy Who Harnessed the Wind by, William Kamkwamba & Brian

Mealer

- Forces that Make Things Move by, Kimberly Bradley
- What Makes a Magnet? By, Franklyn M. Branley
- Lesson Plan for Push and Pull Unit
  http://www.harmonydc.org/Curriculum/pdf/kindersample.pdf
- Forces Unit https://eucaps.wsu.edu/wp-content/uploads/sites/731/2015/04/Kindergarten-Force-Motion-Lessons.pdf



Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/k-ps2-1-motion-and-stability-forces-and-interactions • https://www.nextgenscience.org/pe/k-ps2-2-motion-and-stability-forces-and-interactions

Unit Name K2	Energy
Estimated Timeline	October-May
NGSS	K-PS3-1 K-PS3-2
Student Learning Objectives	• Make observations to determine the effect of sunlight on Earth's surface. • Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.
Suggested projects, activities, labs used to support content	• Examples of Earth's surface could include sand, soil, rocks, and water. • Water experiments- liquid solid gas and how heat affects. Ice in sunlight and ice in shade experiment. • Sun's heat experiment: Using Rocks on plates put in shade and sunlight. Compare heat and feel. • Limit assessment of temperature to relative measures such as warmer/cooler • Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun. • Design shade for your pet rock.
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • Journal entries • response sheets
Suggested resources	• http://www.nextgenscience.org/ • http://www.brainpopjr.com • http://www.learn360.com

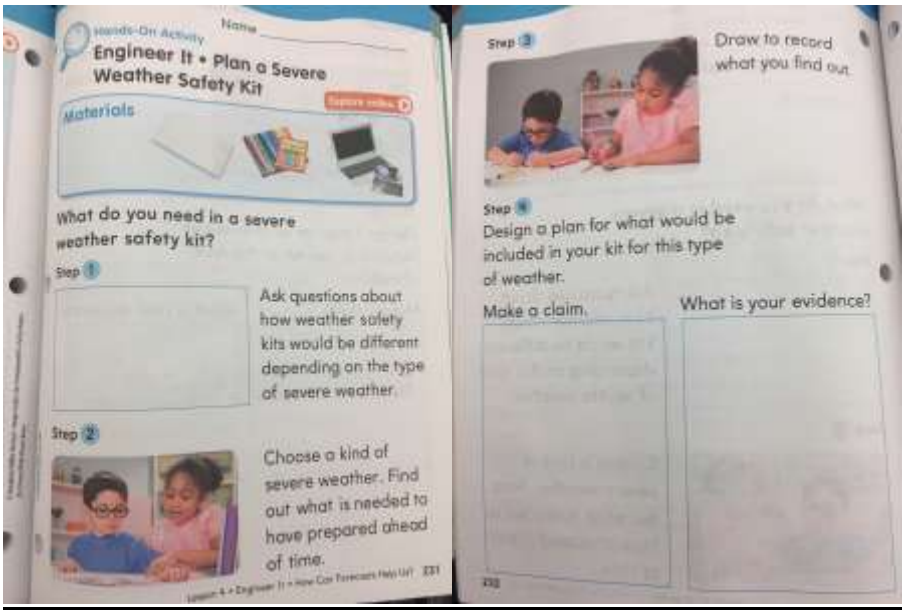
	• Foss online: http://www.fossweb.com • https://www.teachingchannel.org • Scholastic News (w/ online resource) • Science Spin (w/ online resource) • The Boy Who Harnessed the Wind by, William Kamkwamba & Brian Mealer • Forces that Make Things Move by, Kimberly Bradley • What is the World Made Of? By, Kathleen Weidner Zoehfeld • What Makes a Magnet? By, Franklyn M. Branley
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/k-ps3-1-energy • https://www.nextgenscience.org/pe/k-ps3-2-energy

Unit Name K3	From Molecules to Organisms: Structures and Processes
Estimated Timeline	October-May
NGSS	K-LS1-1
Student Learning Objectives	• Use observations to describe patterns of what plants and animals (including humans) need to survive.
Suggested projects, activities, labs used to support content	• Examples of patterns could include that animals need to take in food but plants do not • The different kinds of food needed by different types of animals • The requirement of plants to have light • All living things need water Plant Unit • Planting, observing and comparing plant growth based upon needs • Comparing needs and wants of different plants (desert etc) Animal Units • Wants and needs of plants or animals and their environment: Chicks, butterflies, Frogs, Penguins, Squirrels (hibernation) • Habitat Design challenges: Ponds/Desert/Forest/Oceans/Arctic/Farm

Suggested assessments	Students can demonstrate competency with tasks such as: ● developing and refining models ● generating, discussing and analyzing data ● constructing spoken and written scientific explanations ● engaging in evidence-based argumentation ● reflecting on their own understanding ● journal entries ● response sheets
Suggested resources	● http://www.nextgenscience.org/ ● Foss Kits: Animals two by two https://www.fossweb.com/delegate/ssi-wdf-ucm-webContent?dDocName=G3871660 ● http://www.brainpopjr.com ● http://www.learn360.com ● Foss online: http://www.fossweb.com ● https://www.teachingchannel.org ● Scholastic News (w/ online resource) ● Science Spin (w/ online resource) ● Air is All Around You by, Franklyn M. Branley ● The Boy Who Harnessed the Wind by, William Kamkwamba & Brian Mealer ● Forces that Make Things Move by, Kimberly Bradley ● My Light by Molly Bang ● What is the World Made Of? By, Kathleen Weidner Zoehfeld ● What Makes a Magnet? By, Franklyn M. Branley
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	● https://www.nextgenscience.org/pe/k-ls1-1-molecules-organisms-structures-and-processes

Unit Name K4	Earth's Systems
Estimated Timeline	October-May
NGSS	K-ESS2-1 K-ESS2-2
Student Learning Objectives	● Use and share observations of local weather conditions to describe patterns over time. ● Construct an argument supported by evidence for how plants and animals (including humans) can change the environment

	to meet their needs.
Suggested projects, activities, labs used to support content	• Qualitative observations could include descriptions of the weather (such as sunny, rainy, and warm) • Quantitative observations could include numbers of sunny, windy, and rainy days in a month. • Patterns could include that it is usually cooler in the morning than in the afternoon and the number of sunny days versus cloudy days in different months. • Limit assessment of quantitative observations to whole numbers and relative measures such as warmer/cooler. • Different types of severe weather: Make or model types of weather noises. Ex: thunder, rain • Design a plan for a severe weather kit: include things for safety and fun • Create a weather forecasting center and create tools for weather prediction • Adapting to environment: Hibernation, storing food for the winter
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • Journal entries • response sheets
Suggested resources	• Foss Kit: Trees and Weather https://www.fossweb.com/delegate/ssi-wdf-ucm-webContent?dDocName=G3932057 • http://www.nextgenscience.org/ • http://www.brainpopjr.com • http://www.learn360.com • Foss online: http://www.fossweb.com • https://www.teachingchannel.org • Scholastic News (w/ online resource) • Science Spin (w/ online resource) • Magic School Bus: Lost in the Solar System

	
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/k-ess2-1-earths-systems • https://www.nextgenscience.org/pe/k-ess2-2-earths-systems

Unit Name K5	Earth and Human Activity
Estimated Timeline	October-May
NGSS	K-ESS3-1 K-ESS3-2 K-ESS3-3
Student Learning Objectives	• Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live. • Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather. • Communicate solutions that will reduce the impact of climate change and humans on the land, water, air, and/or other living things in the local environment.

Suggested projects, activities, labs used to support content, and resources	• Relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas
	• Grasses need sunlight so they often grow in meadows.
	• Plants, animals and their surroundings make up a system.
	• Emphasis is on local forms of severe weather.
	• Human impact on the land : Recycle reduce reuse
	  ○ Haunted House project
	  ○ Gingerbread house project
	  ○ Leprechaun traps
	  ○ 
	• Exploring where trash goes : Experiment burying trash and observing
	• Natural Resources: 3 little pigs experiment- building houses using straw, popsicle sticks and clay bricks

Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • notebook entries • response sheets

	• Foss Kits: Trees and Weather https://www.fossweb.com/delegate/ssi-wdf-ucm-webContent?dDocName=G3932057 • Foss Kits: Animals two by two https://www.fossweb.com/delegate/ssi-wdf-ucm-webContent?dDocName=G3871660 • http://www.nextgenscience.org/ • http://www.brainpopjr.com • http://www.learn360.com • Foss online: http://www.fossweb.com • https://www.teachingchannel.org • Scholastic News (w/ online resource) • Science Spin (w/ online resource) • Water! Water! Water! By, Nancy Elizabeth Wallace • What is the World Made Of? By, Kathleen Weidner Zoehfeld • What Makes a Magnet? By, Franklyn M. Branley • Magic School Bus Inside the Earth
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/k-ess3-1-earth-and-human-activity • https://www.nextgenscience.org/pe/k-ess3-2-earth-and-human-activity • https://www.nextgenscience.org/pe/k-ess3-3-earth-and-human-activity

Unit Name K6	Engineering Design
Estimated Timeline	September- June
NGSS	K-2-ETS1-1 K-2-ETS1-2 K-2-ETS1-3
Student Learning Objectives	• Ask questions, make observations, and gather information about a situation people want to change (e.g. climate change) to define a simple problem that can be solved through the development of a new or improved object or tool. • 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. • Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
Suggested projects,	• Launching Unit: Exploring Centers

activities, labs used to support content	○ What is an engineering scientist? ○ What are problems/ solutions ○ What are ways to design- sketching/physical model ○ How do we analyze ● Establish a weekly Engineering Center ● Students create devices to get “that pesky itch in the center of your back.” Once the idea is thought through students produce design sketches and are given everyday materials and recyclables to create their designs.
Suggested assessments	Students can demonstrate competency with tasks such as: ● developing and refining models ● generating, discussing and analyzing data ● constructing spoken and written scientific explanations ● engaging in evidence-based argumentation ● reflecting on their own understanding ● journal entries ● response sheets
Suggested resources	● **Kindergarten Launching Unit/Center https://docs.google.com/document/d/1b7YIc5m-evdfHIEBrWoYksecgA77xQqjP0GrJOf8FfA/edit** ● http://www.nextgenscience.org/ ● http://www.brainpopjr.com ● http://www.learn360.com ● Foss online: http://www.fossweb.com ● https://www.teachingchannel.org ● Scholastic News (w/ online resource) ● Science Spin (w/ online resource) ● Rosie Revere Engineer by, Andrea Beaty ● NGSS Book Source Book List http://www.booksource.com/Products/NGSS-Kindergarten-Complete__NGK-ALL-spc-16.aspx?CategoryBvin=b124d8b2-763d-4fcb-920e-2cbf61800150&SubCategoryBvin=b34aa90f-9a8d-4de8-b82d-41d31a4fbc84&CollectionBvin=bf7031f3-e73b-4b77-81b5-e1aa8110cb7e
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	● https://www.nextgenscience.org/pe/k-2-ets1-1-engineering-design ● https://www.nextgenscience.org/pe/k-2-ets1-2-engineering-design ● https://www.nextgenscience.org/pe/k-2-ets1-3-engineering-design

Scope and Sequence of Content and Skills for Science Grade 1

1st Grade Launching Unit

NGSS- K-2-ETS1-1, K-2-ETS1-3

- **Day 1: Introduce science. What is science?**
  -Read aloud What is Science? by Rebecca Kai Dotlich
  -Brainpopjr video - Science Skills
  https://jr.brainpop.com/science/beascientist/scienceskills/preview.weml

- **Day 2: Introduce scientists. What do scientists do? (study the world around them)**
  -Read aloud What is a Scientist? by Barbara Lehn
  -Great Scientists Activity http://www.teacherspayteachers.com/Product/Freebie-Great-Scientists-861405
  Scientist Anchor Chart - http://www.pinterest.com/pin/356066532791067 29/
  -Draw and label a picture of what a scientist looks like to you.

- **Day 3: What is an engineer? What do engineers do? (problem solvers)**
  -Read aloud Rosie Revere Engineer by Andrea Beaty
https://www.teacherspayteachers.com/Product/Rosie-Revere-Book-growth-mindset-mini-lesson-3127635
  -What does an engineer look like activity. Display pictures of engineers. Draw and label a picture of an engineer.
  -STEM video - https://www.youtube.com/watch?v=AlPJ48simtE
  gn-Process-900979

- **Day 4: Introduce and set up STEM notebook**
  -Templates for STEM notebooks on shared drive.
  -Create cover, table of contents, page numbers.
  https://www.wastatelaser.org/science-notebooks/

- **Days 5-6: Introduce Engineering Design Process (EDP) for K-2**
  -Introduce Engineering Design Process (Ask, Imagine, Plan, Create, Improve)
  -Introduce Design Challenges - Design a name tag
https://www.teacherspayteachers.com/Product/STEM-Engineering-Starter-Kit-for-Teachers-elementary-level-977781

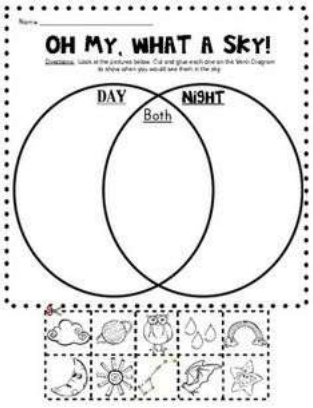
**Discuss science safety and proper use of science tools/materials throughout units as the lesson permits.

Unit Name 1.4	Engineering Design

Estimated Timeline	September(LAUNCH)-June **INTEGRATE THROUGHOUT THE YEAR https://docs.google.com/document/d/1mbbnduE5qsRYEKMoRz4PO1rbX2tmuGKHXA3Gym1pDeY/edit
NGSS	K-2-ETS1-1 K-2-ETS1-2 K-2-ETS1-3
Student Learning Objectives	● Create STEAM journal/notebook-explain routine of using the notebook to keep track of observations ● Understand the roles of a scientist and engineer ● Ask questions, make observations, and gather information about a situation people want to change (e.g. climate change) to define a simple problem that can be solved through the development of a new or improved object or tool. ● 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. ● Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
Suggested projects, activities, labs used to support content	● Students can draw diagrams of their planned derby cars and build them based on those drawings. ● Students will design their own investigation based on the question they created about pill bugs. You can encourage students to create a model for a final product based on what they learned throughout their investigation.
Suggested assessments	Students can demonstrate competency with tasks such as: ● developing and refining models ● generating, discussing and analyzing data ● constructing spoken and written scientific explanations ● engaging in evidence-based argumentation ● reflecting on their own understanding ● Journal entries ● response sheets ● Self assessment/rubric https://www.spfk12.org/cms/lib/NJ01001501/Centricity/Domain/9/Science%20Rubric.pdf
Suggested resources	● http://www.nextgenscience.org/ ● https://betterlesson.com/lesson/resource/3070763/the-engineering-design-process?from=lessonsection_narrative

	• https://betterlesson.com/home • http://speechisbeautiful.com/2017/03/10-wordless-videos-teach-problem-solving/ • http://www.brainpopjr.com • http://www.learn360.com • Foss online: http://www.fossweb.com • https://www.teachingchannel.org • https://nj.pbslearningmedia.org/resource/75e3c673-b02d-4d7b-a490-8a943c013662/75e3c673-b02d-4d7b-a490-8a943c013662/#.WRnD3-srLcs • Scholastic News (w/ online resource) • Science Spin (w/ online resource) • Rosie Revere, Engineer by, Andrea Beaty • Thomas Edison: Great American Inventor by, Shelley Bedik • The Most Magnificent Thing by Ashley Spires..author website/blog & youtube clip • The Girl Who Never Made Mistakes by Mark Pett • What Do You Do With An Idea? By Kobi Yamada • Those Darn Squirrels! By Adam Rubin

Unit Name 1.3	**EARTH SCIENCE** Space Systems: Patterns and Cycles
Estimated Timeline	October/November/December
NGSS	1-ESS1-1 1-ESS1-2
Student Learning Objectives	• 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 the year.
Suggested projects, activities, labs used to support content, and resources	• Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky and set. • Oreo Cookie Moon Phases • 

	• Observing the night sky for 2 weeks for homework-draw what the night sky looks like (moon, stars) • Learn about how the stars other than our sun are visible at night, but not during the day. • Emphasize relative comparisons of the amount of daylight in the winter to the amount in the spring and fall. • Make comparisons of the day and night sky. •  Teacherspayteachers day and night picture sort
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • journal entries • response sheets • Self assessment/rubric
Suggested Resources	• http://www.nextgenscience.org/ • https://betterlesson.com/lesson/635856/the-predictable-patterns-of-the-sun-and-the-seasons • https://betterlesson.com/lesson/613470/observing-the-sun • https://betterlesson.com/lesson/613469/introduction-and-pre-assessment • https://betterlesson.com/lesson/633422/let-s-observe-the-sun-day-1 • https://betterlesson.com/home • http://www.brainpopjr.com • http://www.learn360.com • Foss online: http://www.fossweb.com • https://www.teachingchannel.org • Scholastic News (w/ online resource)

	• Science Spin (w/ online resource) • The Magic School Bus Explores the Solar System • https://mysteryscience.com/sky/sun-moon-stars • The Sun by Seymour Simon • King Kafu and the Moon by, Trish Cooke
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/1-ess1-1-earths-place-universe • https://www.nextgenscience.org/pe/1-ess1-2-earths-place-universe

Unit Name 1.1	**PHYSICAL SCIENCE** Waves: Light and Sound
Estimated Timeline	January/February
NGSS	1-PS4-1 1-PS4-2 1-PS4-3 1-PS4-4
Student Learning Objectives	• 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.
Suggested projects, activities, labs used to support content	• Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. • Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork. • Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light. • Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).

	• https://www.teacherspayteachers.com/Product/Science-Unit-on-Light-Aligned-NGSS-with-5-E-Lessons-929948 • Examples of devices could include a light source to send signals, paper cup and string “telephones”, and a pattern of drum beats.
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • notebook entries • response sheets • Self assessment/rubric
Suggested resources	• http://www.nextgenscience.org/ • https://betterlesson.com/home • https://betterlesson.com/lesson/622032/stem-sound-day-1/ • https://betterlesson.com/lesson/resource/3130569/water-and-sound-waves?from=mtp_home_feed_actor_added_resource_name • https://betterlesson.com/lesson/resource/3064186/5-senses-poster?from=mtp_home_feed_crowd_favorited_resource_name • https://betterlesson.com/lesson/resource/3120274/the-listening-walk-work-sample?from=mtp_home_feed_actor_added_resource_name • https://betterlesson.com/lesson/622032/stem-sound-day-1 • http://www.brainpopjr.com • http://www.learn360.com • Foss online: http://www.fossweb.com • https://www.teachingchannel.org • Scholastic News (w/ online resource) • Science Spin (w/ online resource) • My Light by Molly Bang • Owl Moon by Jane Yolen • What Are Sound Waves by Robin Johnson • Sounds All Around by Wendy Pfeffer • https://mysteryscience.com/light/properties-of-light-sound • **Magic School Bus-In The Haunted Mansion** (sound)
Science and	• https://www.nextgenscience.org/pe/1-ps4-1-waves-and-their-

Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	applications-technologies-information-transfer • https://www.nextgenscience.org/pe/1-ps4-2-waves-and-their-applications-technologies-information-transfer • https://www.nextgenscience.org/pe/1-ps4-3-waves-and-their-applications-technologies-information-transfer • https://www.nextgenscience.org/pe/1-ps4-4-waves-and-their-applications-technologies-information-transfer

Unit Name 1.2	**LIFE SCIENCE** Plants and Animals: Structure, Function, and Information Processing
Estimated Timeline	March/April/May
NGSS	1-LS1-1 1-LS1-2 1-LS3-1
Student Learning Objectives	• 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.
Suggested projects, activities, labs used to support content	• Mimicking plant or animal solutions to solve human problems by designing clothing or equipment to protect bicyclists mimicking turtle shells, acorn shells and animal scales. • Stabilizing structures by mimicking animal tails and roots on plants. • Keeping out intruders by mimicking thorns on branches and animal quills; and detecting intruders by mimicking eyes and ears. • Observe and journal the life cycle of a praying mantis
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • notebook entries • response sheets

	• Self assessment/rubric
Suggested resources	• http://www.nextgenscience.org/ • https://betterlesson.com/home • https://betterlesson.com/lesson/resource/3114245/6-animal-classes-song?from=mtp_home_feed_crowd_viewed_resource_name • https://betterlesson.com/lesson/626229/engineering-solutions • http://www.brainpopjr.com • http://www.learn360.com • Foss online: http://www.fossweb.com • https://www.teachingchannel.org • Scholastic News (w/ online resource) • Science Spin (w/ online resource) • Baby Animals by, Seymour Simon • Big Tracks, Little Tracks by, Millicent Selsam • https://mysteryscience.com/powers/parts-survival-growth • The Curious Garden by Peter Brown • My Little Book of Ocean Life by Camilla de la Bedoyere • What If You Had Animal Hair? What If You Had Animal Feet? What If You Had Animal Teeth?--Sandra Markle- Scholastic Books • A Bird is a Bird by Lizzy Rockwell • Best Foot Forward by Ingo Arndt • Feathers: Not Just for Flying by Melissa Stewart • Animal Faces by Penelope Arlon and Tory Gordon-Harris • Born in the Wild: Baby Mammals and their Parents by Lita Judge
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/1-ls1-1-molecules-organisms-structures-and-processes • https://www.nextgenscience.org/pe/1-ls1-2-molecules-organisms-structures-and-processes • https://www.nextgenscience.org/pe/1-ls3-1-heredity-inheritance-and-variation-traits

Unit Name 2.1	Science Launch
Estimated Timeline	September
NGSS	2-PS1-1 2-PS1-2 K-2-ETS1-1
Student Learning Objectives	• Scientists ask questions, solve problems, make models and investigate. • Scientist draw conclusions, analyze and interpret data. • Scientists use interactive notebooks to organize ideas, share observations and reflect on results. • Scientists follow safety procedures during investigations. • Teacher models investigation and students observe and discuss • Students repeat investigation with teacher guidance (procedures, diagrams, and results) • Teacher models recording, investigation, reflections in notebook and students practice with guided instruction.
Suggested projects, activities, labs used to support content	• Students write, illustrate and present science safety rules on posters. • Students explore science tools placed randomly in buckets and make predictions as to what the tools may be used for.
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • notebook entries • response sheets • Self assessment/ rubric
Suggested resources	• http://www.nextgenscience.org/ • http://www.brainpopjr.com • http://www.learn360.com • Foss online: http://www.fossweb.com • https://www.teachingchannel.org • Steve Spangler Science: Easy Science Experiments, Science Toys ... • https://www.stevespanglerscience.com/

	● McGraw Hill Science Text S1-4 ● Related video clips: ● https://www.youtube.com/watch?v=IRhjGeRP9zM ● https://www.youtube.com/watch?v=owHF9iLyxic ● McGraw Hill Science Text S5-8 ● Related activities: ● file:///Users/intentz152/Downloads/Classroom_Science_Notebooks_Presentation_revised.ppt ● file:///Users/intentz152/Downloads/Setting%20Up%20Your%20Science%20Notebook%20Teacher%20Guide.pdf ● Notebook video clip: https://www.youtube.com/watch?v=NVdRfuWe4YM ● Interactive Science Notebooks ● Setting Up Your Science Notebook ● "The Science Penguin" ● www.sciencenotebooks.org PPT ● Pencil/ Marker investigation ● "The Beautiful Oops" ● https://betterlesson.com ● What is a Scientist? https://betterlesson.com/lesson/613405/what-is-a-scientist - Creating a Science Journal https://betterlesson.com/lesson/614612/creating-the-science-journal - Safety in Science https://betterlesson.com/lesson/617181/safety-in-science - Conducting Investigations https://betterlesson.com/lesson/614613/conducting-investigations - Systems - https://betterlesson.com/lesson/614614/systems ● Tools not Toys! https://betterlesson.com/lesson/614615/tools-not-toys ● Seeing in Science: The Skill of Observation https://betterlesson.com/lesson/622982/seeing-in-science-the-skill-of-observation ● Classifying in Science: The Skill of Sorting https://betterlesson.com/lesson/626371/classifying-in-science-the-skill-of-sorting ● Predictions: The Skill of Why? https://betterlesson.com/lesson/626372/predictions-the-skill-of-thinking-why ● Inferences: The Skill of Scientific Metacognition https://betterlesson.com/lesson/626374/inferences-the-skill-of-

	scientific-metacognition - Documenting with Drawing: Sketches-Diagrams and Labels https://betterlesson.com/lesson/626375/documenting-with-drawing-sketches-diagrams-and-labels ● What Do You Do With A Problem by Kobi Yamada ● What Do You Do With An Idea by Kobi Yamada ● Stuck by Oliver Jeffers ● Rosie Revere Engineer by Andrea Beaty ● The Most Magnificent Thing by Ashley Spires ● The Curious Garden by Peter Brown ● Those Darn Squirrels by Adam Rubin ● Dot by Peter Reynolds ● Ish by Peter Reynolds
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	● https://www.nextgenscience.org/pe/2-ps1-1-matter-and-its-interactions ● https://www.nextgenscience.org/pe/2-ps1-2-matter-and-its-interactions ● https://www.nextgenscience.org/pe/k-2-ets1-1-engineering-design

Unit Name 2.2	Earth's Systems: Processes that Shape the Earth
Estimated Timeline	October - November
NGSS	2-ESS1-1 2-ESS2-1 2-ESS2-2 2-ESS2-3
Student Learning Objectives	● Use information from several sources to provide evidence that Earth events can occur quickly or slowly. ● Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. ● Develop a model to represent the shapes and kinds of land and bodies of water in an area. ● Obtain information to identify where water is found on Earth and that it can be solid or liquid.
Suggested projects, activities, labs used to support content	● Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly. ● Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different

	designs for using shrubs, grass and trees to hold back the land. ● Build sand castles and demonstrate how slow/fast the Earth Changes. ● Read books based on natural disasters and do brain pops.
Suggested assessments	Students can demonstrate competency with tasks such as: ● developing and refining models ● generating, discussing and analyzing data ● constructing spoken and written scientific explanations ● engaging in evidence-based argumentation ● reflecting on their own understanding ● notebook entries ● response sheets ● Self assessment/rubric
Suggested resources	● http://www.nextgenscience.org/ ● http://www.brainpopjr.com ● http://www.learn360.com ● Foss online: http://www.fossweb.com ● https://www.teachingchannel.org ● Steve Spangler Science: Easy Science Experiments, Science Toys ... ● https://www.stevespanglerscience.com/ ● Scholastic News (w/ online resource) ● Science Spin (w/ online resource) ● National Geographic Readers: Water by Melissa Stewart ● http://betterlesson.com ● Coastal Erosion https://betterlesson.com/lesson/636745/coastal-erosion ● Bill Nye - Erosion Season 5 Episode 14 ● Bill Nye- Volcanoes Season 4 Episode 14 ● Bill Nye - Earthquakes Season 4 Episode 4 ● https://jr.brainpop.com/science/land/fastlandchanges/ ● https://jr.brainpop.com/science/land/slowlandchanges/
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	● https://www.nextgenscience.org/pe/2-ess1-1-earths-place-universe ● https://www.nextgenscience.org/pe/2-ess2-1-earths-systems ● https://www.nextgenscience.org/pe/2-ess2-2-earths-systems ● https://www.nextgenscience.org/pe/2-ess2-3-earths-systems

Unit Name 2.3	Structure and Properties of Matter

Estimated Timeline	December - January
NGSS	2-PS1-1 2-PS1-2 2-PS1-3 2-PS1-4
Student Learning Objectives	• Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. • Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. • Make observations to construct an evidence based account of how an object made of a small set of pieces can be disassembled and made into a new object. • Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.
Suggested projects, activities, labs used to support content	• Observations could include color, texture, hardness, and flexibility. • Patterns could include the similar properties that different materials share. • Examples of properties could include strength, flexibility, hardness, texture, and absorbency. • Examples of pieces could include blocks, building bricks, or other assorted small objects. • Examples of reversible changes could include materials such as water, crayons and butter at different temperatures. • Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • notebook entries • response sheets
Suggested resources	• http://www.nextgenscience.org/ • http://www.brainpopjr.com • http://www.learn360.com • Foss online: http://www.fossweb.com • https://www.teachingchannel.org

	• Steve Spangler Science: Easy Science Experiments, Science Toys ... • https://www.stevespanglerscience.com/ • Scholastic News (w/ online resource) • Science Spin (w/ online resource) • What is the World Made Of? By Kathleen Weidner Zoehfeld • Changing Matter (Science Readers) by Karen Larson • http://betterlesson.com • Bill Nye - Phases of Matter • https://jr.brainpop.com/science/matter/changingstatesofmatter/
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/2-ps1-1-matter-and-its-interactions • https://www.nextgenscience.org/pe/2-ps1-2-matter-and-its-interactions • https://www.nextgenscience.org/pe/2-ps1-3-matter-and-its-interactions • https://www.nextgenscience.org/pe/2-ps1-4-matter-and-its-interactions

Unit Name 2.4	Interdependent Relationships in Ecosystems
Estimated Timeline	February - May
NGSS	2-LS2-1 2-LS2-2 2-LS4-1
Student Learning Objectives	• Plan and conduct an investigation to determine if plants need sunlight and water to grow. • Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants. • Make observations of plants and animals to compare the diversity of life in different habitats. • Plant seeds in three different environments and observe which grew faster.

Suggested projects, activities, labs used to support content	• Limit assessment to one variable at a time with sunlight and water. • Emphasis on the diversity of living things in a variety of different habitats (not including specific animal and plant names). • Endangered animal research project: focus on Habitat, animal description, and why they are endangered. • Each classroom represents a different habitat. • Turtles and Beavers research project. (pond) Read Turtle's Race with Beaver. • Incorporate Empowering Writers-Oviparous creatures (research, publish,type, and draw habitat) Expository & Narrative writing • Engineer it- The children will make a plan to build a tool that will pick up and move different seeds. The children will record their plan, design a model, and test their tool. The children will graph how many seeds they were able to move with their tool.
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • notebook entries • response sheets
Suggested resources	• http://www.nextgenscience.org/ • http://www.brainpopjr.com • http://www.learn360.com • Foss online: http://www.fossweb.com • https://www.teachingchannel.org • Steve Spangler Science: Easy Science Experiments, Science Toys ... • https://www.stevespanglerscience.com/ • Scholastic News (w/ online resource) • Science Spin (w/ online resource) • A Fruit is a Suitcase for Seeds by Jean Richards • Air is All Around You by, Franklyn M. Branley • Animal Eyes by, Mary Holland • Antarctica by, Helen Cowcher • Arctic Ocean by, John F. Prevost

	• Army Ants by, Sandra Markle • Baby Animals by, Seymour Simon • Big Tracks, Little Tracks by, Millicent Selsam • Flip, Float, Fly: Seeds on the Move by JoAnn Early Macken and Pam Paparone • Get the Scoop on Animal Poop by, Dawn Cusick • Owl Moon by, Jane Yolen • Snowflake Bentley by, Jacqueline Briggs Martin • Seeds and Fruits (Plant Parts) by Melanie Waldron • A Tree for All Seasons by Robin Bernard • Up in the Garden and Down in the Dirt by Kate Messner • Water! Water! Water! By Nancy Elizabeth Wallace • What Animals Eat by Brenda Stones • http://betterlesson.com • Bill Nye - Plants Season 3 Episode 3 • Bill Nye - Life Cycles Season 5 Episode 6 • Bill Nye - Flowers Season 4 Episode 10 • Bill Nye - Lakes and Ponds Season 5 Episode Episode 10 • Bill Nye - Ocean Exploration Season 5 Episode 9 • Bill Nye - Desert Season 4 Episode 12 • Bill Nye - Wetlands Season 3 Episode 17 • https://jr.brainpop.com/science/habitats/arctichabitats/ • https://jr.brainpop.com/science/habitats/freshwaterhabitats/ • https://jr.brainpop.com/science/habitats/oceanhabitats/ • https://jr.brainpop.com/science/plants/partsofaplant/ • https://jr.brainpop.com/science/plants/plantlifecycle/ • https://jr.brainpop.com/science/habitats/desert/ • https://jr.brainpop.com/science/habitats/rainforests/ • https://jr.brainpop.com/science/plants/plantadaptations/ • https://jr.brainpop.com/science/habitats/forests/
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/2-ls2-1-ecosystems-interactions-energy-and-dynamics • https://www.nextgenscience.org/pe/2-ls2-2-ecosystems-interactions-energy-and-dynamics • https://www.nextgenscience.org/pe/2-ls4-1-biological-evolution-unity-and-diversity

Unit Name 2.5	Engineering Design
Estimated Timeline	Sept - June
NGSS	K-2-ETS1-1

	K-2-ETS1-2 K-2-ETS1-3
Student Learning Objectives	• Ask questions, make observations, and gather information about a situation people want to change (e.g. climate change) to define a simple problem that can be solved through the development of a new or improved object or tool. • 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. • Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
Suggested projects, activities, labs used to support content	• Students are asked to design and build a stick that can pollinate plants in the same manner that a bee does. • Use observations and the engineering design process to test a variety of materials and decide which would make the best rain-proof roof for a doghouse.
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • notebook entries • response sheets
Suggested resources	• http://www.nextgenscience.org/ • http://www.brainpopjr.com • http://www.learn360.com • Foss online: http://www.fossweb.com • https://www.teachingchannel.org • Steve Spangler Science: Easy Science Experiments, Science Toys ... • https://www.stevespanglerscience.com/ • Scholastic News (w/ online resource) • Science Spin (w/ online resource) • Rosie Revere, Engineer by, Andrea Beaty • Thomas Edison: Great American Inventor by, Shelley Bedik
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/k-2-ets1-1-engineering-design • https://www.nextgenscience.org/pe/k-2-ets1-2-engineering-design • https://www.nextgenscience.org/pe/k-2-ets1-3-engineering-design

Roseland
Science Department

I. COURSE NAME: Science 3

II. COURSE PREREQUISITES: Science 2

III. GRADE LEVEL(S): 3

IV. COURSE DESCRIPTION:

A. The performance expectations for third grade help students formulate answers to questions such as:"What is typical weather in different parts of the world and during different times of the year? How can the impact of weather-related hazards be reduced? How do organisms vary in their traits? How are plants, animals, and environments? What happens to organisms when their environment changes? How do equal and unequal forces on an object affect the object? How can magnets be used? Third Grade performance expectations include PS2, LS1, LS2, LS3, LS4, ESS2, and ESS3 Disciplinary Core Ideas. Students are able to organize and use data to describe typical weather conditions expected during a particular season. By applying their understanding of weather-related hazards, students are able to make a claim about the merit of a design solution that reduces the impacts of such hazards. Students are expected to develop an understanding of the similarities and differences of organisms' life cycles. An understanding that organisms have different inherited traits, and that the environment can also affect the traits that an organism develops, is acquired by students at this level. In addition, students are able to construct an explanation using evidence for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. Students are expected to develop an understanding of types of organisms that lived long ago and also about the nature of their environments. Third graders are expected to develop an understanding of the idea that when the environment changes some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die. Students are able to determine the effects of balanced and unbalanced forces on the motion of an object and the cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. They are then able to apply their understanding of magnetic interactions to determine a simple design problem that can be solved with magnets. The crosscutting concepts of patterns; cause and effect; scale, proportion, and quantity; systems and system models; interdependence of science, engineering, and technology; and influence of engineering, and technology; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas.

V. COURSE OBJECTIVES:

A. In third grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in asking questions and defining problems; developing and using models, planning and carrying out investigations, analyzing and interpreting data,

constructing explanations and designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of core ideas.

VI. TEXTS/RESOURCES

A. Textbook

B. www.NSTA.org

C. www.nextgenscience.org

D. https://moore-stem.wikispaces.com/3rd+Grade+STEM

E. www.betterlesson.com

VII. EVALUATIONS/ASSESSMENTS

A combination of formative and summative assessments will be utilized in this course including, but not limited to teacher observations, student work and reflections, projects, quizzes and tests, and writing tasks.

VIII. SCOPE AND SEQUENCE (see table below)

This course has been designed with respect to and in compliance with the expectations set forth in the state-approved standards.

VII. Interdisciplinary Connections

Science, engineering, and technology influence and permeate every aspect of modern life. Some knowledge of science and engineering is required to engage with the major public policy issues of today as well as to make informed everyday decisions. In addition, understanding science and the extraordinary insights it has produced can be meaningful and relevant on a personal level, opening new worlds to explore and offering lifelong opportunities for enriching people's lives. In these contexts, learning science is important for everyone, even those who eventually choose careers in fields other than science or engineering.

Science, math, and language arts should complement each other as often as possible. Students will benefit from this cross-curricular relationship as they learn more about the world through exploration, experimentation, and collaboration.

VIII. Integration of the Computer Science & Design Thinking

New approaches necessary for solving the critical challenges that we face as a society will require harnessing the power of technology and computing. Rapidly changing technologies and the proliferation of digital information have permeated and radically transformed learning, working, and everyday life. To be well-educated, global-minded individuals in a computing-intensive world, students must have a clear understanding of the concepts and practices of computer science. As education systems adapt to a vision of students who are not just computer users but also computationally literate creators who are proficient in the concepts and practices of computer science and design thinking, engaging students in computational thinking and human-centered approaches to design through the study of computer science and technology

serves to prepare students to ethically produce and critically consume technology.

Intent and Spirit

All students receive computer science and design thinking instruction from Kindergarten through grade 12. The study of these disciplines focuses on deep understanding of concepts that enable students to think critically and systematically about leveraging technology to solve local and global issues. Authentic learning experiences that enable students to apply content knowledge, integrate concepts across disciplines, develop computational thinking skills, acquire and incorporate varied perspectives, and communicate with diverse audiences about the use and effects of computing prepares New Jersey students for college and careers.

Mission

Computer science and design thinking education prepares students to succeed in today's knowledge-based economy by providing equitable and expanded access to high-quality, standards-based computer science and technological design education.

Vision

All students have equitable access to a rigorous computer science and design thinking education. Students will benefit from opportunities to engage in high-quality technology programs that foster their ability to:

- Develop and apply computational and design thinking to address real-world problems and design creative solutions;
- Engage as collaborators, innovators, and entrepreneurs on a clear pathway to success through postsecondary education and careers;
- Navigate the dynamic digital landscape to become healthy, productive, 21st century global-minded individuals; and
- Participate in an inclusive and diverse computing culture that appreciates and incorporates perspectives from people of different genders, ethnicities, and abilities.

Please note that the concepts and skills previously included in 8.1 Educational Technology of the 2014 NJSLS — Technology have been expanded and integrated across multiple disciplinary concepts in the 2020 NJSLS — Career Readiness, Life Literacies, and Key Skills standard 9.4. Given the ubiquity of technology, our students will continue to be required to demonstrate increasing levels of proficiency to access, manage, evaluate, and synthesize information in their personal, academic, and professional lives. Therefore, the standards that were housed in one discipline have been enhanced and restructured to reflect the continued need for student learning in technology literacy, digital citizenship, and information and media literacy.

The K–12 Computer Science Framework, led by the Association for Computing Machinery, Code.org, Computer Science Teachers Association, Cyber Innovation Center, and National Math and Science Initiative in partnership with states and districts, informed the development of the NJSLS — Computer Science and Design Thinking.

IX. Integration of Career Readiness, Life Literacies and Key Skills

Intent and Spirit

The NJSLS-CLKS provide a framework of concepts and skills to be integrated into the foundational, academic and technical content areas to prepare students to engage in the postsecondary options of their choice. Though the standard for 9.3 Career and Technical Education remains unchanged for now, 9.1 Personal Financial Literacy and 9.2 Career Awareness, Exploration, Preparation, and Training have been revised based on the feedback provided by New Jersey educators.

The personal financial literacy standard promotes not only the exploration of money management but also the psychology of spending and saving that influences decisions related to finances. From discovering the concept and forms of money to exploring lines of credit and types of insurance, these standards ensure a robust and comprehensive education in financial literacy from early elementary grades through high school. A new standard, 9.4 Life Literacies and Key Skills, has been added to ensure our students are prepared with the necessary knowledge, skills and dispositions to thrive in an interconnected global economy. These standards provide students with a guide to interact in life and work regardless of the setting or context.

Mission

Career readiness, life literacies and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.

Vision

An education in career readiness, life literacies, and key skills fosters a population that:

- Continually self-reflects and seeks to improve the essential life and career practices that lead to success;
- Uses effective communication and collaboration skills and resources to interact with a global society;
- Possesses financial literacy and responsibility at home and in the broader community;
- Plans, executes, and alters career goals in response to changing societal and economic conditions; and
- Seeks to attain skill and content mastery to achieve success in a chosen career path.

For students to be college and career ready they must have opportunities to understand career concepts and financial literacy. This includes helping students make informed decisions about their future personal, educational, work, and financial goals. By integrating Standard 9 into instruction, New Jersey students will acquire the necessary academic and life skills to not only achieve individual success but also to contribute to the success of our society. For example: Career Day event, exposure to a variety of careers in the science field, exploration of technology career options, school-wide science fair and science related field trips (e.g. Liberty Science Center, Buehler Science Center and Environmental Centers)
The Standards: Standard 9 is composed of the Career Ready Practices and Standard 9.1, 9.2, and 9.3 which are outlined below:

- The 12 Career Ready Practices

These practices outline the skills that all individuals need to have to truly be adaptable, reflective, and proactive in life and careers. These are researched practices that are essential to career readiness.

- 9.1 Personal Financial Literacy

This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

- 9.2 Career Awareness, Exploration, and Preparation

This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

- 9.3 Career and Technical Education

This standard outlines what students should know and be able to do upon completion of a CTE Program of Study. For students to be college and career ready they must have opportunities to understand career concepts and financial literacy. This includes helping students make informed decisions about their future personal, educational, work, and financial goals. By integrating Standard 9 into instruction, New Jersey students will acquire the necessary academic and life skills to not only achieve individual success but also to contribute to the success of our society.

IX. Integrated accommodations and modifications for students with: IEP and 504:

(For students with disabilities, appropriate accommodations, instructional adaptations, and/or modifications should be determined by the IEP or 504 team)

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Give repetition and practice exercises
- Model skills/techniques to be mastered
- Give extended time to complete class work
- Provide copy of class notes
- Determine if preferential seating would be beneficial
- Provide access to a computer
- Provide copies of textbooks for home
- Provide access to books on tape/CD/digital media, as available and appropriate
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/school communication

Modifications for Homework and Assignments

- Provide extended time to complete assignments
- Break down assignments
- Provide the student with clearly stated (written) expectations and grading criteria for assignments
- Implement RAFT activities as they pertain to the types/modes of communication (role, audience, format, topic)

Modifications for Assessments

- Provide extended time on classroom tests and quizzes
- Provide alternate setting as needed
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests
- Establish procedures for accommodations /modifications for assessments

High Enrichment Program:

- Allow students to pursue independent projects based on their individual interests
- Provide enrichment activities that include more advanced material
- Allow team-teaching opportunities and collaboration
- Set individual goals
- Conduct research and provide presentation of appropriate topics
- Design surveys to generate and analyze data to be used in discussion.

- Use Higher-Level Questioning Techniques
- Provide assessments at a higher level of thinking

English Language Learners:

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Provide repetition and practice
- Model skills/techniques to be mastered

Modifications for Homework/Assignments

- Provide Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary)
- Provide extended time for assignment completion as needed
- Highlight key vocabulary
- Use graphic organizers

SCOPE AND SEQUENCE (see table below)

This course has been designed with respect to and in compliance with the expectations set forth in the state-approved standards.

Beginning of Year Ideas:
Tech in a Bag:

- https://drive.google.com/drive/folders/0ByFBd0Ins-tSbG81ZWNqQVBlNkE

“Those Daren Squirrels” by Adam Rubin

- https://betterlesson.com/lesson/620235/those-darn-squirrels-brainstorming-ideas

“The Most Magnificent Things” by Ashley Spires
“What to do with an Idea” and “What to do with an Idea” by Kobi Yamada

Scope and Sequence of Content and Skills for Science 3

Unit Name	Motion and Stability: Forces and Interactions
Estimated Timeline	8 weeks
Essential Questions	• What forces are acting on an object at rest? • What forces are acting on an object in motion? • How can you change the forces acting on an object? • How can measurements and observations help predict future motion of objects? • How can electric and magnetic interactions between two objects affect the motion of an object? • What simple designs solve problems using magnets?
NGSS	3-PS2-1 3-PS2-2 3-PS2-3 3-PS2-4 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3

Student Learning Objectives (standards)	• Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. • Make observations and/ or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion. • Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. • Define a simple design problem that can be solved by applying scientific ideas about magnets. • Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. • 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. • 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.

Suggested projects, activities, labs used to support content	● Create an investigation to identify and describe the effects of different forces on an object's motion (starting, stopping, changing direction). ● Develop an investigation to change the motion of an object at rest by applying both balanced (forces that sum zero) and unbalanced forces (forces that do not sum to zero) ● Develop models to represent balanced and unbalanced forces ● Describe the motion of an object will be observed and recorded (control strength and vary the direction, control direction and strength, number of trials needed) ● Create an investigation that tests the magnetic pull of a bar magnet at varying distances with the use of paper clips. Students will hypothesize, conduct the experiment, collect the data, and draw conclusions. As a class, students will then compare each team's data and their interpretation of the results. ● Participate in hands-on investigations to observe the phenomena that occurs when an electrically charged comb interacts with cereal and styrofoam pellets. ● Participate in investigation where students will be given a set of everyday objects and asked to make predictions on how far each object will move when they blow on it. They will then measure the distances the objects moved and record their data and observations in their science journals. ● Develop and carry out investigations to answer the following ○ Will magnets work underwater? ○ Can magnets be blocked by certain materials? ○ Is it harder for a magnet to work through solids, liquids, or gases? ○ Is it truly possible to block a magnetic field? ○ Are all metals magnetic? ○ Does the orientation of a magnet affect movement? ○ Does distance between the objects affect movement? ○ Does the size of the objects affect movement? ○ Can magnetism be transferred to other objects? ● Design a car that could move as far as possible with one breath of air only using four Lifesavers, two straws, two paper clips, scissors, tape, and a sheet of paper. ● Design and improved model of an everyday object using a magnet (example being a magnetic latch to keep a door closed) ● Motion and Wind- See Student Recording Sheet ● Lifesaver Model Car- See Student Recording Sheet

Suggested assessments	Students can demonstrate competency with tasks such as: ● Developing and refining models ● Planning and carrying out investigations ● Generating, discussing and analyzing data ● Constructing spoken and written scientific explanations ● Engaging in evidence-based argumentation ● Reflecting on their own understanding ● Notebook entries ● Response sheets ● Focus question answers ● Science and engineering practices checklist ● Rubrics to assess designs and models
Suggested resources	● *Christina Melillo will send Motion and Matter Unit* ● NSTA Resources and Lesson Plans: http://ngss.nsta.org/classroom-resources-results.aspx?CoreIdea=2 ● Design a car investigation: http://static.nsta.org/files/sc1501_34.pdf ● Movement lab http://serc.carleton.edu/sp/mnstep/activities/48587.html ● Static electricity lab https://www.scientificamerican.com/article/bring-science-home-static-electricity-attraction/ ● Magnet lab (distance) http://serc.carleton.edu/sp/mnstep/activities/26850.html ● Build your own ramp challenge https://stemplayground.org/activities/ramp-race/ ● Improve an object using a magnet https://betterlesson.com/lesson/resource/3228140/situations ● Inertia trajectory investigation https://betterlesson.com/lesson/637934/the-law-of-inertia ● Make Magnetic Slime http://frugalfun4boys.com/2014/03/06/make-magnetic-slime/
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	● https://www.nextgenscience.org/pe/3-ps2-1-motion-and-stability-forces-and-interactions ● https://www.nextgenscience.org/pe/3-ps2-2-motion-and-stability-forces-and-interactions ● https://www.nextgenscience.org/pe/3-ps2-3-motion-and-stability-forces-and-interactions ● https://www.nextgenscience.org/pe/3-ps2-4-motion-and-stability-forces-and-interactions ● https://www.nextgenscience.org/pe/3-5-ets1-1-engineering-design ● https://www.nextgenscience.org/pe/3-5-ets1-2-engineering-design ● https://www.nextgenscience.org/pe/3-5-ets1-3-engineering-design

Unit Name	From Molecules to Organisms: Structures and Processes
Estimated Timeline	8 weeks
Essential Questions	● What are the life cycles for birds, reptiles, and fish? ● What are the life cycles for amphibians? ● What are the life cycles for insects? ● What are the life cycles of mammals? ● How do different plants reproduce? ● How do different animals reproduce? ● What are the stages in an organism's life cycle?
NGSS	3-LS1-1 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3
Student Learning Objectives	● Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. ● Students will 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 will 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.

	● Students will 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.
Suggested projects, activities, labs used to support content	● Students will research an organism's life cycle ● Students will develop models (conceptual, physical, and drawings) to represent different animal life cycles. ● Students will develop models with clay to describe the phenomenon (birth, growth, reproduction, death). ● Students will identify patterns across life cycles. ● Students will observe and track the stages in an organism's life cycle using a life specimen in the classroom. ● Students will observe and track the stages in the life cycle of a lima bean plant in a mason jar. ● Differentiate among the stages in the life cycle of a butterfly, mealworm, frog and plant. ● Life cycle museum (students choose a life cycle to research and represent using a model)
Suggested assessments	Students can demonstrate competency with tasks such as: ● developing and refining models ● generating, discussing and analyzing data ● constructing spoken and written scientific explanations ● engaging in evidence-based argumentation ● reflecting on their own understanding ● notebook entries ● response sheets ● focus question answers ● science and engineering practices checklist ● Rubrics to assess designs and projects

Suggested resources	• Lima Bean investigation http://www.myips.org/cms/lib8/IN01906626/Centricity/Domain/8123/2nd%20grade%20Unit%20Plant%20-%20The%20Life%20Cycle%20Of%20A%20Plant.pdf • Mealworm/ Bess Beetle life cycle https://www.wardsci.com/store/product/8880391/ward-s-live-mealworm-larvae-pupae-and-beetles-tenebrio • Tadpole life cycle https://www.homesciencetools.com/grow-a-frog-kit • Scholastic Life Cycle Lessons https://www.scholastic.com/teachers/blog-posts/genia-connell/10-ready-go-resources-teaching-life-cycles • Wisconsin Fast Grow Plant Seeds https://fastplants.org
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/3-ls1-1-molecules-organisms-structures-and-processes • https://www.nextgenscience.org/pe/3-5-ets1-1-engineering-design • https://www.nextgenscience.org/pe/3-5-ets1-2-engineering-design • https://www.nextgenscience.org/pe/3-5-ets1-2-engineering-design

Unit Name	Ecosystems: Interactions, Energy, and Dynamics
Estimated Timeline	3-4 weeks
Essential Questions	• Why do some animals form groups? • What do animals do to survive in their environments? • What do animals need to survive in their environments?
NGSS	3-LS2-1 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3

Student Learning Objectives	• Construct an argument that some animals form groups that help members survive. • Students will 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 will 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. • Students will 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.
Suggested projects, activities, labs used to support content	• Students will participate in “survival game”. Students will be split up and assigned as a specific animals (lone animal, animal in a pack) Students will have a limited time to travel around the room to get food, water, and shelter which are scattered around the room on different colored post-it notes. Students will debrief on the activity, discussing how the animal in a group had an easier time surviving. • Watch videos observing different animals in groups. Write and discuss advantages and disadvantages to living in groups. • Read and discuss articles on animals to identify animal behaviors and the benefits and drawbacks to these behaviors. • Read articles and watch videos to discuss and write about how changes in the environment can affect animals.
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • notebook entries • response sheets • focus question answers • science and engineering practices checklist

Suggested resources	• Reading passages on survival in groups https://betterlesson.com/lesson/632399/animal-groups-benefits-and-disadvantages • Surviving in groups activity https://betterlesson.com/lesson/632602/animal-groups-what-purpose-do-they-serve • Observing animals in groups videos https://betterlesson.com/lesson/632602/animal-groups-what-purpose-do-they-serve • Writing the relationship between predator and prey (coyote/rabbit) https://betterlesson.com/lesson/631543/predator-and-prey-act-it-out • Amazing group behaviors in insects https://betterlesson.com/lesson/632312/amazing-ants-group-behavior-in-insects • Talents of ants https://betterlesson.com/lesson/635052/social-insects-the-many-talents-of-ants • Gorilla survival https://betterlesson.com/lesson/631906/introduction-to-mountain-gorillas • Animal Adaptations http://stem-works.com/subjects/30-the-animal-kingdom/activities/620 • Animal Lifecycles Video http://stem-works.com/subjects/30-the-animal-kingdom/activities/620
"	

Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/3-ls2-1-ecosystems-interactions-energy-and-dynamics • https://www.nextgenscience.org/pe/3-5-ets1-1-engineering-design • https://www.nextgenscience.org/pe/3-5-ets1-2-engineering-design • https://www.nextgenscience.org/pe/3-5-ets1-3-engineering-design

Unit Name	Heredity: Inheritance and Variation of Traits
Estimated Timeline	2-4 weeks

Essential Questions	• What similarities and differences in traits are shared between offspring, parents, and siblings? • What variations on traits are present among plants or animals of the same group? • What patterns can be observed and recorded? • What traits are inherited? • What traits are affected by the environment? • How can traits be affected by the environment?
NGSS	3-LS3-1 3-LS3-2 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3
Student Learning Objectives	• Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. • Use evidence to support the explanation that traits can be influenced by the environment. • Students will 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 will 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.
Suggested projects, activities, labs used to support content	• Students make a claim to support a given explanation of an adaptation/behavior (ex.: nest building, colorful plumage to attract mates, bright flowers). In their claim, students will include the idea that characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. • Students will develop a model (e.g., Punnett squares, diagrams, simulations) of genetic variation in offspring relative to their parents. • Students will use cause-and-effect relationships found in the model between the type of reproduction and the resulting genetic variation to predict that more genetic variation occurs in organisms. • Students will identify inherited traits in partners.

Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • notebook entries • response sheets • focus question answers • science and engineering practices checklist
Suggested resources	• NSTA Resources and Lesson Plans: http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=32 • Inventory of Traits: http://teach.genetics.utah.edu/content/heredity/files/InventoryOfTraits.pdf, http://learn.genetics.utah.edu/content/inheritance/observable/ • Effect of Environment on Plant Growth: http://www.apsnet.org/edcenter/K-12/TeachersGuide/PlantBiotechnology/Pages/Activity7.aspx • Mutations and Variations: http://www.cosee-west.org/AprilLectureMaterials/Activities/Mutations&Variation.pdf • Reproduction Lesson: http://ca.pbslearningmedia.org/resource/tdc02.sci.life.repro.lp_reproduce/reproduction/ • Human Traits • https://drive.google.com/drive/folders/0ByFBd0Ins-tSYTRsSU5Oc0tVRFE • Monster Traits activity
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/3-ls3-1-heredity-inheritance-and-variation-traits • https://www.nextgenscience.org/pe/3-ls3-2-heredity-inheritance-and-variation-traits • https://www.nextgenscience.org/pe/3-5-ets1-1-engineering-design • https://www.nextgenscience.org/pe/3-5-ets1-2-engineering-design • https://www.nextgenscience.org/pe/3-5-ets1-3-engineering-design

Unit Name	Biological Evolution: Unity and Diversity
Estimated Timeline	2-4 weeks
Essential Questions	● What can fossils tell us about organisms and environments long ago? ● How do certain characteristics in living organisms act as advantages for survival and reproduction? ● How do certain characteristics in living organisms act as disadvantages for survival and reproduction? ● What cause and effect relationships are evident between organisms characteristics and their ability to survive, find mates, and reproduce? ● What factors in an organism's habitat affect its ability to survive, find a mate, and reproduce? ● How do environmental changes affect an organism's ability to survive, find a mate, and reproduce?
NGSS	3-LS4-1 3-LS4-2 3-LS4-3 3-LS4-4 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3

Student Learning Objectives	• Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. • Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. • Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. • Make a claim about the merit of a solution to a problem caused with the environment changes and the types of plants and animals that live there may change. • Students will 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 will 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. • Students will 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. • Students will identify how traits can be influenced by environmental factors (food, exercise, water, chemicals, etc.).
Suggested projects, activities, labs used to support content	• Students will compare animals of the same species with different traits to identify advantages and disadvantages. • Students will discuss and write about environmental factors that affect the traits of living things using videos and text. • Students will identify information that can be be concluded from fossils. • Students will look at the size and distribution of fossils to draw conclusions about how land has changed over time. • Students will participate in online-web quests to investigate fossils. • Students will create their own fossils. • Students will analyze real fossils and draw conclusions.

Suggested assessments	Students can demonstrate competency with tasks such as: ● developing and refining models ● generating, discussing and analyzing data ● constructing spoken and written scientific explanations ● engaging in evidence-based argumentation ● reflecting on their own understanding ● notebook entries ● response sheets ● focus question answers ● science and engineering practices checklist
Suggested resources	● Inherited Traits in Animals: ● http://cals.arizona.edu/fps/sites/cals.arizona.edu.fps/files/education/juniors_tree.pdf ● What Made a Giraffe Decide to be Tall https://api.betterlesson.com/mtp/lesson/629946/print ● What does the Walrus do when the Ice is Gone? https://api.betterlesson.com/mtp/lesson/629946/print ● Colorful Clams https://betterlesson.com/lesson/630994/colorful-clams ● Animals that can't adapt ● https://betterlesson.com/lesson/631920/vanishing-vaquita-in-the-sea-of-cortez ● Fish of the Same Species with different traits https://betterlesson.com/lesson/627426/fish-vertebrates-of-the-sea ● Awesome Bird Traits https://betterlesson.com/lesson/627509/awesome-bird-traits ● What can we learn from a bird dog ● https://betterlesson.com/lesson/resource/3174805/bear-dogs-reading-passage ● Interpreting Fossil Records https://api.betterlesson.com/mtp/lesson/635846/print ● How Our Land has Changed over Time https://api.betterlesson.com/mtp/lesson/638823/print ● Make a fossil model http://serc.carleton.edu/sp/mnstep/activities/27092.html ● What can fossils tell us about organisms and environments long ago? Video Intro: http://study.com/academy/lesson/using-fossil-evidence-to-evaluate-changes-in-environment-life-conditions.html

Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/3-ls4-1-biological-evolution-unity-and-diversity • https://www.nextgenscience.org/pe/3-ls4-2-biological-evolution-unity-and-diversity • https://www.nextgenscience.org/pe/3-ls4-3-biological-evolution-unity-and-diversity • https://www.nextgenscience.org/pe/3-ls4-4-biological-evolution-unity-and-diversity • https://www.nextgenscience.org/pe/3-5-ets1-1-engineering-design • https://www.nextgenscience.org/pe/3-5-ets1-2-engineering-design • https://www.nextgenscience.org/pe/3-5-ets1-3-engineering-design

Unit Name	Earth's Systems
Estimated Timeline	2-3 weeks
Essential Questions	• What is the average temperature and precipitation within a region? • What patterns in weather can be recorded across different times and areas? • What are typical weather conditions in different areas? • How can patterns in climate predict typical weather conditions?
NGSS	3-ESS2-1 3-ESS2-2 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3

Student Learning Objectives	• Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. • Obtain and combine information to describe climates in different regions of the world. • Students will 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 will 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. • Students will 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.
Suggested projects, activities, labs used to support content	• Students will research and record data on the weather and climate in another region of the world. • Students will measure temperature, precipitation, and wind direction using weather tools. • Students will graph typical weather patterns for the region in which they live. • Students will predict weather patterns based on patterns and preview year's data.
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • notebook entries • response sheets • focus question answers • science and engineering practices checklist

Suggested resources	• Difference between weather and climate: http://www3.epa.gov/climatechange/kids/documents/weather-climate.pdf • Weather vs Climate & video from NatGeo https://www.ck12.org/earth-science/Weather-versus-Climate/lesson/Weather-versus-Climate/?referrer=concept_details • Multiple topics under weather and climate http://climatekids.nasa.gov/next-generation-standards/review/ • Climate change over time http://www3.epa.gov/climatechange/kids/documents/temp-and-co2.pdf • Analyzing tree rings to look at climate change over time http://www3.epa.gov/climatechange/kids/documents/tree-rings.pdf And http://climate.nasa.gov/climate_resources/25/ • https://api.betterlesson.com/mtp/lesson/636909/print • Researching Climate • https://betterlesson.com/lesson/636484/researching-climate-data • Make Your own Barometer http://www.weatherwizkids.com/experiments-barometer.htm • Blue Sky Experiment http://www.weatherwizkids.com/experiments-bluesky.htm • Make Fog in a Jar http://stem-works.com/external/activity/418 • Make a Rain Gauge http://stem-works.com/external/activity/247 • Magic School Bus weather http://stem-works.com/external/activity/137 • Make it Rain Experiment http://stem-works.com/external/activity/225
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/3-ess2-1-earths-systems • https://www.nextgenscience.org/pe/3-ess2-2-earths-systems • https://www.nextgenscience.org/pe/3-5-ets1-1-engineering-design • https://www.nextgenscience.org/pe/3-5-ets1-2-engineering-design • https://www.nextgenscience.org/pe/3-5-ets1-3-engineering-design

Unit Name	Earth and Human Activity
Estimated Timeline	1 week
Essential Questions	• How can humans take steps to help reduce the impacts of natural hazards? • What design solutions exist to help reduce the impacts of weather-related hazards? • What could you design to help reduce the impacts of a particular weather-related hazard?
NGSS	3-ESS3-1 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3
Student Learning Objectives	• Will make a claim about the merit of a design that reduces the impacts of climate change and/or a weather-related hazard. • Students will 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 will 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. • Students will 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.
Suggested projects, activities, labs used to support content	• Students will design solutions to prevent weather-related hazards (barriers for flooding, wind resistant roofs, etc.) • Identify hazards and problems caused by weather. • Identify cause and effect relationships associated with weather related hazards. • Research recent natural disasters and the hazardous effects. Identify solutions that were used to solve these issues.

Suggested assessments	Students can demonstrate competency with tasks such as: ● developing and refining models ● generating, discussing and analyzing data ● constructing spoken and written scientific explanations ● engaging in evidence-based argumentation ● reflecting on their own understanding ● notebook entries ● response sheets ● focus question answers ● science and engineering practices checklist
Suggested resources	Building a Bridge - http://www.playdoughtoplato.com/stem-project-straw-bridges/ Flood protection design ● https://betterlesson.com/lesson/634338/protect-my-home ● Building an earthquake resistant structure ● https://betterlesson.com/lesson/636080/building-an-earthquake-resistant-structure ● https://betterlesson.com/lesson/635940/designing-an-earthquake-resistant-structure ● http://teachers.egfi-k12.org/activity-earthquake-proof-structure/ ● Tacoma Narrows Bridge Collapse "Gallopin' Gertie" ○ https://www.youtube.com/watch?v=j-zczJXSxnw ○ http://ngss.nsta.org/classroom-resources-results.aspx?CoreIdea=5
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	● https://www.nextgenscience.org/pe/3-5-ets1-1-engineering-design ● https://www.nextgenscience.org/pe/3-5-ets1-2-engineering-design ● https://www.nextgenscience.org/pe/3-5-ets1-3-engineering-design ● https://www.nextgenscience.org/pe/3-ess3-1-earth-and-human-activity

West Essex Consortium Curriculum
Essex Fells, Fairfield, North Caldwell, Roseland
Science Department

I. COURSE NAME: Science 4

II. COURSE PREREQUISITES: Science 3

III. GRADE LEVEL(S): 4

IV. COURSE DESCRIPTION:

The performance expectations in fourth grade help students formulate answers to questions such as: “What are waves and what are some things they can do? How can water, ice, wind and vegetation change the land? What patterns of Earth’s features can be determined with the use of maps? How do internal and external structures support the survival, growth, behavior, and reproduction of plants and animals? What is energy and how is it related to motion? How is energy transferred? How can energy be used to solve a problem? Fourth grade performance expectations include PS3, PS4, LS1, ESS1, ESS2, ESS3, and ETS1 Disciplinary Core Ideas from the NRC Framework. Students are able to use a model of waves to describe patterns of waves in terms of amplitude and wavelength, and that waves can cause objects to move. Students are expected to develop understanding of the effects of weathering or the rate of erosion by water, ice, wind, and vegetation. They apply their knowledge of natural Earth processes to generate and compare multiple solutions to reduce the impacts of such processes on humans. In order to describe patterns of Earth’s features, students analyze and interpret data from maps. Fourth graders are expected to develop an understanding that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. By developing a model, they describe that an object can be seen when light reflected from its surface enters the eye. Students are able to use evidence to construct an explanation of the relationship between the speed of an object and the energy of that object. Students are expected to develop an understanding that energy can be transferred from place to place by sound, light, heat, and electric currents or from object to object through collisions. They apply their understanding of energy to design, test, and refine a device that converts energy from one form to another. The crosscutting concepts of patterns;cause and effect; energy and matter;systems and system models; interdependence of science on society and the natural world are called out as organizing concepts for these disciplinary core ideas.

V. COURSE OBJECTIVES:

In the fourth grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of the core ideas.

VI. TEXTS/RESOURCES

F. **https://www.wastatelaser.org/science-notebooks/**

G. www.NSTA.org

H. www.nextgenscience.org

I. www.njctl.org

J. www.eie.org Engineering is Elementary

VII. EVALUATIONS/ASSESSMENTS

A combination of formative and summative assessments will be utilized in this course including, but not limited to teacher observations, student work and reflections, projects, quizzes and tests, and writing tasks.

VIII. SCOPE AND SEQUENCE (see table below)

This course has been designed with respect to and in compliance with the expectations set forth in the state-approved standards.

IX. Interdisciplinary Connections

Science, engineering, and technology influence and permeate every aspect of modern life. Some knowledge of science and engineering is required to engage with the major public policy issues of today as well as to make informed everyday decisions. In addition, understanding science and the extraordinary insights it has produced can be meaningful and relevant on a personal level, opening new worlds to explore and offering lifelong opportunities for enriching people's lives. In these contexts, learning science is important for everyone, even those who eventually choose careers in fields other than science or engineering.

Science, math, and language arts should complement each other as often as possible. Students will benefit from this cross-curricular relationship as they learn more about the world through exploration, experimentation, and collaboration.

X. Integration of the Computer Science & Design Thinking

New approaches necessary for solving the critical challenges that we face as a society will require harnessing the power of technology and computing. Rapidly changing technologies and the proliferation of digital information have permeated and radically transformed learning, working, and everyday life. To be well-educated, global-minded individuals in a computing-intensive world, students must have a clear understanding of the concepts and practices of computer science. As education systems adapt to a vision of students who are not just computer users but also computationally literate creators who are proficient in the concepts and practices of computer science and design thinking, engaging students in computational thinking and human-centered approaches to design through the study of computer science and technology serves to prepare students to ethically produce and critically consume technology.

Intent and Spirit

All students receive computer science and design thinking instruction from Kindergarten through grade 12. The study of these disciplines focuses on deep understanding of concepts that enable students to think critically and systematically about leveraging technology to solve local and global issues. Authentic learning experiences that enable students to apply content knowledge, integrate concepts across disciplines, develop computational thinking skills, acquire and incorporate varied perspectives, and communicate with diverse audiences about the use and effects of computing prepares New Jersey students for college and careers.

Mission

Computer science and design thinking education prepares students to succeed in today's knowledge-based economy by providing equitable and expanded access to high-quality, standards-based computer science and technological design education.

Vision

All students have equitable access to a rigorous computer science and design thinking education. Students will benefit from opportunities to engage in high-quality technology programs that foster their ability to:

- Develop and apply computational and design thinking to address real-world problems and design creative solutions;
- Engage as collaborators, innovators, and entrepreneurs on a clear pathway to success through postsecondary education and careers;
- Navigate the dynamic digital landscape to become healthy, productive, 21st century global-minded individuals; and
- Participate in an inclusive and diverse computing culture that appreciates and incorporates perspectives from people of different genders, ethnicities, and abilities.

Please note that the concepts and skills previously included in 8.1 Educational Technology of the 2014 NJSLS — Technology have been expanded and integrated across multiple disciplinary concepts in the 2020 NJSLS — Career Readiness, Life Literacies, and Key Skills standard 9.4. Given the ubiquity of technology, our students will continue to be required to demonstrate increasing levels of proficiency to access, manage, evaluate, and synthesize information in their personal, academic, and professional lives. Therefore, the standards that were housed in one discipline have been enhanced and restructured to reflect the continued need for student learning in technology literacy, digital citizenship, and information and media literacy.

The K–12 Computer Science Framework, led by the Association for Computing Machinery, Code.org, Computer Science Teachers Association, Cyber Innovation Center, and National Math and Science Initiative in partnership with states and districts, informed the development of the NJSLS — Computer Science and Design Thinking.

XI. Integration of Career Readiness, Life Literacies and Key Skills

Intent and Spirit

The NJSLS-CLKS provide a framework of concepts and skills to be integrated into the foundational, academic and technical content areas to prepare students to engage in the postsecondary options of their choice. Though the standard for 9.3 Career and Technical Education remains unchanged for now, 9.1 Personal Financial Literacy and 9.2 Career Awareness, Exploration, Preparation, and Training have been revised based on the feedback provided by New Jersey educators.

The personal financial literacy standard promotes not only the exploration of money management but also the psychology of spending and saving that influences decisions related to finances. From discovering the concept and forms of money to exploring lines of credit and types of insurance, these standards ensure a robust and comprehensive education in financial literacy from early elementary grades through high school. A new standard, 9.4 Life Literacies and Key Skills, has been added to ensure our students are prepared with the necessary knowledge, skills and dispositions to thrive in an interconnected global economy. These standards provide students with a guide to interact in life and work regardless of the setting or context.

Mission

Career readiness, life literacies and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.

Vision

An education in career readiness, life literacies, and key skills fosters a population that:

- Continually self-reflects and seeks to improve the essential life and career practices that lead to success;
- Uses effective communication and collaboration skills and resources to interact with a global society;
- Possesses financial literacy and responsibility at home and in the broader community;
- Plans, executes, and alters career goals in response to changing societal and economic conditions; and
- Seeks to attain skill and content mastery to achieve success in a chosen career path.

For students to be college and career ready they must have opportunities to understand career concepts and financial literacy. This includes helping students make informed decisions about their future personal, educational, work, and financial goals. By integrating Standard 9 into instruction, New Jersey students will acquire the necessary academic and life skills to not only achieve individual success but also to contribute to the success of our society. For example: Career Day event, exposure to a variety of careers in the science field, exploration of technology career options, school-wide science fair and science related field trips (e.g. Liberty Science Center, Buehler Science Center and Environmental Centers)
The Standards: Standard 9 is composed of the Career Ready Practices and Standard 9.1, 9.2, and 9.3 which are outlined below:

- The 12 Career Ready Practices

These practices outline the skills that all individuals need to have to truly be adaptable, reflective, and proactive in life and careers. These are researched practices that are essential to career readiness.

- 9.1 Personal Financial Literacy

This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

- 9.2 Career Awareness, Exploration, and Preparation

This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

- 9.3 Career and Technical Education

This standard outlines what students should know and be able to do upon completion of a CTE Program of Study. For students to be college and career ready they must have opportunities to understand career concepts and financial literacy. This includes helping students make informed decisions about their future personal, educational, work, and financial goals. By integrating Standard 9 into instruction, New Jersey students will acquire the necessary academic and life skills to not only achieve individual success but also to contribute to the success of our society.

SCOPE AND SEQUENCE (see table below)

This course has been designed with respect to and in compliance with the expectations set forth in the state-approved standards. `

Alternate Curriculum map

1. http://www.fortsmithschools.org/Portals/20/Content/Science%202016-17/Fourth%20Grade/Fourth%20Grade%20Year%20at%20a%20Glance.pdf

2. State Map
http://www.nj.gov/education/modelcurriculum/sci/4.shtml

3. http://www.livebinders.com/play/play?id=948826

Scope and Sequence of Content and Skills for Science 4

Unit Name	Earth's Place in the Universe
Estimated Timeline	September-October
Essential Questions (obtain from learning objectives)	• What can fossils tell us about history? • How do wind, water, and ice shape the land? • What is the difference between weathering and erosion? • How do fossils form? • What evidence of erosion can you see around you? • How can maps be used to describe patterns in our landforms? • What is a natural resource? • How are renewable resources different from non-renewable resources? • What resources do humans use from the earth? What impact does using these resources have on our environment? • How do humans survive Earth's natural events?
NGSS	4-ESS1-1 4-ESS2-1 4-ESS2-2 4-ESS3-1 4-ESS3-2
Student Learning Objectives **standards**	• Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. • Make observations and measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. • Analyze and interpret data from maps to describe patterns of Earth's features. • Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. • Generate and compare multiple solutions to reduce the impact of natural Earth processes on humans.

Suggested projects, activities, labs used to support content with applicable resource links	• Students will examine samples of fossils, as well as photographs of rock layers, and write a story about how the landforms have changed over time, and what the landscapes may have been like many years ago. • Students will create fossils using plastic insects and clay - molding the clay with various amounts of weight. Determine the minimum amount of weight needed to create the ideal fossil impression. Discuss the relationship between the weight applied and the layers of sedimentary rock in the earth. • Students will create models of landforms and simulate the effect of different forms of erosion, changing variables for each simulation. Wind, water, and ice will be used on the model landforms to determine the features and effects created. (use stream tables) • Students will measure the effects of different forms of erosion from the models and draw conclusions based on the data. http://www.discoveryeducation.com/teachers/free-lesson-plans/the-grand-canyon.cfm • Students will watch a video comparing satellite views of the Earth over time. • Students will examine maps of the Earth and it's features. Look for patterns and identify features and where they occur. • Students will read articles about natural events and the impacts on communities. (focus on areas near bodies of water for most impact) • Students will create an emergency preparedness kit for handling the impact of natural events/disasters • Save our City - https://www.teachengineering.org/activities/view/cub_natdis_lesson01_activity1 natural disaster prevention • Students will create/build building models that can withstand an earthquake https://www.teachengineering.org/activities/view/cub_natdis_lesson03_activity1 (Earthquake proof building) • Students will build "house of cards" that will remains sturdy when placed under pressure for period of time. (engineering challenge) • Students will build sand castles with combinations of types of sand and glue and design an experiment to determine how well they hold up to weathering. https://www.teachengineering.org/activities/view/cub_earth_lesson1_activity1 (three little pigs sand houses) • Students will read/research the grand canyon and discuss impacts over time http://www.discoveryeducation.com/teachers/free-lesson-plans/the-grand-canyon.cfm (examining the grand canyon) • Students will identify natural hazards in a fictional country and make decisions on where to place scientific devices to help prevent disaster https://www.teachengineering.org/activities/view/cub_natdis_lesson01_activity1 • Birth of rocks 4 week unit of study https://mysteryscience.com/rocks/rock-cycle-erosion-natural-hazards • Oil spill activity - human impact of natural resources https://www.calacademy.org/educators/lesson-plans/slippery-shores-oil-spill-clean-up • Carving out the landscape, http://teachers.egfi-k12.org/road-warriors/

	• Rocks and minerals http://www.livebinders.com/play/play?id=759827
Suggested assessments	Students can demonstrate competency with tasks such as: • Designing, building and refining models • Generating, discussing and analyzing data • Constructing spoken and written scientific explanations • Writing arguments to support scientific evidence • Reflecting on their own understanding • Notebook entries • Response sheets • Focus question answers • Science and engineering practices checklist
Additional Suggested resources	• http://www.earthsciweek.org/classroom-activities/ngss (general resource)
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/4-ess1-1-earths-place-universe • https://www.nextgenscience.org/pe/4-ess2-1-earths-systems • https://www.nextgenscience.org/pe/4-ess2-2-earths-systems • https://www.nextgenscience.org/pe/4-ess3-1-earth-and-human-activity • https://www.nextgenscience.org/pe/4-ess3-2-earth-and-human-activity

Unit Name	Energy
Estimated Timeline	November-January
Essential Questions	• What is energy? • How is energy transferred between objects? • What are some examples of energy around you? • How can energy be converted from one form to another? •
NGSS	4-PS3-1 4-PS3-2 4-PS3-3 4-PS3-4
Student Learning Objectives	• Use evidence to construct an explanation relating the speed of an object to the energy in that object. • Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. • Ask questions and predict outcomes about the changes in energy that occur when objects collide. • Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
Suggested projects, activities, resources, labs used to support content	• Students will design an experiment to test the energy in a moving object by measuring and evaluating the impact the moving object has on a second, stationary object. • Students will build spool racers that will transfer stored energy in a rubber band to kinetic energy in the moving spool racer. Students will write a reflection relating the speed of the racer (measured) to the amount of energy in the rubber band.https://www.teachengineering.org/activities/view/ucd_energy_lesson01_activity1 (spool racer design challenge) • Students will be provided materials to build model circuits converting energy in a battery into light. • Students will convert solar energy to produce workable oven https://www.homesciencetools.com/a/build-a-solar-oven-project/ • Students will explore the amount of energy needed to bounce various types of balls at different heights(golf ball and ping pong ball activity, see attached 5e model lesson plan • Students will demonstrate the transfer of energy from colored paper to an ice cube. See attached 5e model lesson plan • Students will explore principles of energy related to electricity. https://educators.brainpop.com/lesson-plan/electricity-lesson-plan-exploring-currents-circuits-electromagnetism/ • How does height affect the distance a car

	travels:http://teachertech.rice.edu/Participants/louviere/Newton/hotwheels.html • Students will examine the differences between sound energy in solids, liquids, and gases https://www.teachengineering.org/activities/view/cub_energy2_lesson05_activity2 • Students will design and test gliders to obtain the maximum amount of distance. Students will modify and redesign to gain 10% distance over original design. (see Pearson, Interactive Science) • Penny experiment. Penny Experiment
Suggested assessments	Students can demonstrate competency with tasks such as: • Designing, building and refining models • Generating, discussing and analyzing data • Constructing spoken and written scientific explanations • Writing arguments to support scientific evidence • Reflecting on their own understanding • Notebook entries • Response sheets • Focus question answers • Science and engineering practices checklist
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/4-ps3-1-energy • https://www.nextgenscience.org/pe/4-ps3-2-energy • https://www.nextgenscience.org/pe/4-ps3-3-energy • https://www.nextgenscience.org/pe/4-ps3-4-energy

Unit Name	Waves and their Applications
Estimated Timeline	February-March
Essential Questions	• What are waves? • How can you describe the patterns in waves? • What are the parts of a wave? • How can waves affect the motion of an object? • How does light (and changing light) impact the ability of objects to be seen? • What is reflection/refraction? How do they affect how we see things? • How do our eyes see objects?
NGSS	4-PS4-1 4-PS4-2 4-PS4-3
Student Learning Objectives	• Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. • Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. • Generate and compare multiple solutions that use patterns to transfer information.
Suggested projects, activities, labs used to support content	• Students will model waves in water and describe the origin of the wave and the effect of the wave https://www.eduplace.com/rdg/gen_act/ocean/wave.html • Students will demonstrate how force changes a waves amplitude and its ability to move an object. https://api.betterlesson.com/mtp/lesson/636706/print • Students will apply their knowledge of waves (sound, light) to communicate through non verbal means https://api.betterlesson.com/mtp/lesson/630476/print • Students will build/examine a model of the human eye and describe how light is responsible to seeing objects. • Waves unit: https://learning-in-action.williams.edu/opportunities/elementary-outreach/science-lessons/4th-grade-waves-unit/ • Unit lessons: http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=16 • Model waves in 2 liter bottles with a cork inside and examine what happens to the cork https://api.betterlesson.com/mtp/lesson/636706/print

Suggested assessments	Students can demonstrate competency with tasks such as: ● developing and refining models ● generating, discussing and analyzing data ● constructing spoken and written scientific explanations ● engaging in evidence-based argumentation ● reflecting on their own understanding ● notebook entries ● response sheets ● focus question answers ● science and engineering practices checklist
Additional Suggested resources	● Betterlesson.com
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	● https://www.nextgenscience.org/pe/4-ps4-1-waves-and-their-applications-technologies-information-transfer ● https://www.nextgenscience.org/pe/4-ps4-2-waves-and-their-applications-technologies-information-transfer ● https://www.nextgenscience.org/pe/4-ps4-3-waves-and-their-applications-technologies-information-transfer

Unit Name	From Molecules to Organisms: Structures and Processes
Estimated Timeline	April-June
Essential Questions	• What do plants and animals need to survive? • How do internal and external structures support life? • What is a system? • How do these structures/systems work together? • Why do living things need to sense? • What do living things sense? • How does sensory information guide actions of a living thing? • What are sense receptors?
NGSS	4-LS-1 4-LS-2
Student Learning Objectives	• Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. • Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
Suggested projects, activities, labs used to support content	• Students will identify structures useful to animals and describe their functions in survival • Create diagram of plant structures • Students will identify structures useful to plants and describe their functions in survival • Students will watch brain pop videos on various human body systems and play guts and bolts to connect the systems so that they function in a working order. • Students will make a model lung and describe its function in the body and how it assists in a larger system needed for survival • Students will examine camouflage through an activity designed to hide worm from a “bird” based on their color • . Students will use information they know and have learned about bones to apply to an unknown creature by assembling the bone structure and making inferences https://api.betterlesson.com/mtp/lesson/631974/print • Students will use their sense of touch only, to describe unknown objects https://api.betterlesson.com/mtp/lesson/615769/print • “Dissect a Lima Bean” activity: http://buggyandbuddy.com/dissect-a-bean-seed-science-invitation-saturday/ • Use this bird beak adaptation activity to have students examine how easily different shaped beaks pick up food for birds. This is a 7th grade activity, adapt to 4th grade http://www.vrml.k12.la.us/7th/7SC_By_Unit/unit5/act1/7SC_Un5Act1.htm

	• vity&pc=cosp&ptag=C1A68A4E9EB38&form=CONMHP&conlogo=CT3210127&adlt=strict
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • notebook entries • response sheets • focus question answers • science and engineering practices checklist
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/dci-arrangement/4-ls1-molecules-organisms-structures-and-processes • https://www.nextgenscience.org/pe/4-ls1-2-molecules-organisms-structures-and-processes

West Essex Consortium Curriculum
Essex Fells, Fairfield, North Caldwell, Roseland
Science Department

I. COURSE NAME: Science 5

II. COURSE PREREQUISITES: Science 4

III. GRADE LEVEL(S): 5

IV. COURSE DESCRIPTION:

The performance expectations in fifth grade help students formulate answers to questions such as: “When matter changes, does its weight change? How much water can be found in different places on Earth? Can new substances be created by combining other substances? How does matter cycle through ecosystems? Where does the energy in food come from and what is it used for? How do lengths and directions of shadows or relative lengths of day and night change from day to day, and how does the appearance of some stars change in different seasons?” Fifth grade performance expectations include PS1, PS2, PS3, LS1, LS2, ESS1, ESS2, and ESS3 Disciplinary Core Ideas from the NRC Framework. Students are able to describe that matter is made of particles too small to be seen through the development of a model. Students develop an understanding of the idea that regardless of the type of change that matter undergoes, the total weight of matter is conserved. Students determine whether the mixing of two or more substances results in new substances. Through the development of a model using an example, students are able to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. They describe and graph data to provide evidence about the distribution of water on Earth. Students develop an understanding of the idea that plants get the materials they need for growth chiefly from air and water. Using models, students can describe the movement of matter among plants, animals, decomposers, and the environment and that energy in animals’ food was once energy from the sun. Students are expected to develop an understanding of patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. The crosscutting concepts of patterns; cause and effect; scale, proportion, and quantity; energy and matter; and systems and systems models are called out as organizing concepts for these disciplinary core ideas.

V. COURSE OBJECTIVES:

In the fifth grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, engaging in argument from evidence, and obtaining, evaluating, and communicating information; and to use these practices to demonstrate understanding of the core ideas.

VII. TEXTS/RESOURCES

K. **https://www.wastatelaser.org/science-notebooks/**

L. www.NSTA.org

M. www.nextgenscience.org

N. www.njctl.org

O. www.eie.org Engineering is Elementary

XIII. EVALUATIONS/ASSESSMENTS

A combination of formative and summative assessments will be utilized in this course including, but not limited to teacher observations, student work and reflections, projects, quizzes and tests, and writing tasks.

XIV. SCOPE AND SEQUENCE (see table below)

This course has been designed with respect to and in compliance with the expectations set forth in the state-approved standards.

XV. Interdisciplinary Connections

Science, engineering, and technology influence and permeate every aspect of modern life. Some knowledge of science and engineering is required to engage with the major public policy issues of today as well as to make informed everyday decisions. In addition, understanding science and the extraordinary insights it has produced can be meaningful and relevant on a personal level, opening new worlds to explore and offering lifelong opportunities for enriching people's lives. In these contexts, learning science is important for everyone, even those who eventually choose careers in fields other than science or engineering.

Science, math, and language arts should complement each other as often as possible. Students will benefit from this cross-curricular relationship as they learn more about the world through exploration, experimentation, and collaboration.

XVI. Integration of the Computer Science & Design Thinking

New approaches necessary for solving the critical challenges that we face as a society will require harnessing the power of technology and computing. Rapidly changing technologies and the proliferation of digital information have permeated and radically transformed learning, working, and everyday life. To be well-educated, global-minded individuals in a computing-intensive world, students must have a clear understanding of the concepts and practices of computer science. As education systems adapt to a vision of students who are not just computer users but also computationally literate creators who are proficient in the concepts and practices of computer science and design thinking, engaging students in computational thinking and human-centered approaches to design through the study of computer science and technology serves to prepare students to ethically produce and critically consume technology.

Intent and Spirit

All students receive computer science and design thinking instruction from Kindergarten through grade 12. The study of these disciplines focuses on deep understanding of concepts that enable students to think critically and systematically about leveraging technology to solve local and global issues. Authentic learning experiences that enable students to apply content knowledge, integrate concepts across disciplines, develop computational thinking skills, acquire and incorporate varied perspectives, and communicate with diverse audiences about the use and effects of computing prepares New Jersey students for college and careers.

Mission

Computer science and design thinking education prepares students to succeed in today's knowledge-based economy by providing equitable and expanded access to high-quality, standards-based computer science and technological design education.

Vision

All students have equitable access to a rigorous computer science and design thinking education. Students will benefit from opportunities to engage in high-quality technology programs that foster their ability to:

- Develop and apply computational and design thinking to address real-world problems and design creative solutions;
- Engage as collaborators, innovators, and entrepreneurs on a clear pathway to success through postsecondary education and careers;
- Navigate the dynamic digital landscape to become healthy, productive, 21st century global-minded individuals; and
- Participate in an inclusive and diverse computing culture that appreciates and incorporates perspectives from people of different genders, ethnicities, and abilities.

Please note that the concepts and skills previously included in 8.1 Educational Technology of the 2014 NJSLS — Technology have been expanded and integrated across multiple disciplinary concepts in the 2020 NJSLS — Career Readiness, Life Literacies, and Key Skills standard 9.4. Given the ubiquity of technology, our students will continue to be required to demonstrate increasing levels of proficiency to access, manage, evaluate, and synthesize information in their personal, academic, and professional lives. Therefore, the standards that were housed in one discipline have been enhanced and restructured to reflect the continued need for student learning in technology literacy, digital citizenship, and information and media literacy.

The K–12 Computer Science Framework, led by the Association for Computing Machinery, Code.org, Computer Science Teachers Association, Cyber Innovation Center, and National Math and Science Initiative in partnership with states and districts, informed the development of the NJSLS — Computer Science and Design Thinking.

XVII. Integration of Career Readiness, Life Literacies and Key Skills

Intent and Spirit

The NJSLS-CLKS provide a framework of concepts and skills to be integrated into the foundational, academic and technical content areas to prepare students to engage in the postsecondary options of their choice. Though the standard for 9.3 Career and Technical Education remains unchanged for now, 9.1 Personal Financial Literacy and 9.2 Career Awareness, Exploration, Preparation, and Training have been revised based on the feedback provided by New Jersey educators.

The personal financial literacy standard promotes not only the exploration of money management but also the psychology of spending and saving that influences decisions related to finances. From discovering the concept and forms of money to exploring lines of credit and types of insurance, these standards ensure a robust and comprehensive education in financial literacy from early elementary grades through high school. A new standard, 9.4 Life Literacies and Key Skills, has been added to ensure our students are prepared with the necessary knowledge, skills and dispositions to thrive in an interconnected global economy. These standards provide students with a guide to interact in life and work regardless of the setting or context.

Mission

Career readiness, life literacies and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.

Vision

An education in career readiness, life literacies, and key skills fosters a population that:

- Continually self-reflects and seeks to improve the essential life and career practices that lead to success;
- Uses effective communication and collaboration skills and resources to interact with a global society;
- Possesses financial literacy and responsibility at home and in the broader community;
- Plans, executes, and alters career goals in response to changing societal and economic conditions; and
- Seeks to attain skill and content mastery to achieve success in a chosen career path.

For students to be college and career ready they must have opportunities to understand career concepts and financial literacy. This includes helping students make informed decisions about their future personal, educational, work, and financial goals. By integrating Standard 9 into instruction, New Jersey students will acquire the necessary academic and life skills to not only achieve individual success but also to contribute to the success of our society. For example: Career Day event, exposure to a variety of careers in the science field, exploration of technology career options, school-wide science fair and science related field trips (e.g. Liberty Science Center, Buehler Science Center and Environmental Centers)
The Standards: Standard 9 is composed of the Career Ready Practices and Standard 9.1, 9.2, and 9.3 which are outlined below:

- The 12 Career Ready Practices

These practices outline the skills that all individuals need to have to truly be adaptable, reflective, and proactive in life and careers. These are researched practices that are essential to career readiness.

- 9.1 Personal Financial Literacy

This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

- 9.2 Career Awareness, Exploration, and Preparation

This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

- 9.3 Career and Technical Education

This standard outlines what students should know and be able to do upon completion of a CTE Program of Study. For students to be college and career ready they must have opportunities to understand career concepts and financial literacy. This includes helping students make informed decisions about their future personal, educational, work, and financial goals. By integrating Standard 9 into instruction, New Jersey students will acquire the necessary academic and life skills to not only achieve individual success but also to contribute to the success of our society.

SCOPE AND SEQUENCE (see table below)

This course has been designed with respect to and in compliance with the expectations set forth in the state-approved standards.

Scope and Sequence of Content and Skills for Science 5

Unit Name	Earth's Place in the Universe (Forces integrated)
Estimated Timeline	February - April
Essential Questions	• If an object is initially stationary, why does it move downward when released? • Why do some stars appear brighter in the night sky? • How do objects move in space? • What patterns are created by Earth's orbit around the sun? • How and why does your shadow change during the day?
NGSS	5-PS2-1 5-ESS1-1 5-ESS1-2 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3
Student Learning Objectives	• Support an argument that the gravitational force exerted by Earth on objects is directed down. • Support an argument that difference in the apparent brightness of the sun compared to other stars is due to their relative distance from Earth. • Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. • Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. • 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. • 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.
Suggested projects, activities, labs used to support content, and resources	• Students construct a size-distance scale model of the solar system (distance scale limited to distance from the sun to Earth). Given a model sun, students will make predictions of the size of Earth in relation to the model sun. The students will locate Earth's distance from the sun. ○ http://www.exploratorium.edu/ronh/solar_system/ • Students will use their bodies and movements to model the relationship between time and astronomical motions of Earth (rotation on its axis and orbit around the sun) as well as how these motions affect our view of objects in the sky at various times of day and year. Earth's rotation causes day and night as well as the daily pattern of the sun's apparent motion and altitude relative to the horizon. ○ Earth's Tilt ○ Earth's Tilt 2 ○ Earth's Orbit Simulation Website • Students will use a light and moon model to determine the phases of the moon, and make a phases of the moon chart to summarize their

	results. • Kids Discover: Galaxies • iPad app: Solar Walk • Life and Death of a Star • Extend: Planet Research Paper • Shadow Shifting*: Students will trace their shadows in the morning and afternoon, and compare tracings. They will use this information to determine the position of the Sun as it appears to move throughout the day. • Sun Tracking*: Students will construct Sun trackers. After using a compass to orient the Sun tracker north-south, students make hourly records of the position of the tip of the shadow cast by a golf tee. • Gravity Experiment Lesson: https://nj.pbslearningmedia.org/resource/phy03.sci.phys.mfe.lp_gravity/gravity-and-falling-objects/#.WRtEXvkrLcs
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • notebook entries • response sheets • focus question answers • science and engineering practices checklist
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/5-ps2-1-motion-and-stability-forces-and-interactions • https://www.nextgenscience.org/pe/5-ess1-1-earths-place-universe • https://www.nextgenscience.org/pe/5-ess1-2-earths-place-universe • https://www.nextgenscience.org/pe/3-5-ets1-1-engineering-design • https://www.nextgenscience.org/pe/3-5-ets1-2-engineering-design • https://www.nextgenscience.org/pe/3-5-ets1-3-engineering-design

Unit Name	Matter and Its Interactions
Estimated Timeline	April - June
Essential Questions	• What makes up matter? • Does matter still exist if you cannot see it? • How can matter be broken down? • How is matter affected when it changes form? • Describe the properties of matter. • What is the difference between a physical change and a chemical change? • How are mixtures separated?

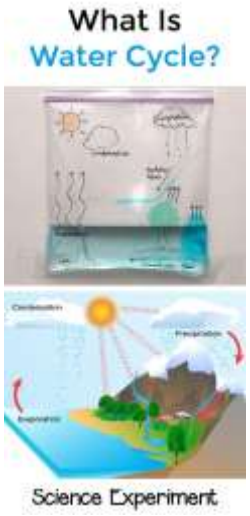
NGSS	5-PS1-1 5-PS1-2 5-PS1-3 5-PS1-4 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3
Student Learning Objectives	• Develop a model to describe that matter is made of particles too small to be seen. • Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. • Make observations and measurements to identify materials based on their properties. • Conduct an investigation to determine whether the mixing of two or more substances results in new substances. • Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. • 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. • 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.
Suggested projects, activities, labs used to support content, and resources	• Separating a Mixture*: Students will be given a mixture of gravel, powder, salt, and magnetite. Students will use screens, filters, magnets, and evaporation dishes to separate the mixture, without being told what the mixture consists of. • Saturation*: Students will saturate three 50 mL bottles of water with salt, Epsoms salt, and citric acid. Students will use solubility and crystals shape (through evaporation) to identify the three materials. • Chemical Reactions*: Students will use three substances (calcium chloride, baking soda, and citric acid) to make three different combinations of two substances. They will add water and observe the changes that occur. The new products that form (a gas and a white precipitate) are identified as evidence of a chemical reaction. • Reaction Products*: Students will use filtering and evaporation to separate the products of the chemical reactions listed above and identify the products by testing with vinegar (chalk) and evaporation (salt) to identify the products. • Conservation of Mass: Students will use a balance and mass pieces to show that matter is conserved when making a salt water solution. • Students will sort and categorize cards of different images of matter. The goal is to get students to identify solid, liquid, and gas. • http://www.strangematterexhibit.com/index.html • Mystery Matter (https://api.betterlesson.com/mtp/lesson/641976/print): Students recieve a bag with a mystery item in it. They will have to gather data on the properties of matter in order to present it to the class. • Mystery Powder Investigation: Students observe the chemical properties of matter.

	• Mixing Substances Investigation: Students conduct experiments to tell if mixing two or more substances will result in a new substance. *Students will need to know the difference between physical and chemical changes.* • Trap and Store: Students will stimulate a smoke stack by combining vinegar and baking soda. Working as a team, they will design, build, and test a way to collect the carbon dioxide that their smoke stack releases. (Interactive Science p. 4) http://interactivesites.weebly.com
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • notebook entries • response sheets • focus question answers • science and engineering practices checklist
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/5-ps1-1-matter-and-its-interactions • https://www.nextgenscience.org/pe/5-ps1-2-matter-and-its-interactions • https://www.nextgenscience.org/pe/5-ps1-2-matter-and-its-interactions • https://www.nextgenscience.org/pe/5-ps1-4-matter-and-its-interactions • https://www.nextgenscience.org/pe/3-5-ets1-1-engineering-design • https://www.nextgenscience.org/pe/3-5-ets1-2-engineering-design • https://www.nextgenscience.org/pe/3-5-ets1-3-engineering-design

Unit Name	Ecosystems (Energy & Molecules to Organism: Structure & Processes infused)
Estimated Timeline	September - November
Essential Questions	● How do plants get the food they need? ● What factors determine how animals meet their basic needs? ● How are the components that make up an ecosystem interdependent? ● How does matter and energy transfer and cycle within an ecosystem? ● What are the components and interactions within a given ecosystem?
NGSS	5-LS2-1 5-PS3-1 5-PS3.D 5-LS1-1 LS1.C LS2.A LS2.B
Student Learning Objectives	● Use models to describe that energy in animals' food (used for body repair, growth, motion and to maintain body warmth) was once energy from the sun. ● Justify that animals' food is used for body repair, growth, motion, & to maintain body warmth. ● Defend that energy can be transferred in various ways and between objects. ● Develop a model to demonstrate phenomena of mechanisms for natural events. ● Construct a model that represents the interdependent relationships in an Ecosystem. ● Create a representation of matter and energy transfer in an ecosystem. ● Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ● 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. ● 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.
Suggested projects, activities, labs used to support content, and resources	● Plant nutrition*: Students will plant wheat seeds in a dark environment and a light environment to observe that plants get the materials they need for growth mainly from air and water. ● Food Chain Digital Challenges: https://ecokids.ca/swf-files/gamesPage/chain_reaction.swf http://www.iknowthat.com/ScienceIllustrations/foodchains/science_desk.swf ● Interactions of Living things:

	http://cashmancuneo.net/flash/fc44/foodchain.swf • Ecosystem Design Challenge: Students design and create a model of a sustainable environment for a specific organism. • Conduct research to create a food web utilizing technology software, Inspiration. • Food Fight Game: Digitally build an environment in which animals complete for resources: https://www.brainpop.com/games/foodfight/Ecogame.swf • Research Endangered Species: http://www.kidsplanet.org/factsheets/map.html • Exploring Animal Survival Activity 
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • notebook entries • response sheets • focus question answers • science and engineering practices checklist
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/5-ls2-1-ecosystems-interactions-energy-and-dynamics • https://www.nextgenscience.org/pe/5-ps3-1-energy • https://www.nextgenscience.org/dci-arrangement/5-ps3-energy • https://www.nextgenscience.org/pe/5-ls1-1-molecules-organisms-structures-and-processes

Unit Name	Earth's Systems (Human Activity infused)
Estimated Timeline	December - March
Essential Questions	• What are Earth's major systems? • What is the water cycle? • How do oceans influence climate? • How do mountain ranges influence climate? • How is Earth's water distributed? • How do Earth's systems interact? • How does Earth's surface change? • What are the positive and negative effects of human activity on the environment?
NGSS	5-ESS2-1 5-ESS2-2 5-ESS3-1 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3
Student Learning Objectives	• Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. • Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. • Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources, environment, and address climate change issues. • Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. • 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. • 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. • Research an environmental issue, steps that have already been done to correct it, and activities 5th graders could do to help it.
Suggested projects, activities, labs used to support content, and resources	• Students will be given data for pairs of cities with similar latitude, with one city being closer to the ocean. They will analyze the data to determine the effect of proximity to an ocean on climate. * • Students will be given data for pairs of cities, with one city being in the rain shadow of a mountain range. They will analyze the data to determine the effect of mountain ranges on climate. • Students will model distribution of Earth's water using different size beakers and graduated cylinders. They will then make a graph (pie, bar, etc.) to show the distribution of water on earth. * • Students will design a prototype to convert saltwater to freshwater. Provide criteria and constraints for prototype. • Students will construct a model to show the interaction between two of earth's systems. • FOSS Water Cycle Game

	• Water Cycle Model  • Water Filtration Challenge https://www.jpl.nasa.gov/edu/teach/activity/water-filtration-challenge/ • Environmental Concerns Project/presentation
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • notebook entries • response sheets • focus question answers • science and engineering practices checklist
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/5-ess2-1-earths-systems • https://www.nextgenscience.org/pe/5-ess2-2-earths-systems • https://www.nextgenscience.org/pe/5-ess3-1-earth-and-human-activity • https://www.nextgenscience.org/pe/3-5-ets1-1-engineering-design • https://www.nextgenscience.org/pe/3-5-ets1-2-engineering-design • https://www.nextgenscience.org/pe/3-5-ets1-3-engineering-design

West Essex Consortium Curriculum
Essex Fells
Fairfield
North Caldwell
Roseland
Science Department

I. COURSE NAME: Science 6

II. COURSE PREREQUISITES: Science 5

III. GRADE LEVEL(S): 6

IV. COURSE DESCRIPTION:

The performance expectations in **Space Systems** help students formulate answers to the questions: "What is Earth's place in the universe?" and "What makes up our solar system and how can the motion of Earth explain seasons and eclipses?" Two sub-ideas from the NRC Framework are addressed in these performance expectations: ESS1.A and ESS1.B. Middle school students can examine Earth's place in relation to the solar system, Milky Way galaxy, and universe. There is a strong emphasis on a systems approach, using models of the solar system to explain astronomical and other observations of the cyclic patterns of eclipses, tides, and seasons. There is also a strong connection to engineering through the instruments and technologies that have allowed us to explore the objects in our solar system and obtain data that support the theories that explain the formation and evolution of the universe. The crosscutting concepts of patterns; scale, proportion, and quantity; systems and system models; and interdependence of science, engineering, and technology are called out as organizing concepts for these disciplinary core ideas. In the MS. Space Systems performance expectations, students are expected to demonstrate proficiency in developing and using models and analyzing and interpreting data and to use these practices to demonstrate understanding of the core ideas.

The performance expectations in **Weather and Climate** help students formulate an answer to the question, "What factors interact and influence weather and climate?" Three sub-ideas from the NRC Framework are addressed in these performance expectations: ESS2.C, ESS2.D, and ESS3.D. Students can construct and use models to develop an understanding of the factors that control weather and climate. A systems approach is also important here, examining the feedbacks between systems as energy from the sun is transferred between systems and circulates through the oceans and atmosphere. The crosscutting concepts of cause and effect, systems and system models, and stability and change are called out as organizing concepts for these disciplinary core ideas. In the MS. Weather and Climate performance expectations, students are expected to demonstrate proficiency in asking questions, developing and using models, and planning and carrying out investigations and to use these practices to demonstrate understanding of the core ideas.

The Performance Expectations in **Structure, Function, and Information Processing** help students formulate an answer to the question, "How do the structures of organisms contribute to life's functions?" Middle school students can plan and carry out investigations to develop evidence that living organisms are made of cells and to determine the relationship of organisms to the environment. Students can use understanding of cell theory to develop physical and conceptual models of cells. They can construct explanations for the interactions of systems in cells and organisms and for how organisms gather and use information from the environment. By the end of their studies, students understand that all organisms are made of cells, that special structures are responsible for particular functions in organisms, and that for many

organisms the body is a system of multiple interacting subsystems that form a hierarchy from cells to the body. Crosscutting concepts of cause and effect, structure and function, and matter and energy are called out as organizing concepts for these core ideas.

The Performance Expectations in **Growth, Development, and Reproduction of Organisms** help students formulate an answer to the question, “How do organisms grow, develop, and reproduce?” Students understand how the environment and genetic factors determine the growth of an individual organism. They also demonstrate understanding of the genetic implications for sexual and asexual reproduction. Students can develop evidence to support their understanding of the structures and behaviors that increase the likelihood of successful reproduction by organisms. They have a beginning understanding of the ways in which humans can select for specific traits, the role of technology, genetic modification, and the nature of ethical responsibilities related to selective breeding. At the end of middle school, students can explain how select structures, functions, and behaviors of organisms change in predictable ways as they progress from birth to old age. Students can use the practices of analyzing and interpreting data, using models, conducting investigations, and communicating information. Crosscutting concepts of structure and function, change and stability, and matter and energy flow in organisms support understanding across this topic.

V. COURSE OBJECTIVES:

In Science 6, performance expectations focus on students developing an understanding of several scientific practices. These include asking questions and defining problems, planning and carrying out investigations, analyzing and interpreting data, developing and using models, constructing explanations and designing solutions, engaging in argument from evidence, using mathematics and computational thinking, and obtaining, evaluating, and communicating information. Students will use these practices to demonstrate understanding of the core ideas. Students are also expected to demonstrate understanding of several of engineering practices, including design and evaluation.

VI. TEXTS/RESOURCES

A. Textbook

B. www.NSTA.org

C. www.nextgenscience.org

VIII. VII. TEXTS/RESOURCES

P. **https://www.wastatelaser.org/science-notebooks/**

Q. www.NSTA.org

R. www.nextgenscience.org

S. www.njctl.org

T. www.eie.org Engineering is Elementary

XVIII. EVALUATIONS/ASSESSMENTS

A combination of formative and summative assessments will be utilized in this course including, but not limited to teacher observations, student work and reflections, projects, quizzes and tests, and writing tasks.

XIX. SCOPE AND SEQUENCE (see table below)

This course has been designed with respect to and in compliance with the expectations set forth in the state-approved standards.

XX. Interdisciplinary Connections

Science, engineering, and technology influence and permeate every aspect of modern life. Some knowledge of science and engineering is required to engage with the major public policy issues of today as well as to make informed everyday decisions. In addition, understanding science and the extraordinary insights it has produced can be meaningful and relevant on a personal level, opening new worlds to explore and offering lifelong opportunities for enriching people's lives. In these contexts, learning science is important for everyone, even those who eventually choose careers in fields other than science or engineering.

Science, math, and language arts should complement each other as often as possible. Students will benefit from this cross-curricular relationship as they learn more about the world through exploration, experimentation, and collaboration.

XXI. Integration of the Computer Science & Design Thinking

New approaches necessary for solving the critical challenges that we face as a society will require harnessing the power of technology and computing. Rapidly changing technologies and the proliferation of digital information have permeated and radically transformed learning, working, and everyday life. To be well-educated, global-minded individuals in a computing-intensive world, students must have a clear understanding of the concepts and practices of computer science. As education systems adapt to a vision of students who are not just computer users but also computationally literate creators who are proficient in the concepts and practices of computer science and design thinking, engaging students in computational thinking and human-centered approaches to design through the study of computer science and technology serves to prepare students to ethically produce and critically consume technology.

Intent and Spirit

All students receive computer science and design thinking instruction from Kindergarten through grade 12. The study of these disciplines focuses on deep understanding of concepts that enable students to think critically and systematically about leveraging technology to solve local and global issues. Authentic learning experiences that enable students to apply content knowledge, integrate concepts across disciplines, develop computational thinking skills, acquire and incorporate varied perspectives, and communicate with diverse audiences about the use and effects of computing prepares New Jersey students for college and careers.

Mission

Computer science and design thinking education prepares students to succeed in today's knowledge-based economy by providing equitable and expanded access to high-quality, standards-based computer science and technological design education.

Vision

All students have equitable access to a rigorous computer science and design thinking education. Students will benefit from opportunities to engage in high-quality technology programs that foster their ability to:

- Develop and apply computational and design thinking to address real-world problems and design creative solutions;
- Engage as collaborators, innovators, and entrepreneurs on a clear pathway to success through postsecondary education and careers;

- Navigate the dynamic digital landscape to become healthy, productive, 21st century global-minded individuals; and
- Participate in an inclusive and diverse computing culture that appreciates and incorporates perspectives from people of different genders, ethnicities, and abilities.

Please note that the concepts and skills previously included in 8.1 Educational Technology of the 2014 NJSLS — Technology have been expanded and integrated across multiple disciplinary concepts in the 2020 NJSLS — Career Readiness, Life Literacies, and Key Skills standard 9.4. Given the ubiquity of technology, our students will continue to be required to demonstrate increasing levels of proficiency to access, manage, evaluate, and synthesize information in their personal, academic, and professional lives. Therefore, the standards that were housed in one discipline have been enhanced and restructured to reflect the continued need for student learning in technology literacy, digital citizenship, and information and media literacy.

The K–12 Computer Science Framework, led by the Association for Computing Machinery, Code.org, Computer Science Teachers Association, Cyber Innovation Center, and National Math and Science Initiative in partnership with states and districts, informed the development of the NJSLS — Computer Science and Design Thinking.

XXII. Integration of Career Readiness, Life Literacies and Key Skills

Intent and Spirit

The NJSLS-CLKS provide a framework of concepts and skills to be integrated into the foundational, academic and technical content areas to prepare students to engage in the postsecondary options of their choice. Though the standard for 9.3 Career and Technical Education remains unchanged for now, 9.1 Personal Financial Literacy and 9.2 Career Awareness, Exploration, Preparation, and Training have been revised based on the feedback provided by New Jersey educators.

The personal financial literacy standard promotes not only the exploration of money management but also the psychology of spending and saving that influences decisions related to finances. From discovering the concept and forms of money to exploring lines of credit and types of insurance, these standards ensure a robust and comprehensive education in financial literacy from early elementary grades through high school. A new standard, 9.4 Life Literacies and Key Skills, has been added to ensure our students are prepared with the necessary knowledge, skills and dispositions to thrive in an interconnected global economy. These standards provide students with a guide to interact in life and work regardless of the setting or context.

Mission

Career readiness, life literacies and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.

Vision

An education in career readiness, life literacies, and key skills fosters a population that:

- Continually self-reflects and seeks to improve the essential life and career practices that lead to success;
- Uses effective communication and collaboration skills and resources to interact with a global society;
- Possesses financial literacy and responsibility at home and in the broader community;
- Plans, executes, and alters career goals in response to changing societal and economic conditions; and

- Seeks to attain skill and content mastery to achieve success in a chosen career path.

For students to be college and career ready they must have opportunities to understand career concepts and financial literacy. This includes helping students make informed decisions about their future personal, educational, work, and financial goals. By integrating Standard 9 into instruction, New Jersey students will acquire the necessary academic and life skills to not only achieve individual success but also to contribute to the success of our society. For example: Career Day event, exposure to a variety of careers in the science field, exploration of technology career options, school-wide science fair and science related field trips (e.g. Liberty Science Center, Buehler Science Center and Environmental Centers)
The Standards: Standard 9 is composed of the Career Ready Practices and Standard 9.1, 9.2, and 9.3 which are outlined below:

- The 12 Career Ready Practices

These practices outline the skills that all individuals need to have to truly be adaptable, reflective, and proactive in life and careers. These are researched practices that are essential to career readiness.

- 9.1 Personal Financial Literacy

This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

- 9.2 Career Awareness, Exploration, and Preparation

This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

- 9.3 Career and Technical Education

This standard outlines what students should know and be able to do upon completion of a CTE Program of Study. For students to be college and career ready they must have opportunities to understand career concepts and financial literacy. This includes helping students make informed decisions about their future personal, educational, work, and financial goals. By integrating Standard 9 into instruction, New Jersey students will acquire the necessary academic and life skills to not only achieve individual success but also to contribute to the success of our society.

SCOPE AND SEQUENCE (see table below)

This course has been designed with respect to and in compliance with the expectations set forth in the state-approved standards.

Scope and Sequence of Content and Skills for Science 6

Unit Name	Space Systems
Estimated Timeline	September-October

Essential Questions	● Why does the Sun's position change over time? ● What causes the Sun's position to change during the year? ● How does the position of the Earth and Sun affect seasonal patterns? ● What causes the phases of the moon? ● What causes solar and lunar eclipses? ● What determines the gravitational pull on an object? ● How does gravity hold planets in orbit? ● How do objects in our solar system compare? ● How do scientists study our solar system?
NGSS/Companion Standards	MS-ESS1-1 MS-ESS1-2 MS-ESS1-3 RST.6-8.1 RST.6-8.3 RST.6-8.7
Student Learning Objectives	● Generate and analyze evidence to explain why the Sun's apparent motion across the sky changes over the course of the year. ● Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. ● Develop and use a model that shows how gravity causes smaller objects to orbit around larger objects at increasing scales, including the gravitational force of the sun causes the planets and other bodies to orbit around it holding together the solar system. ● Analyze and interpret data to determine scale properties of objects in the solar system. ● Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.
Suggested projects, activities, labs used to support content	● Students will use models to predict the lunar phase given the positions of Earth, Moon, and the Sun. Students will manipulate their models to show locations where a solar or lunar eclipse will take place. ● Students will trace their shadows in the morning and afternoon, and compare the tracings. They will use this information to determine the position of the Sun as it appears to move throughout the day. ● Students will use a light and moon model to determine the phases of the moon, and make a phases of the moon chart to summarize their results. ● Winter Olympics Project - Students will use their knowledge relating to seasons, earth's tilt, and solar energy to determine which location would be the best option the 2026 Winter Olympics.

	• Students will use a model to describe that gravity is an inward pulling force that can keep smaller/less massive objects in orbit around larger/more massive objects. Given different scenarios, students will determine which scenario would have the greatest gravitational pull. • Students will calculate how much they would weigh on other planets and how far they could jump on other plants. They will use this data to come to a conclusion about gravitational pull and mass. • Students will design a model or diagram that shows two ways gravitational pull exists between Earth and the Moon. • Students will organize data on solar system objects to design diagrams, graphs, or physical models. • Students will use quantitative analyses to describe similarities and differences among solar system objects by describing patterns of features. • Students will identify advances in solar system science made possible by improved engineering. • Students will interpret quantitative and qualitative data to draw their own conclusions about patterns in the solar system (ex.: outer planets have the greatest size).
Suggested assessments	Students can demonstrate competency with tasks such as: • developing and refining models • generating, discussing and analyzing data • constructing spoken and written scientific explanations • engaging in evidence-based argumentation • reflecting on their own understanding • notebook entries • response sheets • focus question answers • science and engineering practices checklist
Suggested resources	• NSTA Resources and Lesson Plans: http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=34 • Motion of the Sun: http://astro.unl.edu/naap/motion3/motion3.html • Seasons Interactive: http://highered.mheducation.com/sites/007299181x/student_view0/chapter2/seasons_interactive.html • Shadow Tracker: http://www.fossweb.com/delegate/ssi-wdf-ucmwebContent/Contribution%20Folders/FOSS/multimedia_2E/Solar_MM_2E/activities/whiteboard/shadowtracker/index.html • Seasons: http://www.fossweb.com/delegate/ssi-wdf-ucmwebContent/Contribution%20Folders/FOSS/multimedia/Planetary_Science/activities/seasons/index.html • Comparing Size and Distance http://www.nasa.gov/pdf/622130main_SSML1Tchr.pdf • Gravity Interactive: https://www.explorelearning.com/index.cfm?method=cResource.dsp
	Detail&ResourceID=648 Gravity Interactive: http://phet.colorado.edu/en/simulation/gravityand-orbits

	Pull of the Planets Activity: http://www.lpi.usra.edu/education/explore/solar_system/activities/big Kid/planetPull/ Modeling Eclipses: http://lasp.colorado.edu/home/wpcontent/uploads/2012/05/A4_Modeling_Eclipses.pdf Bill Nye Phases of Moon Model Video: https://www.youtube.com/watch?v=eufP3v46zko Phases of the Moon Review: http://teachers.henrico.k12.va.us/staffdev/clough_d/DragDrop/Moon Match.swf Phase Simulator: http://astro.unl.edu/naap/lps/animations/lps.swf Eclipse Interactive: http://highered.mheducation.com/olcweb/cgi/pluginpop.cgi?it=swf::640::480::/sites/dl/free/007299181x/220730/eclipse_interactive.swf::Eclipse%20Interactive, http://highered.mheducation.com/sites/007299181x/student_view0/chapter9/eclipse_interactive.html# Lunar Phases: http://aspire.cosmic-ray.org/Labs/LunarPhases/lunar_phases_main.html Fossweb.com
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/ms-ess1-1-earths-place-universe • https://www.nextgenscience.org/pe/ms-ess1-2-earths-place-universe • https://www.nextgenscience.org/pe/ms-ess1-3-earths-place-universe

Unit Name	Weather and Climate
Estimated Timeline	November-January

Essential Questions	● What is the difference between weather and climate? ● What is the sun's role in the water cycle and how does that affect us? ● How does energy from the Sun affect wind on Earth? ● What is air? ● What is the atmosphere? ● How does pressure affect air? ● What happens when two areas of air have different pressures? ● What factors do meteorologists use to forecast the weather? Why can't meteorologists predict weather with 100% certainty? ● What is density? ● What affects the direction that ocean water flows? ● How does weather differ between locations? ● How does the ocean affect climate on land? ● How does energy from the Sun affect weather and climate on Earth? ● How does latitude affect an area's weather and climate? ● How has climate changed over time? ● How do greenhouse gases in the atmosphere affect Earth's temperature? ● What can we do to prevent the continuation of global warming?
NGSS/Companion Standards	MS-ESS2-5 MS-ESS2-6 MS-ESS3-5 RST.6-8.8 RST.6-8.9 WHST.6-8.1 NJSLSA.R6
Related standards	RI 6.2 (central idea), RI 6.7 (Different media integration) W 6.8 (write from multiple sources) 6.1.8.B.1.b Analyze the world in spatial terms using historical maps

Student Learning Objectives	● Develop a conceptual model to explain the mechanisms for the Sun's energy to drive wind and the hydrologic cycle. ● Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. ● Explain how variations in density result from variations in temperature and salinity drive a global pattern of interconnected ocean currents. ● Use a model to explain the mechanisms that cause varying daily temperature ranges in a coastal community and in a community located in the interior of the country. ● Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. ● Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

Suggested projects, activities, labs used to support content	● After watching a video of severe weather, students discuss in small groups and whole class reaches a consensus on the factors that constitute weather. Students begin monitoring local weather conditions, using tools. ● Students review local weather reports and determine the factors that combine to produce what we know as weather. They are introduced to, and use, a thermometer, barometer, hygrometer, compass, and anemometer. outdoors and develop a plan for acquiring daily data and sharing them with the class. ● Students work with syringes and tubing to discover that air takes up space and is compressible. They work in small groups to design demonstrations to show that air has mass. They study the atmosphere, a mixture of gases, using diagrams, photos, and a reading. ● Students investigate how the shape of Earth and its relationship to the Sun affect the weather around the world. They use light sources and globes to model the length of the day throughout the year. ● Students investigate what happens to different earth materials (sand, soil, water, air) when placed in sunshine and then in shade to show radiation. They set up an experiment and collect and analyze the data by observing the differential heating of earth materials, one factor that contributes to weather. ● Students observe two examples of heat transfer by conduction: movement of heat from a container of hot water to a container of cold water, and movement of heat from one end of a metal strip to the other. ● Students make a density column to investigate density of fluids by layering colored salt solutions in a straw. They determine the relative densities of the salt solutions by comparing the masses of equal volumes. They calculate the density of each solution, using the ratio of mass to volume.

	● Students observe the interaction of colored water of different temperatures to determine that warm water rises and cold water descends. ● Students design investigations to show that water vapor is in the air around them. Materials are provided, and each group plans an investigation, conducts it, and reports to the class in a short presentation. ● Students measure temperature change that occurs during evaporation, using wet- and dry-bulb thermometers to be introduced to humidity as the measure of water vapor in the air. ● To explore the temperature at which water vapor condenses into drops of liquid water, students determine the dew-point temperature for their classroom and use wet-bulb and dry-bulb thermometers and a hygrometer to measure humidity. ● Students investigate the relationship between pressure and temperature, using 2-liter soda bottles and thermometer strips. They discover that, the greater the pressure in a gas, the higher the temperature. They use this understanding of pressure and temperature to explore cloud formation. ● Students observe a demonstration that shows how Earth's water is

	distributed. They participate in a game that simulates the travels of a water molecule through the water cycle. They compare the results of the game to their understanding of how the water cycle operates on Earth. ● Students investigate the relationship between changing air pressure and wind. They assemble and explore a pressure indicator and learn about barometers. Using knowledge developed in previous investigations, they come up with models of wind. They build an anemometer to measure local wind and use pressure maps to make weather predictions. ● Students observe a solar hot-air balloon and consider it as a model for a warm air mass to introduce the concept how air masses form. ● Students consider severe weather in relation to air masses and fronts. Climate is introduced and climate regions are discussed. Students compare a water-cycle multimedia simulation with the global- warming variation, in which Earth's average temperature has increased 2–5°C. They analyze the results and make predictions of the continued effect of global warming on Earth. ● They compare different climate regions around the world, using a multimedia database. ● Students will model the Coriolis Effect to explain its influence on the wind and water current on earth, by using a balloon and a marker. One student turns the balloon, while the other tries to draw a straight line from the North Pole to the equator, and South Pole to the equator. ● Analyze an air pressure map. ● Research and analyze data for two cities of similar lat/long, one coastal, one inland. Look for patterns and draw a conclusion. ● Research and analyze data for groups of cities at different latitudes. Look for patterns and draw a conclusion. ● Students investigate the effect of the ocean on climate by observing the effects of the layering of warm and cold water and water that is more or less saline than the normal. They will do this by creating saline solutions of different colors that mimic ocean salinity, are more saline than ocean water, and are less saline than ocean water and pouring the different solutions into a basin that shows how the different solutions can model layering in the ocean. The student will combine the results of the two separate exercises and predict which of the conditions might prevail. ● Students map greenhouse gas emissions where they live by researching what greenhouse gasses are and using an online resource (website of the epa) to find the most common greenhouse gasses for where they live and their sources. They will graph the data. They will use their knowledge to determine ways that facilities can reduce their emissions and how they and their families can reduce their emissions.
Suggested assessments	Students can demonstrate competency with tasks such as: ● developing and refining models

	generating, discussing and analyzing data constructing spoken and written scientific explanations engaging in evidence-based argumentation reflecting on their own understanding notebook entries response sheets focus question answers science and engineering practices checklist
Suggested resources	Difference between weather and climate: http://www3.epa.gov/climatechange/kids/documents/weatherclimate.pdf Weather vs Climate & video from NatGeo https://www.ck12.org/earth-science/Weather-versus-Climate/lesson/Weather-versusClimate/?referrer=concept_details Layers of the atmosphere: Folding resource on atmosphere http://mjksciteachingideas.com/pdf/AtmosphereFoldable.pdf Composition of Air at different atmospheric levels http://www.fossweb.com/delegate/ssi-wdf-ucm-webContent/Contribution%20Folders/FOSS/multimedia_ms_1E/WeatherandWater/atmosphericdata/elevator.html Ocean Currents/Temperature Lab http://www.carolinacurriculum.com/premium_content/ebooks/catastrophic+events/pdfs/Lesson_7.pdf Salinity Lab & Salinity at various latitudes http://mjksciteachingideas.com/pdf/SalinityLab.pdf Salinity and Temperature (this says 9th - 12th, but it is still useful for 6th) http://oceanservice.noaa.gov/education/lessons/hot_cold_lesson.html Earth's rotation and the movement of winds and water currents across the earth experiment for class (Coriolis Effect) http://www.carolina.com/teacher-resources/Interactive/modeling-the-coriolis-effect/tr10643.tr "Four Cities" Sample Task from NextGen http://www.livebinders.com/play/play?id=1541676 under NGSS click sample classroom tasks, under Middle School, "Four Cities" Multiple topics under weather and climate http://climatekids.nasa.gov/next-generation-standards/review/ Mapping greenhouse gases http://www3.epa.gov/climatechange/kids/documents/mapping-emissions.pdf climate change over time http://www3.epa.gov/climatechange/kids/documents/temp-

	and-co2.pdf and http://climate.nasa.gov/climate_resources/25/ analyzing tree rings to look at climate change over time http://www3.epa.gov/climatechange/kids/documents/treerings.pdf And http://climate.nasa.gov/climate_resources/25/ Foss Online www.fossweb.com http://www.electronicfieldtrip.org/cascades/index.html Information and games on climate change
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/ms-ess2-5-earths-systems • https://www.nextgenscience.org/pe/ms-ess2-6-earths-systems • https://www.nextgenscience.org/pe/ms-ess3-1-earth-and-human-activity

Unit Name	Structure, Function and Information Processing
Estimated Timeline	February-March
Essential Questions	● What are the building blocks of life? ● How does each part of a cell function? ● How is the body a system of interacting subsystems composed of groups of cells? ● What are the fundamental differences between animal and plant cells pertain to cell reproduction? ● How do our sensory receptors send information to our brain?
NGSS/Companion Standards	MS-LS1-1 MS-LS1-2 MS-LS1-3 MS-LS1-8 RST.6-8.3 RST.6-8.6 WHST.6-8.2
Student Learning Objectives	● Conduct an investigation to provide evidence that living things are made of cells: either one cell or many different numbers of cells ● Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function ● Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells ● Develop a model to explain how senses change energy coming from the environment (light, sound waves, chemicals in gases or food, heat or touch/pressure) into electrical signals in the nerves that go into the brain and spinal cord ● Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories
Suggested projects, activities, labs used to support content	● Students investigate cells using a compound microscope ● Students use microscope to explore unicellular and multicellular organisms, and plant and animal cells. ● Students use interactive website to explore the components within a cell and how they work together ● Develop a model in which they identify the parts (components: nucleus, chloroplast, cell wall, mitochondria, cell membrane, the function of a cell as a whole) of cells ● Project: “A cell is like a _____ “ Students create a poster/model to display their analogy relating each organelle to something in their project *(ex.city, park, school, etc)* ● Students describe the relationships between the parts of cells in terms of their contributions to overall cellular function and the

	structure of the cell membrane or cell wall and its relationship to the function of the organelles and the whole cell. ● Students use the model to identify key differences between plant and animal cells based on structure and function. Build models of both a plant and animal cell and be able to demonstrate key characteristics that define both ● Complexity of Life Card Sort (FOSSweb) (With addition of tissues, organs, organisms) ● Demonstrate key characteristics that define both ● Students use interactive website to "Build an organ" using different tissues ● Lab: "Dissecting a Chicken Wing"- Students will dissect a chicken wing to observe the different types of tissues present in a wing ● Project: Body Systems- Each group will research an assigned body system in order to create an informative poster about the body system and its function and display on poster. Each group will then use what they've learned to determine how body systems interact with each other. ● Lab: "Can You Trust Your Senses?"- Students will explore three of your sensory receptors: chemoreceptors (taste and smell) and photoreceptors (sight) ● Online Interactive: Students will play a game on Fossweb that tests their response time. ● Lab: Response Time: Students will conduct an experiment to test visual, auditory, and tactile reaction times using one ruler. ● Online Interactive: Students explore the process of synapse and how the brain receives and transmits messages.
Suggested assessments	Students can demonstrate competency with tasks such as: ● developing and refining models ● generating, discussing and analyzing data ● constructing spoken and written scientific explanations ● engaging in evidence-based argumentation ● reflecting on their own understanding ● notebook entries ● response sheets ● focus question answers ● science and engineering practices checklist
Suggested resources	● https://njctl.org/courses/science/7th-grade-science/structure-andfunction-information-processing/ Link above includes: ➔ Cell Analogy Project and Rubric ➔ Dissecting Wing Lab ➔ Body System Project ➔ Sense Lab
	● http://learn.genetics.utah.edu/content/cells/insideacell/ (inside a cell interactive

	● https://www.centreofthecell.org/learn-play/games/explore-a-cell/ (inside a cell interactive) ● https://www.centreofthecell.org/learn-play/games/build-an-organ/ (build an organ interactive) ● https://backyardbrains.com/experiments/reactiontime Response Time resources and lab ● https://www.centreofthecell.org/learn-play/games/synapse/ Synapes Video ● Card Sort- Found on Fossweb or in kit ● Response Timer- Found on Fossweb
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/ms-ls1-1-molecules-organisms-structures-and-processes • https://www.nextgenscience.org/pe/ms-ls1-2-molecules-organisms-structures-and-processes • https://www.nextgenscience.org/pe/ms-ls1-3-molecules-organisms-structures-and-processes • https://www.nextgenscience.org/pe/ms-ls1-8-molecules-organisms-structures-and-processes

Unit Name	Growth, Development, and Reproduction of Organisms

Estimated Timeline	April-June
Essential Questions	• How do organisms reproduce? • What is the difference between sexual and asexual reproduction? • How can an organism's behavior increase its chance of survival and reproduction? • What structures or mechanisms aid in plant reproduction? • How does the environment contribute to successful reproduction or growth? • How do genetic factors influence the growth of organisms? • How do natural differences in organisms increase survival and reproduction?
NGSS/Companion Standards	MS-LS1-4 MS-LS1-5 MS-LS3-1 MS-LS3-2 MS-LS4-5 RST.6-8.2 RST.6-8.7 NJSLSA.W7

Student Learning Objectives	● Use argument 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. ● Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. ● Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may results 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 and sexual reproduction results in offspring with genetic variation. ● Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.
Suggested projects, activities, labs used to support content	● Students make a claim to support a given explanation of an adaptation/behavior (ex.: nest building, colorful plumage to attract mates, bright flowers). In their claim, students will include the idea that characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. Students will identify evidence, evaluate the evidence, and use reasoning to connect appropriate evidence to claim. ● Students will articulate a statement that relates the given

	phenomenon to a scientific idea, including the idea that both environmental and genetic factors influence the growth of organisms.Students identify and describe evidence (e.g., from students' own investigations, observations, reading material, archived data) necessary for constructing the explanation. ● Students will research and develop a model to show how a mutation can have harmful, beneficial, or neutral effects. ● Students will develop a model (e.g., Punnett squares, diagrams, simulations) for a given phenomenon involving the differences in genetic variation that arise from sexual and asexual reproduction. In the model, students identify and describe the relevant components. Students use the model to describe an account for why sexual and asexual reproduction result in different amounts of genetic variation in offspring relative to their parents. ● Students will use cause-and-effect relationships found in the model between the type of reproduction and the resulting genetic variation to predict that more genetic variation occurs in organisms that reproduce sexually compared to organisms that reproduce asexually. ● Students will gather information about at least two technologies that have changed the way humans influence the inheritance of desired traits in plants and animals through artificial selection by choosing desired parental traits determined by genes, which are then often passed on to offspring. Examples could include gene therapy, genetic modification, and selective breeding of plants and animals. ● Students will dissect lima beans to explore structural adaptations of seeds that allow them to survive. ● Students will investigate how increasing salinity affects the germination and growth of food crops. They will compare four grains to determine that the different grains have varying levels of salt tolerance (genetic factors). ● Students will dissect flowers to learn about flower structures and sexual reproduction. ● Students will observe flowers to identify adaptations that plants help to aid in pollination.
Suggested assessments	Students can demonstrate competency with tasks such as: ● developing and refining models ● generating, discussing and analyzing data ● constructing spoken and written scientific explanations ● engaging in evidence-based argumentation ● reflecting on their own understanding ● notebook entries ● response sheets ● focus question answers ● science and engineering practices checklist
Suggested resources	● NSTA Resources and Lesson Plans: http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=32

	• Various Traits/DNA Activities: http://teach.genetics.utah.edu/content/heredity/#item3 • Inventory of Traits: http://teach.genetics.utah.edu/content/heredity/files/InventoryOfTraits.pdf, http://learn.genetics.utah.edu/content/inheritance/observable/ • Effect of Environment on Plant Growth: http://www.apsnet.org/edcenter/K-12/TeachersGuide/PlantBiotechnology/Pages/Activity7.aspx • Mutations and Variations: http://www.cosee-west.org/AprilLectureMaterials/Activities/Mutations&Variation.pdf • Reproduction Lesson: http://ca.pbslearningmedia.org/resource/tdc02.sci.life.repro.lp_reproduce/reproduction/ • Genetics with a Smile: http://sciencespot.net/Media/gen_smilewkst1.pdf • Breeding Critters Activity • Investigating Reproductive Strategies: http://teach.genetics.utah.edu/content/evolution/files/ReproductiveStrategies.pdf • Pollinators Game: http://www.fossweb.com/delegate/ssi-wdf-ucmwebContent/Contribution%20Folders/FOSS/multimedia_ms_1E/DiversityofLife/media/pollinators.htm • Inherited Traits in Animals: http://cals.arizona.edu/fps/sites/cals.arizona.edu.fps/files/education/juniors_tree.pdf • Tomato Technology: http://archives.lessoncorner.com/e9f8ef1e4c901b193.pdf HYPERLINK "http://archives.lessoncorner.com/e9f8ef1e4c901b193.pdf" \h • Fossweb.com
Science and Engineering Practices/ Disciplinary Core Ideas/ Crosscutting Concepts	• https://www.nextgenscience.org/pe/ms-ls1-4-molecules-organisms-structures-and-processes • https://www.nextgenscience.org/pe/ms-ls1-5-molecules-organisms-structures-and-processes • https://www.nextgenscience.org/pe/ms-ls3-1-heredity-inheritance-and-variation-traits • https://www.nextgenscience.org/pe/ms-ls3-2-heredity-inheritance-and-variation-traits • https://www.nextgenscience.org/pe/ms-ls4-5-biological-evolution-unity-and-diversity

Science ~ Appendix A

Differentiation

Kindergarten	Push, Pull, Go Unit 1, 2, 7 6	Weather and Sky Unit 4, 6	Living Things Unit 3, 5, 6
HEP	Create their own object that moves from the bucket of tinker toys	Create a weather report and "broadcast" it to the class	Change the variables for how to grow a plant from a seed i.e. place in the dark
Tier 2	Use the activity card to build an object that moves	Make a bar graph of the weather for the month	Measure the heights of different pumpkin plants and compare
Tier 3	Use the activity card (broken down into 4 steps) to build an object that moves	Color coded thermometer correlate to how to dress for the weather appropriately	Identify living and non-living things from the unit cards. Add by drawing their own examples
504	Go outside and investigate parts on the playground then discuss how they work	Matching weather words to the daily weather cards and actual weather outside	Using clay re-create a Bessbug and label its parts
ELL	Draw and label objects within the bucket of tinker toys	Make a chart to show vocabulary terms related to weather	Label the parts of the Bessbug on a worksheet
IEP	Use the color coded sheet to verify that all materials are ready for the activity	Weather cards are matching to the math/weather center	Grow lima beans and compare that to the size of the pumpkin seeds

Grade 1	Light and Sound Waves Unit 1, 4	Sky Watchers Unit 3, 4	Exploring Organisms Unit 2, 4
HEP	Design a communication device using light and sound i.e. household items: flashlights, mirrors, plastic cups, metal spoons	Maintain a moon journal by writing about what they see in the nighttime sky each day for 2 weeks	Write about how parents and offspring are alike using plants, animals, and self
Tier 2	Compare different sounds based upon the thickness of the rubber band over an open box	Observe the daytime sky: Go outside 3 different times during the day and compare the shadows and draw the length of the shadows	Show how people and animals protect themselves with a chart/poster i.e. person wear a helmet and turtle has a shell (adaptations)
Tier 3	Use mirrors and flashlights to explain reflection and how light travels	Create a Venn diagram comparing the day and night sky	Draw and label the parts of the praying mantis
504	Make a drum then place rice on the top to show the vibration	Demonstrate the phases of the moon by having students be the space items and move about each other	Work in small groups to show how animal parents care for their young. Present and have others guess their animal based upon their caring methods
ELL	Have students label items used for their science notebooks	Draw and label the phases of the moon and explain the patterns	Write a thank you note to their parents about how they have protected/care for them
IEP	Build a phone out of cups and string – using a picture diagram as a model	Use the lamp and their bodies to show the sun, moon, Earth relationships	Create a Venn diagram comparing and contrasting animal and plant needs

Grade 2	Matter Unit 1, 3, 5	Earth Materials Unit 2, 5	Ecosystem Diversity Unit 4, 5
HEP	Build a pyramid out of unifex cubes using a different number of cubes	Watch a video about melting glaciers, then work together to research and write about glacier retreat to present to the class	Work in partners to design and create a habitat using the 3-D printer
Tier 2	Use student magazine and support content discussed in class	Create a Haiku about nature (follow the poem criteria) and illustrate the poem	Read *The Lorax* and create a concept map detailing the problems within the text
Tier 3	Sort solids and liquids then create a bar graph to show different quantities of each type of matter and write a story problem	Work in small groups to research ways to slow/prevent wind or water for changing the shape of the land.	Read 2 books called *Seed to Plant* (different authors) and create a Venn Diagram to compare the two books
504	Sort solids and liquids then create a bar graph to show different quantities of each type of matter	Project *Kids in Motion: water cycle fitness* and have students exercise while showing how the water cycle works	Go outside and collect types of leaves, place under paper, and create a leaf rubbing. Describe and label the parts
ELL	Read *What's smaller than a pigmy shrew?* Point out the illustrations and graphics and explain text features	Project images and students provide adjectives / phrases to describe each photo in the sand grain gallery	Cut up magazines and look for pictures of various habitats then create puzzle pieces while describing shapes of each piece
IEP	Watch a documentary clip about the how the pyramids at Giza were formed	Create a word web and write about how the characters in the text help to preserve sand dunes after a storm	Take your class on a virtual tour of the Everglades in Florida, by using the National Park website

Grade 3	Weather (Earth's Systems; Earth and Human Activity)	Life in Ecosystems (Structures, Processes and Ecosystems; Biology, Evolution, Heredity)	Forces and Interactions (Motion and Stability)
HEP	Create an instrument that makes the sound of rain falling (using everyday items)	Conduct a virtual fossil dig online and describe their findings and the tools that were used	Teams design a car on the 3D printer and race it with others from the classroom
Tier 2	Research and graph types of weather and climate patterns	Learn more about organisms in different habitats i.e. terrestrial, marine, or fresh water (use link from text)	Perform a magic trick of pulling a tablecloth out from under and set of items to show inertia
Tier 3	Use leveled readers with different "magazines" to support students	Observe traits of a partner and describe their differences i.e. widow's peak etc.	Watch *Inertia in Action* report on the importance of vehicle safety
504	After viewing a video: act out the different weather hazards	Read *The Very Hungry Caterpillar* to a Kindergarten student and then have the 3rd grader explain the life cycle of a caterpillar	Play tug of war to understand balance and unbalanced forces
ELL	Distinguish between different siren sounds and how they are used around the community and how/why they help people	Research collective nouns for groups of different animals and illustrate	Read *Gravity is a Mystery* and discuss concepts such as gravity and inertia
IEP	Conduct a weather forecast using vocabulary terms given within the unit	Identify the purpose of different beak shapes and how they're used in their environment	Drop a spot of paint on the paper and have students drop a ball to show how different heights change the splatter

Grade 4	Unit 1 Energy Works (Energy; Waves and their Application)	Unit 2 Changing Earth (Earth's Place in the Universe)	Unit 3 Plant and Animal Structures (Structure and Processes)
HEP	Build a series and a parallel circuit by using provided materials and no instructions.	Students will be able to identify tectonic plates using puzzle to complete independently.	Identify all hearts of a squid using dissection and investigation of actual structure.
Tier 2	Build a parallel and a series circuit using provided instructions.	Students will be able to identify tectonic plates using puzzle to complete independently in small groups.	Complete a flower structure diagram without a word bank.
Tier 3	Build a series or a parallel circuit by building a diagram.	Complete tectonic plates puzzle using a provided map.	Complete a handout on flower structure using a word bank.
504	Vocabulary using leveled readers.	Using a graphic organizer, they will research types of rocks.	Create a model of a flower labeling each part.
ELL	Provided handouts with illustrations and definitions.	Complete a graphic organizer on rocks in small groups for google slide presentation.	Draw pictures of plants, animals, and flowers and their structures.
IEP	Handouts with vocabulary provided.	Complete a rock cycle flow chart with a word bank.	Complete an internal versus external plant and animal structure handout using word bank.

Grade 5	Unit 1 Structure and Properties of Matter (Matter & its Interactions)	Unit 2 Earth and Space Systems (Earth's Systems)	Unit 3 Matter and Energy in Ecosystems (Ecosystems)
HEP	Create an experiment to show the amount of materials dissolved in a liquid effects its melting point	Research what a sun dial is using online resources to build their own sun dial using materials they collect	Research the importance of water in a specific ecosystem and the effect of removing the water. They will present in a google document
Tier 2	Create an experiment to show how volume can be calculated using water displacement	Invite student to research activities that students can participate in during seasons in different locations while comparing and contrasting	Read a short introduction about food webs, food chains, and trophic levels and then complete a food chain for an arctic ecosystem
Tier 3	Conduct an experiment using different liquids to show the effect of density	Make a google slide show to compare and contrast one season and location and how sun effects these areas	Select and read two books and then compare habitats with a partner
504	Make ice cream in plastic bag to model the changes of state	Model the phases of the sun by acting it out in a dark room with a flashlight	Design and build a solar oven so that it can warm up a slice of pizza
ELL	Using picture diagrams identify whether the picture is showing a solid, liquid, or a gas	Make a shadow flip book of the moon's phases and label each phase appropriately	Explore pictures of food chain energy pyramids and identify differences between animals
IEP	Make lemonade to show the difference between solute and solvent and how each mixture taste different	Cut out different phases of the moon and match them to appropriate location	Make a music recording about the effects of human impact of the environment

Grade 6	Space Systems	Weather and Climate	Structure, Function and Information Processing	Growth, Development and Reproduction of Organisms.
HEP	Using an online program animate the phases of the moon and present it to the class.	Create a weather report to be “televised” focusing on air pressure maps and how it will impact the future weather.	Design an experiment to see how different liquid environments affect a living organism (brine shrimp)	Students will complete the activity Genetics with a Smile to create a new offspring.
Tier 2	Using small groups, each group will take a planet and design it to scale using a 3-D printer.	Look at a weather map (focus on air pressure) and predict what the future weather will be.	Students will examine their own cheek cells in a microscope and present their findings via Google Classroom.	Based on their families’ features, students will try to create a “family” Punnett Square.
Tier 3	Students will explore the phases of the moon by accessing the US Naval website.	Students will take barometric weather readings and create a line graph showing the change and relate it to the weather changes outside.	Use a Venn Diagram to compare different types of cells.	Students will create a step by step flow chart for either mitosis or meiosis.
504	Create a 3-d model showing the phases of the moon.	Will build a wind sock to help determine wind direction and strength.	Students will make a water-drop microscope and determine how to view objects and change its focus.	Create a poster to depict either mitosis or meiosis.
ELL	Students will create a Google Slide helping to distinguish between waxing and waning lunar phases.	Create a poster depicting the layers of the atmosphere and correctly labeling each one.	Make a T-Chart separating living from non-living things.	Students will create a virtual picture book showing and describing different phenotypes.
IEP	Use picture cut outs to order the phases of the moon properly.	Track the outdoor temperature throughout the unit and create a line graph both on paper and by using an digital spreadsheet.	Draw a nature scene and label and identify at least 5 living and 5 non-living things in their picture.	Using a T-Chart to compare and contrast mitosis and meiosis.

Science~ Appendix B

Interdisciplinary Connections

Grade	Social Studies	Language Arts
K	**Unit 2 – 6.1.4.B.2**– Geography and flooding in town **Unit 1** – **6.1.4.D.17** Then and Now games and activities played **Unit 3** – **6.1.4.B.10 -** habitats, communities, what grows in certain areas, visit Fairfield Farms. Grow in the spring – harvest in the fall	**Unit 1 – SL.K.3** Ask and answer questions in order to seek help, get information, or clarify something that is not understood. **Unit 2 - L.K.4.** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on kindergarten reading and content. **Unit 3 – W.K.7.** Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them).
1	**Unit 1 – 6.1.4.C.12** biographies about inventors **Unit 2** Informational text about astronauts, NASA **Unit 3** – **6.1.4.B.10-** Environmental / Earth Day / plants and Fairfield Farms	Unit 1 – W 1.7 Participate in shared Unit 2 – King Kafu Ask and answer questions/ RI 1.2 Unit 3 – Life cycle of an apple tree RI 1.10
2	**Unit 1 – 6.1.4.D.17** National Parks **Unit 2 – 6.1.4.B.10** Earth materials: erosion, water cycle, **Unit 3 – 6.1.4.B.4** Land and water habitats – geography of land	Unit 1 – L 2.5 Vocabulary acquisition and use Unit 2 – RI 2.3 Key ideas and details in a text Unit 3 – W 2.8 Research to build and present knowledge
3	**Unit 1 –6.1.4.B.4** Geography effects weather **Unit 2 – 6.1.4.B,4** Regions and life cycles **Unit 3 – 6.1.4.D.17** Biographies about Scientists	Unit 1 – L 3.6 Vocabulary acquisition and use Unit 2 – RI 3.4 Craft and structure Unit 3 – W 3.2 Text type and purpose
4	**Unit 1 – 6.1.4.B.8** resouces and energy sources **Unit 2 – 6.1.4.B.3** Geography, tectonic plates, map skills **Unit 3-6.1.4.B.4** environment influences on plant and animal structures	Unit 1-L.4.6 Vocabulary acquisition and use Unit 2-W.4.1 Text type and Purposes Unit 3-R.I.4.1 Key Ideas and Details
5	**Unit 1- 6.1.**Geography impact on seasons and weather **Unit 2 – 6.1.8.C.1.B** water cycle impact on indigenous people of North America **Unit 3- 6.2.8.B.3.A** - geography and its effects on the food web	Unit 1-S.L.5.1 Comprehension and Collaboration Unit 2-L.5.4 Vocabulary Acquisition and Use Unit 3-R.I.5.2-Key Ideas and Details
6	**Unit 1 – 6.3.8.C.C.1** Communities in relation to space and frames of reference. **Unit 2 – 6.2.8.B.3.A–** Climate change in relation to local geography **Unit 3- 6.2.8.B.4.e** Timeline to show the historical discovers of cells in relation to history. **Unit 4 -6.2.8.B.4.e** historical figures in genetic discoveries	Unit 1 – SL 8.5 – Integrate multimedia and visual displays into presentation to clarify information. Unit 2- RST.6-8.9 – Compare and contrast the information gained from experiments, simulations, etc. with that gained from reading text on the same topic. Unit 3 - WHST.6-8.1 – Write arguments focused on discipline content. Unit 4 – WHST.8-8.9 – Draw evidence from informational texts to support analysis, reflection and research.

Science ~ Appendix C

Computer Science

K	8.1.2.DA.4 - Unit 1 8.1.2.NI.2 Identify how the ways people live and work has changed because of technology – Unit 2 8.1.2.DA.3 – Unit 3 Life cycle of the pumpkin
1	8.2.2.ITH.3 – Use digital devices to create stories from pictures – Unit 1 8.1.2.DA.4 – Engage in a variety of appropriate learning activities with students from another class - Unit 2 8.1.2.CS.1 – Enter information into a spreadsheet – Unit 3
2	8.1.2.NI.2 – Demonstrate developmentally navigation skills in a virtual environment – Unit 1 8.2.2.ITH.3 – Digital devices to create stories – Unit 2 8.1.2.CS.1 – Create a document using a word processing information – Unit 3
3	8.2.5.NT.3 – Engage in online discussions with learners from other cultures to discuss a world-wide issue – Unit 1 8.1.5.DA.4 – Graph data using a spreadsheet – Unit 2 8.1.5.DA.1 – Select and use appropriate digital tools to solve problems - Unit 3
4	8.1.5.DA.3-Use a graphic organizer to organize Information-Unit 2 8.2.5.ETW.3-Analyze the research citations in online materials-Unit 1 8.1.5.DA.1-Analyze digital tools to collect, analyze, and organize date to support specific findings-Unit 3
5	8.1.5.DA.1- Select and use appropriate digital tools to solve problems-Unit 1 8.1.5.DA.4-Graph data using a spreadsheet-Unit 2 8.1.5.EC.1-Understand digital citizenship and understand consequences of inappropriate and appropriate uses of technology-Unit 3
6	8.1.8.DA.4 – Graph and calculate data within a spreadsheet and present a summary of the results – Unit 2 8.2.8.ITH.1 – Synthesize and publish information about a local or global issue or event – Unit3 8.2.8.IHT.5 – Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision. – Unit 2

Science ~ Appendix D
Standard 9 - Career Readiness, Life Literacies and Key Skills

Standard	Grade / Unit
9.1.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each jo	Kindergarten – Unit 3 Living Things Grade 1 – Unit 1 Light and Sound Waves Grade 2 – Unit Matter Grade 3 – Unit 1 Weather and climate patterns Grade 4- Unit 1 Energy Works Grade 5- Unit1 Structure and Properties of Matter Grade 6 Unit 1- Space systems
9.4.8.IML.12: Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience.	Grade 2 – Unit 3 Ecosystem diversity Grade 3 – Unit 3 Forces and Interactions Grade 4-Unit 1 Energy Works
9.1.5. EG.4: Describe how an individual's financial decisions affect society and contribute to the overall economy	Grade 3 – Unit 1 Weather and climate patterns Grade 4-Unit 3 Plant and Animal Structures
9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity	Grade 1 – Unit 1 Light and Sound Waves Grade 2 – Unit 1 Matter Grade 3 – Unit 3 Forces and Interactions Grade 4-Unit 2 Changing Earth Grade 5-Unit 2 Earth and Space Systems Grade 6 – Unit 2 Weather and Climate
9.1.2.CAP.4: List the potential rewards and risks to starting a business 9.1.2.CAP.4: Explain the reasons why some jobs and careers require specific training, skills and certification. 9.2.CAP.3: Explain how career choices, educational choices, skills, economic conditions and personal behavior affect income.	Grade 1 – Unit 3 Exploring Organisms Grade 2 – Unit 2 Ecosystem diversity Grade 3 – Unit 1 Weather and climate patterns Grade 4 – Unit 1 Energy Works Grade 5-Unit 3 Matter and Energy in Ecosystems Grade 6 – Unit 2 Weather and Climate
9.4.5.CI.4: Research the development process of a product and identify the role of failure as a part of the creative process	Kindergarten – Unit 1 Push, Pull, Go Grade 2 - Unit 2 Ecosystem diversity Grade 3 - Unit 3 Forces and Interactions Grade 4- Unit 2 Changing Earth Grade 5-Unit 2 Earth and Space Systems
9.4.8.DC.1: Analyze the resource citations in online materials for proper use	Grade 2 – Unit 3 Ecosystem diversity Grade 4-Unit 2 Changing Earth
CRP8 Utilize critical thinking to make sense of problems and persevere in solving them	Kindergarten – Unit 2 Weather and Sky Grade 4- Unit 3 Plant and Animal Systems Grade 5-Unit 1 Structure and Properties of Matter Grade 6 Unit 1 – Space Systems

Science ~ Appendix E

Financial Literacy

Standard	Grade / Unit
9.1.2.FP.1: Differentiate the various forms of money and how they are used	Grade Kindergarten – Unit 1 Push, Pull, Go Grade 4-Unit 1 Energy Works
9.1.5.FP.1: Illustrate the impact of financial traits on financial decisions	Grade Kindergarten – Unit 3 Living Things Grade 4- Unit 1 Energy Works
9.1.2.PB.2 Explain why an individual would choose to save money	Grade 1 – Unit 1 Light and Sound Waves
9.1.2.CR.1: List ways to give back including making donations, volunteering and starting a business	Grade 1 – Unit 3 Exploring Organisms Grade 2 – Unit 1 Matter
9.1.2.FP.2 Differentiate between financials wants and needs	Grade 2 – Unit 3 Ecosystem Diversity
9.1.5.EG.3: Explain the impact of the economic system on ones' personal financial goals	Grade 3 – Unit 3 Forces and Interactions Grade 4- Unit 1 Energy Works
9.1.5.FP.1: Differentiate the various forms of money and how they are used	Grade 3 – Unit 2 Life and Ecosystems
9.1.5.PB.2 Describe choices consumers have with money	Grade 4-Unit 1 Energy Works
9.2.4.A.1-Identify reasons why people work different types of work, and how work can be help a person achieve personal and professional goals	Grade 4- Unit 2 Changing Earth
p.1.8.FI.1 ID the factors to consider when selecting various financial service providers.	Grade 5-Unit 1 Structure and Properties of Matter Grade 6 – Unit 2 – Weather and Climate
9.1.8.FP.7 ID the techniques and effects of deceptive advertising	Grade 5- Unit 1 Structure and Properties of Matter