



Springfield Public Schools
Springfield, New Jersey 07081

Science
Grade 6

Curriculum Guide

2026

This curriculum may be modified through varying materials, techniques, and strategies as per an individual student's IEP.

Springfield Board of Education
Approved July 27, 2026

Springfield Public Schools

Cultivating compassionate and extraordinary learners!

EXTRACT OF THE MINUTES OF A MEETING OF THE BOARD OF EDUCATION OF THE TOWNSHIP OF SPRINGFIELD COUNTY OF UNION, NEW JERSEY AS RECORDED IN THE OFFICIAL MINUTE BOOK

Resolution: 21

Introduced By: Mrs. Gamarekian

Seconded By: Vice President Rinaldi

Adopted: July 27, 2026

Curriculum Adoption

To approve the following new and revised curriculum and courses for the 2026-2027 school year:

1. High School Courses

- a. AP Cybersecurity (new course)
- b. AP Business with Personal Finance (new course)
- c. AP Biology
- d. AP Chemistry
- e. AP Physics 1
- f. PLTW Robotics and Automation
- g. PLTW Introduction to Engineering Design
- h. PLTW Principles of Engineering
- i. Biology
- j. Biology Honors
- k. Chemistry
- l. Chemistry Honors
- m. Conceptual Physics
- n. Physics
- o. Environmental Science
- p. Forensics
- q. Human Anatomy and Physiology
- r. Oceanography
- s. Science 8
- t. Molecular Biology Research Lab (new course)

2. Middle School Courses

- a. Science 6
- b. Science 7

3. Elementary School Courses

- a. Kindergarten Science
- b. Grade 1 Science
- c. Grade 2 Science

(continued)

I, Michelle Calas, School Business Administrator/ Board Secretary of the Springfield Board of Education, hereby certify that the extract from the minutes of a meeting of the Board of Education duly called and held on July 27, 2026 has been compared by me with the original minute book of said Board of Education, and is a true, complete and exact copy thereof, as far as the same relates to the subject matter to on said extract.

In WITNESS THEREOF, I have hereunto set my hand and seal of the Springfield Board of Education, this 28th day of July 2026.

SEAL



Michelle Calas

School Business Administrator/ Board Secretary



SPRINGFIELD PUBLIC SCHOOLS
ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Springfield Public Schools
Springfield, New Jersey

Rachel Goldberg
Superintendent of Schools

Erica Scudero
Assistant Superintendent of Curriculum and Instruction

Curriculum Developed By:

Ron Slate ~ Principal of Florence M. Gaudineer Middle School

Gregory Salmon ~ STEM Supervisor

Kimberly Masterson ~ 6th grade science

Jason Perone ~ 6th grade science



Unit Overview Template

Content Area: Science **Grade Level:** 6 **Unit Title:** Engineering, Design, & Investigation

Unit Summary: Scientists use tools, math, inquiry skills, methods, and processes to investigate the world around them. They conduct scientific investigations and experiments, ask questions, and take measurements in order to gain knowledge and understanding to make new discoveries. During the course of this unit students will utilize the steps of the scientific method to investigate a question. The scientific method will stand as a process used for investigating and acquiring new knowledge, or correcting and integrating prior knowledge. Students will be introduced to the intricate tools scientists use to gather accurate data, learn to accurately map out a science experiment, differentiate between controlled and experimental variables, and, in addition, understand the importance of proper lab etiquette.

Primary Interdisciplinary Connections: Mathematics

21st Century Themes ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ ICT Literacy
☒ Information Literacy ☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy

Unit Rationale: Innovation and discovery are predicated on the principles of scientific investigation and processes. The systematic and comprehensive approach to problems and questions is the basis of all scientific inquiry. Scientists use specific skill sets and techniques to aid them in this process. Teaching and consistently reinforcing the importance of proper lab safety ensures that students learn in a safe environment. The importance of making accurate measurements will allow students to gather correct data and arrive at a valid conclusion. Making accurate measurements also enables others to recreate experiments (which is an important part of science). The scientific method provides an objective, a standardized approach to conducting experiments and, in doing so, improves student results. By using a standardized approach in investigating, scientists (students) can feel confident that they will stick to the facts and limit the influence of personal, preconceived notions. Reinforcing proper lab safety ensures that students learn in a safe environment. Accurate measurements lead to accurate data.

Career Readiness (Standard 9):

9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2)

9.4.CT.: Use a variety of types of thinking to solve problems (e.g., inductive, deductive)

9.1.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job

9.1.2.CAP.3: Define entrepreneurship and social entrepreneurship.

9.2.5.CAP.1: Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.

9.2.5.CAP.3: Identify qualifications needed to pursue traditional and non-traditional careers and occupations.

9.2.8.CAP.3: Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income

9.4.2.DC.2: Explain the importance of respecting the digital content of others.

9.4.2.DC.3: Explain how to be safe online and follow safe practices when using the internet (e.g., 8.1.2.NI.3, 8.1.2.NI.4).



9.4.2.DC.4: Compare information that should be kept private to information that might be made public.

9.4.2.TL.1: Identify the basic features of a digital tool and explain the purpose of the tool

9.4.2.TL.2: Create a document using a word processing application.

9.4.2.TL.3: Enter information into a spreadsheet and sort the information.

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3)

Learning Targets

Standards: MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETS1-4

Content Statements: Engineering Design

CPI#:	Cumulative Progress Indicator (CPI):
MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
MS-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
MS-ETS1-4	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem
8.2.8.ITH.1	Explain how the development and use of technology influences economic, political, social, and cultural issues.
8.2.8.ITH.2	Compare how technologies have influenced society over time.
8.2.8.ITH.4	Identify technologies that have been designed to reduce the negative consequences of other technologies and explain the change in impact.
8.2.8.ITH.5	Compare the impacts of a given technology on different societies, noting factors that may make a technology appropriate and sustainable in one society but not in another.
8.2.8.NT.3	Examine a system, consider how each part relates to other parts, and redesign it for another purpose.
8.2.8.NT.4	Explain how a product designed for a specific demand was modified to meet a new demand and led to a new product.



8.2.8.ETW.1	Illustrate how a product is upcycled into a new product and analyze the short- and long-term benefits and costs.
8.2.8.ETW.3	Analyze the design of a product that negatively impacts the environment or society and develop possible solutions to lessen its impact.
8.2.8.ETW.4	Compare the environmental effects of two alternative technologies devised to address climate change issues and use data to justify which choice is best.
6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
6.SP.B.5	Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Science and Engineering Practices:

Asking Questions and Defining Problems

Asking questions and defining problems in grades 6–8 builds on K–5 experiences and progresses to specifying relationships between variables and clarifying arguments and models.

- Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. (MS-ETS1-1)

Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

- Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs. (MS-ETS1-4)

Analyzing and Interpreting Data

Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

- Analyze and interpret data to determine similarities and differences in findings. (MS-ETS1-3)

Engaging in Argument from Evidence

Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world.



- Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (MS-ETS1-2)

Disciplinary Core Ideas (DICs):

ETS1.A: Defining and Delimiting Engineering Problems

- The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. (MS-ETS1-1)

ETS1.B: Developing Possible Solutions

- A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (MS-ETS1-4)
- There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2), (MS-ETS1-3)
- Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. (MS-ETS1-3)
- Models of all kinds are important for testing solutions. (MS-ETS1-4)

ETS1.C: Optimizing the Design Solution

- Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design. (MS-ETS1-3)
- The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (MS-ETS1-4)

Crosscutting Concepts:

Influence of Science, Engineering, and Technology on Society and the Natural World

- All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. (MS-ETS1-1)
- The uses of technologies and limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. (MS-ETS1-1)

Unit Essential Questions:

- How do scientists use tools and math?
- What are science inquiry skills?
- What methods & processes do scientists use?
- How do we create a safe science environment?



- How is the scientific method used to investigate and solve questions?
- What specific scientific equipment is used in making length, time, temperature, volume, and mass measurements?

Unit Enduring Understandings:

- Scientists use tools and math to record and communicate data.
- Inquiry skills help scientists conduct investigations, record data, and communicate the results.
- Scientists use the scientific process beginning with the hypothesis formation, followed by observing, gathering and recording data, drawing conclusions, and communicating results.
- Utilize all safety precautions and concepts in a lab environment.
- Identify the proper tools scientists use to collect accurate data.
- Convert measurements between various metric units.
- Use inquiry skills to ask and solve scientific questions.
- Utilize the steps of the scientific method to successfully map out the steps of a controlled experiment to investigate a problem, analyze data, and arrive at a conclusion.

Unit Learning Targets:

Students will....

- Describe some tools used in scientific investigations.
- Describe some ways math is used to analyze, interpret, and report data.
- Define some of the inquiry skills used in scientific investigations.
- Describe how to use inquiry skills in an investigation or experiment.
- Identify a relationship between the dependent and independent variables in an investigation.
- Carry out a simple investigation and draw valid conclusions from it.
- Explain the scientific method & process.
- Describe how experiments and investigations use the scientific process.
- Explain and observe proper safety procedures during investigations.
- Identify and use proper safety precautions within a laboratory environment.
- Create an experiment using the steps of the scientific method that incorporates the usage of both controls and variables.



Evidence of Learning

Summative Assessment: Unit Assessment and Labs

Equipment Needed: Student iPads, laboratory materials and supplies, safety equipment, measuring tools, calculators

Teacher Resources: Teacher laptop, textbook, laboratory materials and supplies, safety equipment, measuring tools, calculators

Formative Assessments:

- Exit/Admit cards
- Class discussion/observation
- Self-assessing lab activities
- Lab reports/summary questions
- Test/Quiz
- Online Gizmo questions
- Homework
- Adult/student modeling
- Peer/Self Assessments
- Presentations



Lesson Plans

Lesson	Time Frame
Lesson 1: Lab Safety	3 days
Lesson 2: Scientific Method	3 days
Lesson 3: Making Drop Prints	3 days

Teacher Notes: In order to help obtain accurate measurements it is important the teacher focuses on breaking down which tool to use and how to use it correctly. In addition, students need to know how to read and identify proper scale. Interactive tools such as Gizmos or PhET to visually explain each concept.

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

www.explorelearning.com

www.brainpop.com



Lesson Plan 1 Template

Content Area: Science

Lesson Title: Lab Safety Manual

Time Frame: 3 days

Lesson Components

21st Century Themes

- ☒ Global Awareness ☐ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☒ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☒ ICT Literacy

Interdisciplinary Connections: Mathematics

Integration of Technology:

- Students will use iPads to view digital lab safety videos, analyze safety scenarios, complete interactive safety activities, and create a digital safety manual or presentation.
- Students will use multimedia tools to communicate scientific ideas and demonstrate understanding of laboratory procedures.

Equipment Needed:

- iPads
- Safety goggles
- Beakers, graduated cylinders, and common laboratory glassware
- Aprons and gloves
- Eyewash station and safety shower
- Fire extinguisher and fire blanket
- First aid kit
- Laboratory safety symbols and scenario cards
- Poster paper and markers or digital presentation tools

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Understand the importance of laboratory safety and recognize that scientists use procedures and equipment to reduce risks and prevent accidents. • Identify and explain the purpose and location of	Lesson Sequence 1. Anchoring Phenomenon: Students observe images and a short video of real laboratory accidents and discuss how a simple mistake can result in injury or damaged materials. 2. Students participate in a class discussion	• Participation in safety discussions and scenario analyses. • Completion of laboratory safety scavenger hunt. • Safety scenario responses and group discussions. • Laboratory Safety Manual, poster, infographic, or iMovie.



classroom safety equipment. • Demonstrate proper handling and use of common laboratory materials and equipment. • Distinguish between safe and unsafe laboratory practices. • Apply laboratory safety rules to authentic scenarios and justify appropriate responses. • Collaboratively create a laboratory safety manual that communicates expectations for scientific investigations.	about why safety procedures are essential in science laboratories around the world. 3. Students review laboratory rules and analyze various safe and unsafe classroom scenarios. 4. Students discuss questions and concerns regarding laboratory equipment and proper safety techniques. 5. The teacher demonstrates the location and appropriate use of classroom safety equipment. 6. Students participate in a laboratory safety scavenger hunt to locate and identify safety equipment and emergency procedures. 7. Students rotate through stations practicing proper techniques such as carrying glassware, wearing goggles correctly, and handling materials safely. 8. In small groups, students analyze safety scenarios and determine the safest course of action. 9. Students create a laboratory safety manual, poster, infographic, or iMovie depicting laboratory	• Laboratory Safety Practical Quiz. • Signed Safety Contract and acknowledgment of classroom rules.
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- safety symbols, rules, and their meanings.
10. Students participate in a hands-on laboratory safety practical in which they demonstrate correct procedures and identify potential hazards.

Differentiation:

- All students will view the laboratory safety video and review classroom expectations.
- Students may demonstrate understanding by creating a poster, digital presentation, infographic, or iMovie.
- Visual supports, safety symbol charts, and step-by-step directions will be provided.
- Students may work independently, with partners, or in small groups during activities.
- Teacher modeling and guided practice will be provided before independent tasks.
- Modified templates, graphic organizers, and additional practice opportunities will be provided according to individual student needs.
- Extension activities may include designing additional laboratory scenarios and proposing solutions to prevent accidents.

Resources Provided:

- Textbook
- Digital lab safety video
- Safety contract and classroom rules
- Laboratory safety symbols and scenario cards
- Lab supplies and safety goggles
- iPads and presentation tools
- Graphic organizers and manual templates
- Classroom safety equipment for demonstrations



Lesson Plan 2 Template

Content Area: Science

Lesson Title: Scientific Method

Time Frame: 3 days

Lesson Components

21st Century Themes

- ☒ Global Awareness ☐ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☒ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☒ ICT Literacy

Interdisciplinary Connections: Mathematics

Integration of Technology:

- Students will use the Gizmos interactive simulation to investigate variables, experimental design, and data collection.
- Students will use iPads to record observations, analyze data, create graphs, and communicate findings.
- Students may use spreadsheet applications to organize experimental data and generate graphs.

Equipment Needed:

- iPads
- Gizmos access
- Labware and glassware
- Safety goggles
- Paper towels (multiple brands)
- Graduated cylinders
- Beakers or cups
- Water
- Timers or stopwatches
- M&M candies
- Data collection sheets
- Graph paper
- Measuring tools and other classroom lab materials

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Outline and apply the steps of the scientific method. • Differentiate between independent,	Lesson Sequence 1. Anchoring Phenomenon: Present students with several different brands of paper towels and a	• Scientific Method Experiment • Paper Towel Investigation data table



dependent, and controlled variables. • Distinguish between controlled and non-controlled experiments. • Design and conduct an investigation to answer a scientific question. • Collect, organize, and communicate quantitative and qualitative data. • Analyze experimental results and evaluate the reliability of conclusions. • Revise experimental procedures based on evidence and propose future investigations. • Collaborate with peers to solve problems and communicate scientific findings.	spilled cup of water. Ask, "Why do some paper towels seem to absorb more water than others, and how could we scientifically determine which is best?" 2. Students participate in a class discussion about how scientists answer questions and solve problems using evidence. 3. Students review the steps of the scientific method, inquiry skills, and methods of communicating scientific data. 4. Students use the Gizmos simulation to identify variables and examine how changing one variable affects experimental outcomes. 5. Students work collaboratively to develop a testable question regarding paper towel absorbency. 6. Student groups design an investigation, identify independent, dependent, and controlled variables, and create a procedure. 7. Students conduct the paper towel investigation by measuring and recording the amount of water absorbed by	• Variable identification practice • M&M Graphing Analysis • Lab Report • Group presentation of findings • Reflection on experimental improvements • Exit ticket explaining the purpose of controlled variables
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- different paper towel brands.
8. Students organize data into tables and construct graphs to compare results.
 9. Students complete an M&M graphing activity to practice creating and interpreting data displays.
 10. Student groups present their findings and justify their conclusions using evidence from their investigations.
 11. Students evaluate sources of error and discuss how the experiment could be improved or extended into future investigations.
 12. Students reflect on how the scientific method is used to solve everyday problems and make evidence-based decisions.

Differentiation:

- Provide tiered assignments with varying levels of complexity and scaffolding based on student readiness.
- Provide graphic organizers outlining the steps of the scientific method and experimental variables.
- Offer partially completed data tables and graph templates for students who require additional support.
- Allow students to communicate findings through written reports, presentations, diagrams, or digital products.
- Use heterogeneous grouping to encourage peer collaboration and problem solving.
- Provide extension activities in which advanced learners design and conduct an additional investigation using a new testable question.
- Offer teacher conferencing and guided questioning to support students throughout the investigation process.

Resources Provided:

- Textbook



- Gizmos access
- Lab supplies, glassware, and safety goggles
- Scientific method graphic organizer
- Variable identification practice sheets
- Data tables and graph templates
- Lab report template
- Classroom notes and reference materials



Lesson Plan 3 Template

Content Area: Science

Lesson Title: Making Drop Prints

Time Frame: 3 days

Lesson Components

21st Century Themes

- ☒ Global Awareness ☐ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☒ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☒ ICT Literacy

Interdisciplinary Connections: Mathematics

Integration of Technology:

- Students will use the Gizmos interactive simulation to investigate cause-and-effect relationships and experimental design.
- Students will use iPads to record observations, photograph drop print patterns, analyze data, and communicate findings.
- Students may use digital graphing tools or spreadsheet applications to organize measurements and display trends.

Equipment Needed:

- iPads
- Gizmos access
- Safety goggles
- Colored water
- Droppers or pipettes
- Meter sticks or rulers
- White paper or chart paper
- Measuring tape or rulers
- Data collection sheets
- Graph paper
- Lab trays or protective coverings
- General lab materials and classroom supplies

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Carry out a scientific investigation and draw evidence-based conclusions.	Lesson Sequence 1. Anchoring Phenomenon: Display several colored water drop prints of different sizes and shapes. Ask students, "Why are	• Drop Print lab data sheet • Measurements and data tables • Graph of experimental results



• Explain and apply the steps of the scientific method. • Identify independent, dependent, and controlled variables in an experiment. • Investigate cause-and-effect relationships by examining how drop height affects drop print size. • Collect, organize, and analyze quantitative and qualitative data. • Construct graphs and identify patterns and trends in experimental results. • Communicate scientific findings using appropriate evidence and reasoning. • Collaborate with peers to evaluate procedures and improve experimental designs.	some splatters larger than others? What might cause these differences?" 2. Students make initial observations and predictions about what factors may affect the size of a water drop print. 3. Students review the scientific method and discuss how scientists investigate cause-and-effect relationships. 4. Students identify the independent variable (drop height), dependent variable (drop print width), and controlled variables. 5. Student groups design and conduct an investigation by dropping colored water from various heights onto paper. 6. Students measure the diameter of each drop print, record observations, and repeat trials to improve reliability. 7. Students organize their data into tables and create graphs showing the relationship between drop height and drop print width. 8. Students use the Gizmos simulation to explore additional examples of variables and experimental design. 9. Student groups analyze patterns in their data and discuss whether their evidence supports their original predictions. 10. Students communicate their findings and explain how	• Analyze and conclude questions • Communication of findings to the class • Scientific explanation of cause-and-effect relationship • Experiment results on lab sheet • Drop Print Lab report
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- the scientific method helped them answer the investigation question.
11. Students reflect on how repeating trials and controlling variables improve the quality of scientific investigations.

Differentiation:

- Provide tiered assignments with varying levels of complexity and scaffolding based on student readiness.
- Provide partially completed data tables and graph templates for students requiring additional support.
- Use teacher-guided mini lessons to reinforce concepts such as variables, graphing, and data interpretation.
- Allow students to communicate findings through written explanations, diagrams, oral presentations, or digital products.
- Use heterogeneous grouping to promote collaboration and peer support.
- Provide extension opportunities in which advanced learners investigate additional variables, such as droplet volume or surface type.
- Offer teacher conferencing and guided questioning throughout the investigation process.

Resources Provided:

- Textbook
- Gizmos access
- Lab supplies and safety goggles
- Data collection sheets
- Graph templates
- Lab report template
- Classroom notes and reference materials



Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson Strongly, Moderately or Weakly meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging and require higher order thinking and problem solving skills	☒	☐	☐
Allow for student choice	☒	☐	☐
Provide scaffolding for acquiring targeted knowledge/skills	☒	☐	☐
Integrate global perspectives	☐	☒	☐
Integrate 21st century skills	☒	☐	☐
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	☒	☐	☐
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	☒	☐	☐
Are varied to address different student learning styles and preferences	☒	☐	☐
Are differentiated based on student needs	☒	☐	☐
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	☐	☐	☐
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	☒	☐	☐
Provide opportunities for student reflection and self-assessment	☒	☐	☐
Provide data to inform and adjust instruction to better meet the varying needs of learners	☒	☒	☐

Curriculum Design Template

Content Area: Science	Grade Level: 6	Unit Title: Engineering, Design, & Investigation
Created: 2026		Board Approved on:



Unit Overview Template

Content Area: Science **Grade Level:** 6 **Unit Title:** Space Systems

Unit Summary: The Earth's rotation on its axis and revolution around the sun cause daily, monthly, and seasonal cycles. The moon's revolution around Earth causes eclipses and is mostly responsible for tides. The moon appears to change shape as it revolves. How much light we see reflected from the moon's surface depends on where the moon is in its revolution around Earth. Also unique are the characteristics of the inner and outer planets, their composition, and the presence of moons (satellite bodies). Satellite bodies orbit most planets and there are asteroids, meteors, comets, and dwarf planets orbiting the sun. Stars differ in color, surface temperature, mass, and brightness, and each star has a unique life cycle. Galaxies contain billions of stars and are classified by shape. Scientists hypothesize how the universe was formed and what its future may be.

Primary Interdisciplinary Connections: Mathematics

21st Century Themes ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ ICT Literacy
☒ Information Literacy ☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy

Unit Rationale: Bodies in space have constant motion and unique characteristics that we can observe with telescopes (some orbiting the Earth or satellites sent on planetary missions). Many things are caused by the interaction of Earth, moon, and sun. Day changes into night as Earth rotates on its axis. A year passes as Earth revolves around the sun. The seasons also change as Earth revolves, tilted on its axis. And the positions of the Earth, sun, and moon sometimes cause eclipses. These rotations and revolutions also cause the phases of the moon. Asteroids, meteors, and comets are all parts of the solar system. Stars have a life cycle and are classified by their size and temperature.

Career Readiness (Standard 9):

- 9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2)
- 9.4.CT.3 : Use a variety of types of thinking to solve problems (e.g., inductive, deductive)
- 9.1.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job
- 9.1.2.CAP.3: : Define entrepreneurship and social entrepreneurship.
- 9.2.5.CAP.1: Evaluate personal likes and dislikes and identify careers that might be suited to personal like
- 9.2.5.CAP.3: Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
- 9.2.8.CAP.3: : Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income
- 9.4.2.DC.2: Explain the importance of respecting the digital content of others.
- 9.4.2.DC.3 Explain how to be safe online and follow safe practices when using the internet (e.g., 8.1.2.NI.3, 8.1.2.NI.4).
- 9.4.2.DC.4: Compare information that should be kept private to information that might be made public.
- 9.4.2.TL.1: : Identify the basic features of a digital tool and explain the purpose of the tool
- 9.4.2.TL.2: Create a document using a word processing application.
- 9.4.2.TL.3: Enter information into a spreadsheet and sort the information.



9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).

9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3)

Learning Targets

Standards: MS-ESS1; MS-ETS1

Content Statements: Earth's Place in the Universe, Engineering Design

CPI#:	Cumulative Progress Indicator (CPI):
MS-ESS1-1	Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun, the moon, and seasons.
MS-ESS1-2	Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.
MS-ESS1-3	Analyze and interpret data to determine scale properties of objects in the solar system.
8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem
6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
6.SP.B.5	Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Science and Engineering Practices:

Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

- Develop and use a model to describe phenomena. (MS-ESS1-1), (MS-ESS1-2)

Analyzing and Interpreting Data

Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.



- Analyze and interpret data to determine similarities and differences in findings. (MS-ESS1-3)

Disciplinary Core Ideas (DICs):

ESS1.A: The Universe and Its Stars

- Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. (MS-ESS1-1)
- Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. (MS-ESS1-2)

ESS1.B: Earth and the Solar System

- The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. (MS-ESS1-2), (MS-ESS1-3)
- This model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. (MS-ESS1-1)
- The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. (MS-ESS1-2)

Crosscutting Concepts:

Patterns

- Patterns can be used to identify cause-and-effect relationships. (MS-ESS1-1)

Scale, Proportion, and Quantity

- Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS1-3)

Systems and System Models

- Models can be used to represent systems and their interactions. (MS-ESS1-2)

Connections to Engineering, Technology, and Applications of Science

Interdependence of Science, Engineering, and Technology

- Engineering advances have led to important discoveries in virtually every field of science and scientific discoveries have led to the development of entire industries and engineered systems. (MS-ESS1-3)

Connections to Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

- Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS-ESS1-1), (MS-ESS1-2)

**Unit Essential Questions:**

- What are some Earth-sun-moon interactions?
- What causes the phases of the moon?
- What is in the solar system?
- What is beyond the solar system?

Unit Enduring Understandings:

- The Earth's rotation on its axis and revolution around the sun cause daily, monthly, and seasonal cycles.
- The moon's revolution around Earth causes eclipses and is mostly responsible for tides.
- The moon appears to change shape as it revolves.
- The amount of light we see reflected from the moon's surface depends on where the moon is in its revolution around Earth.
- The characteristics of the inner and outer planets, their composition, and presence of satellites.
- Satellites orbit most planets and there are asteroids, meteors, comets, and dwarf planets orbiting the sun.
- Stars differ in color, surface temperature, mass, and brightness, and each star has a unique life cycle.
- Galaxies contain billions of stars and are classified by shape.
- Scientists hypothesize how the universe was formed and what its future may be.

Unit Learning Targets:**Students will....**

- Construct a model of an elliptical orbit.
- Define day, year, season, eclipse, and tide.
- Explain interactions between Earth, the moon, and the sun.
- Illustrate one complete lunar cycle.
- Name and describe the moon's phases.
- Explain why the moon has phases.
- Construct a scale model of the distances in the solar system.
- Compare the sizes, positions, and motions of bodies in the solar system.
- Describe the composition and motions of asteroids, meteors, and comets.
- Identify variables that affect apparent brightness.
- Describe types of stars and their life cycles.
- Define types of galaxies and explain theories of how the universe formed.



Evidence of Learning

Summative Assessment: Unit Assessment and Labs

Equipment Needed: Student iPads, laboratory materials and supplies, safety equipment, measuring tools, calculators

Teacher Resources: Teacher laptop, textbook, laboratory materials and supplies, safety equipment, measuring tools, calculators

Formative Assessments:

- Exit/Admit cards
- Class discussion/observation
- Self assessing lab activities
- Lab reports/summary questions
- Test/Quiz
- Online Gizmo questions
- Homework
- Adult/student modeling
- Peer/Self Assessments
- Presentations



Lesson Plans

Lesson	Time Frame
Lesson 1: Displaying the Moon's Cycle	2-3 days
Lesson 2: Modeling the Solar System	5-7 days
Lesson 3: Experimenting with Brightness	1-2 days

Teacher Notes: Be sure to gather and organize all supplies ahead of time to facilitate the management of the lesson activities. Gizmos and PhET are helpful interactive tools to visually explain each concept.

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

www.explorelearning.com



Lesson Plan 1 Template

Content Area: Science

Lesson Title: Displaying the Moon's Cycle

Time Frame: 2-3 days

Lesson Components

21st Century Themes

- ☒ Global Awareness ☐ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☒ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☒ ICT Literacy

Interdisciplinary Connections: Mathematics

Integration of Technology:

- Students will use the Gizmo Interactive Lab to model the positions of the Earth, Moon, and Sun and investigate the causes of lunar phases.
- Students will use iPads to research the current phase of the Moon, record observations, and create digital or paper-based representations of the lunar cycle.
- Students may use online astronomy resources and moon phase trackers to compare their models with real-world observations.

Equipment Needed:

- iPads
- Gizmo Interactive Lab access
- Textbook and classroom reference materials
- Moon phase observation chart
- Construction paper or index cards
- Scissors and glue
- Markers or colored pencils
- Flashlights
- Styrofoam balls or foam spheres
- Pencils
- General classroom and lab supplies

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Illustrate one complete lunar cycle. • Name and describe each phase of the Moon.	Lesson Sequence 1. Anchoring Phenomenon: Display photographs of the Moon taken over several weeks showing different phases. Ask students,	• Lunar cycle observation chart • Moon phase modeling activity • Lunar Cycle Flip Book



- Explain why the Moon appears to change shape throughout the month.
- Develop and use models to demonstrate the positions of the Earth, Moon, and Sun during different lunar phases.
- Analyze patterns in lunar observations and identify the cyclical nature of the Moon's phases.
- Use evidence from observations and models to explain that the Moon's phases are caused by changing viewing angles rather than changes in the Moon itself.
- Communicate scientific explanations using diagrams, models, and written responses.

- "Why does the Moon seem to change shape throughout the month?"
2. Students share prior knowledge and make predictions about why the Moon's appearance changes.
 3. Students create an observation chart to record and organize information about the lunar cycle.
 4. Students use internet resources and moon phase trackers to identify and record the current phase of the Moon.
 5. Students participate in a hands-on modeling activity using flashlights and foam spheres to represent the Sun, Earth, and Moon and observe how different lunar phases occur.
 6. Students use the Gizmo Interactive Lab to manipulate the positions of the Earth, Moon, and Sun and investigate patterns in the lunar cycle.
 7. Students create a lunar cycle flip book illustrating each phase of one complete lunar cycle.
 8. Students use their flip books and models to answer conclusion questions and explain the cause of the Moon's phases.

- Responses to conclusion questions
- Class discussion and explanations
- Moon Gizmo investigation responses
- Lunar Cycle Quiz



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| | <p>9. Students compare their observations and models with real-world lunar data and discuss patterns they observed.</p> <p>10. Students communicate their explanations through class discussion and written responses.</p> | |
|--|--|--|

Differentiation:

- All students complete a lunar cycle observation chart and participate in the modeling activity.
- Students may choose to create a digital or paper-based lunar cycle representation.
- Provide labeled diagrams, moon phase reference cards, and partially completed charts for students requiring additional support.
- Use teacher-guided mini lessons and small-group instruction to reinforce the relationship between the Earth, Moon, and Sun.
- Allow students to demonstrate understanding through drawings, written explanations, oral presentations, or digital products.
- Provide extension opportunities for advanced learners to investigate lunar eclipses or compare lunar cycles to other cyclical astronomical phenomena.
- Use heterogeneous grouping to encourage peer collaboration and scientific discourse.

Resources Provided:

- Textbook
- Gizmo Interactive Lab access
- Lab supplies
- Moon phase charts and diagrams
- Online moon phase resources
- Classroom notes and reference materials



Lesson Plan 2 Template

Content Area: Science Lesson Title: Modeling the Solar System Time Frame: 5-7 days

Lesson Components

21st Century Themes

- ☒ Global Awareness ☐ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☒ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☒ ICT Literacy

Interdisciplinary Connections: Mathematics

Integration of Technology:

- Students will use Gizmos and PhET simulations to investigate the relative sizes, distances, and motions of objects within the solar system.
- Students will use iPads to access planetary data, perform scale calculations, record observations, and communicate findings.
- Students may use digital measurement and spreadsheet tools to organize and analyze planetary distance and size data.

Equipment Needed:

- iPads
- Gizmos access
- PhET simulation access
- Textbook and classroom reference materials
- Balloons of varying sizes
- Meter sticks and measuring tapes
- String or rope
- Planet data tables
- Calculators
- Chart paper
- Markers
- Labels or index cards
- General classroom and lab materials

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Construct a scale model of the solar system.	Lesson Sequence 1. Anchoring Phenomenon: Display an image showing all of the planets lined up	• Scale model of the solar system • Planetary distance calculations



- Compare the relative sizes, positions, and motions of bodies within the solar system.
- Calculate scaled distances between planets using mathematical models and proportional reasoning.
- Differentiate between rotation and revolution and explain how these motions affect planetary systems.
- Describe the compositions and motions of asteroids, meteors, and comets.
- Analyze patterns within the solar system and explain how models help scientists understand systems that are too large to observe directly.
- Communicate scientific explanations using models, diagrams, calculations, and evidence-based reasoning.

- closely together and ask students, "Does our solar system actually look like this? How far apart are the planets really?"
2. Students discuss prior knowledge and make predictions about the relative sizes and distances of objects in the solar system.
 3. Students examine planetary data tables and determine an appropriate scale for representing planetary distances and sizes.
 4. Students calculate scaled distances using proportional reasoning and record their calculations.
 5. Students participate in a hands-on engineering activity by constructing a large-scale model of the solar system using balloons, labels, and measured distances.
 6. Students position planetary models according to calculated distances and compare the immense scale of the solar system.
 7. Students use physical models to demonstrate planetary rotation and revolution and discuss how these motions differ.
 8. Students use Gizmos and PhET simulations to observe planetary

- Data charts and observations
- Planetary model explanations
- Responses to conclusion questions
- Class discussions and explanations
- Planetary Scale Quiz



- motion and investigate the relative movement of objects within the solar system.
9. Students analyze images and data related to asteroids, meteors, and comets and compare their compositions and motions with those of planets.
 10. Students record observations, complete conclusion questions, and communicate findings through discussion and written explanations.

Differentiation:

- Provide tiered assignments with varying levels of complexity and scaffolding based on student readiness.
- Provide partially completed data tables and guided calculation examples for students requiring additional support.
- Use teacher-guided mini lessons to reinforce proportional reasoning and scale calculations.
- Allow students to demonstrate understanding through physical models, diagrams, written explanations, oral presentations, or digital products.
- Use heterogeneous grouping to encourage peer collaboration and shared problem solving.
- Provide extension opportunities for advanced learners to investigate dwarf planets, exoplanets, or the scale of galaxies beyond our solar system.
- Offer additional support through graphic organizers, reference charts, and teacher conferencing throughout the investigation.

Resources Provided:

- Textbook
- Gizmos access
- PhET simulation access
- Lab supplies
- Planetary data tables
- Scale calculation guides
- Classroom notes and reference materials



Lesson Plan 3 Template

Content Area: Science Lesson Title: Experimenting with Brightness Time Frame: 1-2 days

Lesson Components

21st Century Themes

- ☒ Global Awareness ☐ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☒ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☒ ICT Literacy

Interdisciplinary Connections: Mathematics

Integration of Technology:

- Students will use the Gizmo Interactive Simulation to investigate how distance and intrinsic properties affect the apparent brightness of stars.
- Students will use iPads to record observations, organize data, create graphs, and communicate findings.
- Students may use digital graphing tools and astronomy resources to compare their observations with real astronomical objects and star data.

Equipment Needed:

- iPads
- Gizmo Interactive Simulation access
- Textbook and classroom reference materials
- Flashlights
- Meter sticks or measuring tapes
- Light meters (if available) or brightness comparison charts
- Wax paper or transparencies
- Index cards
- Graph paper
- Data collection sheets
- Calculators
- General classroom and lab materials

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Identify variables that affect the apparent brightness of stars. • Explain how the distance between an observer and a	Lesson Sequence 1. Anchoring Phenomenon: Display images of bright stars in the night sky and ask students, "Why do some	• Observation chart and data tables • Experiment results on lab sheet



light source influences observed brightness. • Investigate how changes in a light source's properties affect its observed brightness. • Collect and analyze data to identify patterns between distance and apparent brightness. • Describe major types of stars and summarize the stages of stellar life cycles. • Define different types of galaxies and compare their characteristics. • Explain scientific theories describing the formation and evolution of the universe. • Construct evidence-based explanations using observations, models, and data analysis.	stars appear much brighter than others? Are the brightest stars always the closest stars?" 2. Students discuss prior knowledge and develop hypotheses about factors that influence apparent brightness. 3. Students create an observation chart and identify variables that may affect how bright a light source appears. 4. Students participate in a hands-on investigation using flashlights positioned at varying distances to model how the brightness of stars changes as distance increases. 5. Students collect quantitative observations and record changes in apparent brightness at each measured distance. 6. Students use the Gizmo Interactive Simulation to investigate additional variables affecting star brightness and compare their findings with the physical investigation. 7. Students organize and graph their data to identify patterns and relationships between distance and brightness. 8. Students examine diagrams and models of stellar evolution and	• Graphs of brightness and distance relationships • Answers to analyze and conclude questions • Class discussions and scientific explanations • Responses to conclusion questions • Communication of experimental findings
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- discuss how stars differ in size, temperature, brightness, and life cycle stages.
9. Students analyze images of spiral, elliptical, and irregular galaxies and compare their characteristics.
 10. Students discuss evidence supporting theories of the origin and evolution of the universe, including how observations of stars and galaxies help scientists understand the cosmos.
 11. Students complete conclusion questions and communicate findings through written explanations and class discussions.

Differentiation:

- Provide tiered assignments with varying levels of complexity and scaffolding based on student readiness.
- Provide partially completed data tables, graph templates, and guided questions for students requiring additional support.
- Use teacher-guided mini lessons to reinforce concepts such as variables, graph interpretation, and stellar evolution.
- Allow students to demonstrate understanding through written explanations, diagrams, oral presentations, physical models, or digital products.
- Use heterogeneous grouping to encourage collaboration and peer support during investigations.
- Provide extension opportunities for advanced learners to investigate how astronomers determine distances to stars or explore additional evidence related to galaxy formation and the expanding universe.
- Offer teacher conferencing and guided questioning throughout the investigation process.

Resources Provided:

- Textbook
- Gizmo Interactive Simulation access
- Lab supplies
- Data collection sheets



- Graph templates
- Astronomy diagrams and reference materials
- Classroom notes and reference materials



Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson Strongly, Moderately or Weakly meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging and require higher order thinking and problem solving skills	☒	☐	☐
Allow for student choice	☒	☐	☐
Provide scaffolding for acquiring targeted knowledge/skills	☒	☐	☐
Integrate global perspectives	☐	☒	☐
Integrate 21st century skills	☒	☐	☐
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	☒	☐	☐
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	☒	☐	☐
Are varied to address different student learning styles and preferences	☒	☐	☐
Are differentiated based on student needs	☒	☐	☐
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	☒	☐	☐
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	☒	☐	☐
Provide opportunities for student reflection and self-assessment	☒	☐	☐
Provide data to inform and adjust instruction to better meet the varying needs of learners	☐	☒	☐

Curriculum Design Template

Content Area: Science	Grade Level: 6	Unit Title: Space Systems
Created: 2026	Board Approved on:	



Unit Overview Template

Content Area: Science

Grade Level: 6

Unit Title: Weather & Climate

Unit Summary: Earth's atmosphere is made up of several gases needed for life to exist. It is composed of five layers, and the Sun affects it. Large air masses form and move over Earth's surface, air masses collide along fronts, and weather changes often result. Global winds blow across long distances in predictable patterns. Precipitation, temperature, and ocean currents influence climate. Meteorologists are weather scientists who use specialized equipment to gather and analyze weather data. They use these data to forecast short-term and long-term weather conditions.

Primary Interdisciplinary Connections: Mathematics

21st Century Themes ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ ICT Literacy

☒ Information Literacy ☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy

Unit Rationale: Factors in the atmosphere interact to cause changes in weather conditions and may cause sudden and severe storms. The gases in the atmosphere make life possible. The sun warms the atmosphere and influences the weather within it. An air mass is a body of air that has the same overall characteristics, including relative humidity, temperature, and air pressure. The movement of these air masses causes changes in weather. Meteorologists use weather maps, Doppler radar, radio waves, satellites, and other data collected from high above Earth's surface to make predictions and accurate forecasts.

Career Readiness (Standard 9):

9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).

9.4.CT.3: : Use a variety of types of thinking to solve problems (e.g., inductive, deductive)

9.1.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job

9.1.2.CAP.3: Define entrepreneurship and social entrepreneurship

9.2.5.CAP.1: Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.

9.2.5.CAP.3: Identify qualifications needed to pursue traditional and non-traditional careers and occupations.

9.2.8.CAP.3: : Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.

9.4.2.DC.2: Explain the importance of respecting digital content of others.

9.4.2.DC.3: Explain how to be safe online and follow safe practices when using the internet (e.g., 8.1.2.NI.3, 8.1.2.NI.4).

9.4.2.DC.4: Compare information that should be kept private to information that might be made public. An individual's digital footprint reflects the various actions an individual makes online, both positive and negative.

9.4.2.DC.5: Explain what a digital footprint is and how it is created



Learning Targets

Standards: MS-ESS2

Content Statements: Earth's Systems. Earth and Human Activity.

CPI#:	Cumulative Progress Indicator (CPI):
MS-ESS2-1	Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
MS-ESS2-4	Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
MS-ESS2-5	Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.
MS-ESS2-6	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.
8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem
6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
6.SP.B.5	Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Science and Engineering Practices:

Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

- Develop and use a model to describe phenomena. (MS-ESS2-1), (MS-ESS2-6)
- Develop a model to describe unobservable mechanisms. (MS-ESS2-4)

Planning and Carrying Out Investigations

Planning and carrying out investigations in 6–8 builds on K–5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions.

- Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions. (MS-ESS2-5)



Disciplinary Core Ideas (DICs):

ESS2.A: Earth's Materials and Systems

- All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms. (MS-ESS2-1)

ESS2.C: The Roles of Water in Earth's Surface Processes

- Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. (MS-ESS2-4)
- The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (MS-ESS2-5)
- Global movements of water and its changes in form are propelled by sunlight and gravity. (MS-ESS2-4)
- Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS-ESS2-6)

ESS2.D: Weather and Climate

- Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. (MS-ESS2-6)
- Because these patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5)
- The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. (MS-ESS2-6)

Crosscutting Concepts:

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS2-5)

Systems and System Models

- Models can be used to represent systems and their interactions— such as inputs, processes and outputs—and energy, matter, and information flows within systems. (MS-ESS2-6)

Energy and Matter

- Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. (MS-ESS2-4)



Stability and Change

- Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale. (MS-ESS2-1)

Unit Essential Questions:

- What makes up the atmosphere?
- What are the characteristics of each atmospheric layer?
- What is weather?
- How do temperature and pressure interact within fluids?
- How can you track a severe storm?
- How do scientists predict the paths of hurricanes?

Unit Enduring Understandings:

- Earth's atmosphere is made up of several gases needed for life to exist.
- It is composed of five layers, and the Sun affects it.
- Large air masses form and move over Earth's surface, air masses collide along fronts, and weather changes often result.
- Global winds blow across long distances in predictable patterns.
- Precipitation, temperature, and ocean currents influence climate.
- Meteorologists are weather scientists who use specialized equipment to gather and analyze weather data.
- This data is used to forecast short-term and long-term weather conditions.

Unit Learning Targets:

Students will....

- Map the composition of the atmosphere.
- Identify the layers of the atmosphere.
- Recognize how the sun affects the atmosphere.
- Investigate the effects of air pressure.
- Understand air masses and how they cause weather.
- Identify global wind patterns and other factors that affect climate.
- Understand how to track the path of a hurricane.
- Understand how weather is forecasted.
- Describe different types of severe storms.



Evidence of Learning

Summative Assessment: Unit Assessment and Labs

Equipment Needed: Student iPads, laboratory materials and supplies, safety equipment, measuring tools, calculators

Teacher Resources: Teacher laptop, textbook, laboratory materials and supplies, safety equipment, measuring tools, calculators

Formative Assessments:

- Exit/Admit cards
- Class discussion/observation
- Self assessing lab activities
- Lab reports/summary questions
- Test/Quiz
- Online Gizmo questions
- Homework
- Adult/student modeling
- Peer/Self Assessments
- Presentations



Lesson Plans

Lesson	Time Frame
Lesson 1: Layers of the Atmosphere	2-3 days
Lesson 2: Air Pressure	1-2 days
Lesson 3: Tracking Hurricanes	2-3 days

Teacher Notes: Be sure to gather and organize all supplies ahead of time to facilitate the management of the lesson activities. Gizmos and PhET are helpful interactive tools to visually explain each concept.

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

www.explorelearning.com

www.brainpop.com



Lesson Plan 1 Template

Content Area: Science Lesson Title: Layers of the Atmosphere Time Frame: 2-3 days

Lesson Components

21st Century Themes

- ☒ Global Awareness ☐ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☒ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections: Mathematics

Integration of Technology:

- Students will use Gizmo Interactive Simulations to explore the structure, composition, and temperature changes within Earth's atmospheric layers.
- Students will use iPads to collect, organize, and graph temperature data at different altitudes.
- Students may use digital graphing tools to compare atmospheric trends and identify patterns in large datasets.

Equipment Needed:

- iPads
- Gizmo Interactive Simulation access
- Graph paper or digital graphing tools
- Rulers
- Pencils and colored pencils/markers
- Atmospheric temperature data charts
- Textbook and reference materials
- Flipbook materials (paper, staples, scissors, glue)
- Classroom lab materials

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Plot temperature data at various altitudes on a graph. • Analyze graphical data to identify patterns and relationships between altitude and temperature. • Draw evidence-based conclusions about how	Lesson Sequence 1. Anchoring Phenomenon: Display images of weather occurring at Earth's surface while commercial aircraft fly above clouds and ask, "Why does the temperature change so	• Temperature vs. altitude graph • Graph analysis questions • Data interpretation responses • Atmospheric layer flipbook • Group presentation of findings • Class discussion responses



temperature changes through Earth's atmospheric layers.

- Describe the characteristics and structure of the major atmospheric layers.
- Construct a model (flipbook) representing the layers of the atmosphere and their key features.
- Use data analysis to explain how and why atmospheric conditions change with altitude.
- Communicate scientific understanding through graphs, models, and written explanations.

much as you go higher in the sky?"

2. Students share prior ideas about air temperature and altitude.
3. Students review a temperature vs. altitude data table and discuss initial observations.
4. Students plot temperature data on graph paper or using a digital graphing tool.
5. Students analyze the graph to identify patterns, including temperature changes across different atmospheric layers.
6. Students complete guiding questions that require interpretation of the data and explanation of observed trends.
7. Students use Gizmo Interactive Simulation to model the structure of Earth's atmosphere and compare simulation data with their graph.
8. Students construct a flipbook illustrating each atmospheric layer, including drawings and key characteristics.
9. Students compare flipbooks and discuss how atmospheric layers differ in temperature, composition, and function.



	10. Students present findings in small groups and explain how data supports their conclusions.	
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Differentiation:

- All students complete a temperature graph using provided data sets.
- Students may choose digital or paper-based graphing tools.
- Provide partially completed graphs, labeled axes, and scaffolded data tables for students needing support.
- Use tiered questioning during analysis to match student readiness levels.
- Allow students to demonstrate understanding through flipbooks, written responses, oral explanations, or digital presentations.
- Provide extension opportunities for advanced learners to investigate weather patterns in different atmospheric layers or compare Earth's atmosphere to other planets.
- Use small-group instruction and conferencing to support data interpretation and graphing skills.

Resources Provided:

- Textbook
- Gizmo Interactive Simulation access
- Atmospheric data charts
- Graph paper and digital tools
- Flipbook materials
- Classroom reference notes



Lesson Plan 2 Template

Content Area: Science Lesson Title: Air Pressure Time Frame: 1-2 days

Lesson Components

21st Century Themes

- ☒ Global Awareness ☐ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☒ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☒ ICT Literacy

Interdisciplinary Connections: Mathematics

Integration of Technology:

- Students will use Gizmo Interactive Simulations to investigate the relationships among air pressure, temperature, and density.
- Students will use iPads to collect, organize, and analyze experimental data.
- Students may use digital graphing tools and presentation software to communicate scientific findings.

Equipment Needed:

- iPads
- Gizmo Interactive Simulation access
- Balloons
- Plastic bottles or jars
- Thermometers
- Hot and cold water containers
- Syringes (without needles) or sealed containers for pressure demonstrations
- Data collection sheets
- Graph paper
- Calculators
- Textbook and reference materials
- General classroom lab equipment

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Discover the relationship between temperature and air pressure. • Explain the correlation among pressure,	Lesson Sequence 1. Anchoring Phenomenon: Display images and videos of a weather balloon expanding as it rises through the	• Observation charts • Data tables and graphs • Analysis and conclusion questions • Small-group discussions



temperature, and density. • Collect and analyze quantitative data related to changes in atmospheric conditions. • Use evidence from investigations to identify patterns and relationships among variables. • Construct explanations for how changes in temperature can affect air movement and weather. • Communicate scientific findings using graphs, models, and evidence-based reasoning.	atmosphere and ask, "Why does a balloon get larger as it moves higher into the sky?" 2. Students share prior ideas about how air behaves when it is heated, cooled, compressed, or allowed to expand. 3. Students create an observation chart and identify variables that may affect air pressure. 4. Students participate in a hands-on investigation by placing balloons on bottles and observing how the balloons respond when bottles are placed in hot and cold water. 5. Students conduct a second investigation using syringes or sealed containers to model how compressing air changes pressure and density. 6. Students record observations and collect data throughout each investigation. 7. Students use the Gizmo Interactive Simulation to manipulate temperature and pressure variables and compare the simulation results with their physical investigations. 8. Students organize data into tables and graphs and identify patterns and relationships	• Communication of experimental findings to the class • Written explanations supported by evidence
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- among pressure, temperature, and density.
9. Students analyze their findings and complete conclusion questions using evidence from their investigations.
 10. Students communicate their results to the class and compare explanations among groups.
 11. Students discuss how understanding air pressure helps scientists predict weather patterns and make informed decisions that protect communities during severe weather events.

Differentiation:

- Students may communicate findings through a verbal presentation, digital presentation, scientific sketch, infographic, poster, or written explanation.
- Provide partially completed data tables, guided questions, and graph templates for students requiring additional support.
- Use tiered assignments with varying levels of complexity and scaffolding based on student readiness.
- Provide small-group instruction and teacher conferencing during data collection and analysis.
- Allow students to work independently, with partners, or in collaborative groups based on learning needs.
- Provide extension opportunities for advanced learners to investigate how changing air pressure contributes to weather events such as storms, hurricanes, and changes in wind patterns.
- Offer multiple methods for demonstrating understanding through written, visual, oral, and digital formats.

Resources Provided:

- Textbook
- Gizmo Interactive Simulation access
- Lab supplies and equipment
- Data collection sheets
- Graph templates
- Classroom notes and reference materials



Lesson Plan 3 Template

Content Area: Science Lesson Title: Tracking Hurricanes Time Frame: 2-3 days

Lesson Components

21st Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☒ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☒ ICT Literacy

Interdisciplinary Connections: Mathematics

Integration of Technology:

- Students will use Gizmo Interactive Simulations to investigate the environmental conditions that contribute to hurricane formation and movement.
- Students will use iPads to collect, organize, graph, and analyze weather data associated with hurricanes.
- Students may use digital weather maps, satellite imagery, and hurricane tracking tools to examine real-world storm events and communicate findings.

Equipment Needed:

- iPads
- Gizmo Interactive Simulation access
- Clear jars or bottles with lids
- Water
- Food coloring
- Glitter or confetti
- Ice cubes
- Trays or paper towels
- Data collection sheets
- Graph paper
- Calculators
- Textbook and reference materials
- General classroom lab materials

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Describe the conditions necessary for hurricanes to form and intensify.	Lesson Sequence 1. Anchoring Phenomenon: Display satellite images and video footage of a major hurricane and ask,	• Observation charts • Hurricane model investigation results • Data tables and graphs



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| <ul style="list-style-type: none">• Investigate how temperature differences and the movement of air contribute to hurricane development.• Analyze patterns in hurricane movement and interpret weather data associated with storms.• Construct and use models to explain how hurricanes develop and move through Earth's systems.• Use evidence from investigations and simulations to explain the interactions among the atmosphere, oceans, and weather systems.• Evaluate how scientific information and weather forecasting help communities prepare for severe weather events.• Communicate scientific findings through graphs, models, and evidence-based explanations. | <p>"How can a storm that begins over warm ocean water grow into one of the most powerful and destructive weather events on Earth?"</p> <ol style="list-style-type: none">2. Students discuss prior knowledge about hurricanes and generate questions about how and why hurricanes form.3. Students create an observation chart and identify variables that may influence hurricane formation and movement.4. Students participate in a "Hurricane in a Jar" investigation by creating a rotating water model using jars, water, and food coloring to observe patterns of circular motion and energy transfer.5. Students record observations at each stage of the investigation and compare their model to real hurricane systems.6. Students use the Gizmo Interactive Simulation to investigate conditions that contribute to hurricane development, including ocean temperature, air movement, and storm intensity.7. Students examine maps and historical hurricane | <ul style="list-style-type: none">• Analysis and conclusion questions• Communication of findings to the class• Written explanations supported by evidence• Responses to class discussion questions |
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| | <p>tracks to identify patterns in hurricane formation and movement.</p> <p>8. Students organize and analyze data, answer conclusion questions, and explain how interactions between Earth's atmosphere and oceans contribute to severe weather.</p> <p>9. Students discuss how scientists use models and data to predict hurricane paths and issue warnings that help protect people and communities.</p> <p>10. Students communicate findings through presentations, scientific explanations, and class discussions.</p> | |
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Differentiation:

- Students may communicate findings through verbal presentations, digital presentations, scientific illustrations, infographics, posters, or written explanations.
- Provide partially completed data tables, guided questions, and graphic organizers for students requiring additional support.
- Use tiered assignments with varying levels of complexity and scaffolding based on student readiness.
- Provide small-group instruction and teacher conferencing during investigations and data analysis.
- Allow students to work independently, with partners, or in collaborative groups based on learning needs.
- Provide extension opportunities for advanced learners to investigate historical hurricanes, compare hurricane impacts across regions, or evaluate improvements in weather forecasting technology.
- Offer multiple methods for demonstrating understanding through written, visual, oral, and digital formats.

Resources Provided:

- Textbook
- Gizmo Interactive Simulation access
- Lab supplies and materials
- Data collection sheets



- Weather maps and satellite images
- Classroom notes and reference materials



Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson Strongly, Moderately or Weakly meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging and require higher order thinking and problem solving skills	☒	☐	☐
Allow for student choice	☒	☐	☐
Provide scaffolding for acquiring targeted knowledge/skills	☒	☐	☐
Integrate global perspectives	☐	☒	☐
Integrate 21st century skills	☒	☐	☐
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	☒	☐	☐
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	☒	☐	☐
Are varied to address different student learning styles and preferences	☒	☐	☐
Are differentiated based on student needs	☒	☐	☐
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	☐	☒	☐
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	☒	☐	☐
Provide opportunities for student reflection and self-assessment	☒	☐	☐
Provide data to inform and adjust instruction to better meet the varying needs of learners	☐	☒	☐

Curriculum Design Template

Content Area: Science	Grade Level: 6	Unit Title: Weather & Climate
Created: 2026	Board Approved on:	



Unit Overview Template

Content Area: Science **Grade Level:** 6 **Unit Title:** Waves and Electromagnetic Radiation

Unit Summary: During the course of this unit students will identify and compare the three main types of waves, describe how a wave's speed is related to its wavelength, and use frequency to calculate a wave's speed.

Primary Interdisciplinary Connections: Mathematics

21st Century Themes ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ ICT Literacy
☒ Information Literacy ☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy

Unit Rationale: Wave theory is derived from observations of the natural world. The understanding of wave theory has led to advancements in construction, sound amplification/acoustics, communications, and medicine. Through the study of wave theory, students see that ordinary people develop these theories. They should take away a new understanding of how our world works and identify waves that occur all around them. Often middle school students view science in a purely academic context. This compartmentalization of scientific knowledge can and does lead to student disengagement. Many students simply tune out and lose the natural interest in exploration they possessed earlier in life. This unit is designed to use living applications to introduce and connect to abstract physics concepts.

Career Readiness (Standard 9):

9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2)

9.4.CT.3 : Use a variety of types of thinking to solve problems (e.g., inductive, deductive)

9.1.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job

9.1.2.CAP.3: : Define entrepreneurship and social entrepreneurship.

9.2.5.CAP.1: Evaluate personal likes and dislikes and identify careers that might be suited to personal like

9.2.5.CAP.3: Identify qualifications needed to pursue traditional and non-traditional careers and occupations.

9.2.8.CAP.3: : Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income

9.4.2.DC.2: Explain the importance of respecting digital content of others.

9.4.2.DC.3 Explain how to be safe online and follow safe practices when using the internet (e.g., 8.1.2.NI.3, 8.1.2.NI.4).

9.4.2.DC.4: Compare information that should be kept private to information that might be made public.

9.4.2.TL.1: : Identify the basic features of a digital tool and explain the purpose of the tool

9.4.2.TL.2: Create a document using a word processing application.

9.4.2.TL.3: Enter information into a spreadsheet and sort the information.

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).

9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).



9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

Learning Targets

Standards: MS-PS3

Content Statements: Waves and Their Applications in Technologies for Information Transfer

CPI#:	Cumulative Progress Indicator (CPI):
MS-PS3-1	Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.
MS-PS3-2	Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.
MS-PS3-3	Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.
MS-PS3-4	Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.
MS-PS3-5	Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.
8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem
6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
6.SP.B.5	Summarize numerical data sets in relation to their context, such as by: - Reporting the number of observations. - Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. - Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. - Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Science and Engineering Practices:

Developing and Using Models

Modeling in 6–8 builds on K–5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.

- Develop a model to describe unobservable mechanisms. (MS-PS3-2)



Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in 6–8 builds on K–5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or design solutions.

- Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim. (MS-PS3-4)

Analyzing and Interpreting Data

Analyzing data in 6–8 builds on K–5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

- Construct and interpret graphical displays of data to identify linear and nonlinear relationships. (MS-PS3-1)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

- Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process or system. (MS-PS3-3)

Engaging in Argument from Evidence

Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed worlds.

- Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon. (MS-PS3-5)

Disciplinary Core Ideas (DICs):

PS3.A: Definitions of Energy

- Motion energy is properly called kinetic energy; it is proportional to the mass of the moving object and grows with the square of its speed. (MS-PS3-1)
- A system of objects may also contain stored (potential) energy, depending on their relative positions. (MS-PS3-2)
- Temperature is a measure of the average kinetic energy of particles of matter. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present. (MS-PS3-3), (MS-PS3-4)

PS3.B: Conservation of Energy and Energy Transfer



- When the motion energy of an object changes, there is inevitably some other change in energy at the same time. (MS-PS3-5)
- The amount of energy transfer needed to change the temperature of a matter sample by a given amount depends on the nature of the matter, the size of the sample, and the environment. (MS-PS3-4)
- Energy is spontaneously transferred out of hotter regions or objects and into colder ones. (MS-PS3-3)

PS3.C: Relationship Between Energy and Forces

- When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. (MS-PS3-2)

ETS1.A: Defining and Delimiting an Engineering Problem

- The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that is likely to limit possible solutions. (secondary to MS-PS3-3)

ETS1.B: Developing Possible Solutions

- A solution needs to be tested, and then modified on the basis of the test results in order to improve it. There are systematic processes for evaluating solutions with respect to how well they meet criteria and constraints of a problem. (secondary to MS-PS3-3)

Crosscutting Concepts:

Scale, Proportion, and Quantity

- Proportional relationships (e.g. speed as the ratio of distance traveled to time taken) among different types of quantities provide information about the magnitude of properties and processes. (MS-PS3-1), (MS-PS3-4)

Systems and System Models

- Models can be used to represent systems and their interactions – such as inputs, processes, and outputs – and energy and matter flows within systems. (MS-PS3-2)

Energy and Matter

- Energy may take different forms (e.g. energy in fields, thermal energy, energy of motion). (MS-PS3-5)
- The transfer of energy can be tracked as energy flows through a designed or natural system. (MS-PS3-3)

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

- Science knowledge is based upon logical and conceptual connections between evidence and explanations (MS-PS3-4), (MS-PS3-5)

**Unit Essential Questions:**

- What are waves?
- How do waves travel?
- How do waves interact?
- What causes seismic waves?

Unit Enduring Understandings:

- A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude.
- A sound wave needs a medium through which it is transmitted.
- When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) of the light.
- The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends.
- A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media.
- However, because light can travel through space, it cannot be a matter wave, like sound or water waves.
- Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information.

Unit Learning Targets:**Students will....**

- Define waves and identify what causes them.
- Identify and compare the three main types of waves.
- List and describe the basic properties of waves.
- Describe how a wave's speed is related to its wavelength and frequency and calculate a wave's speed.
- Identify and compare reflection, refraction and diffraction.
- Describe the two types of interface of waves.
- Identify and describe standing waves and resonance.
- Describe what creates seismic waves.
- Identify the different types of seismic waves.
- Explain how a seismograph works.



Evidence of Learning

Summative Assessment: Unit Assessment and Labs

Equipment Needed: Student iPads, laboratory materials and supplies, safety equipment, measuring tools, calculators

Teacher Resources: Teacher laptop, textbook, laboratory materials and supplies, safety equipment, measuring tools, calculators

Formative Assessments:

- Exit/Admit cards
- Class discussion/observation
- Self assessing lab activities
- Lab reports/summary questions
- Test/Quiz/Unit Exam
- Online Gizmo questions
- Homework
- Adult/student modeling
- Peer/Self Assessments
- Presentations
- Kinesthetic Assessments



Lesson Plans

Lesson	Time Frame
Lesson 1: Properties of Waves	5 days
Lesson 2: Interactions of Waves	5 days
Lesson 3: Seismic Waves	5 days

Teacher Notes: In order to help obtain accurate measurements it is important the teacher focuses on breaking down which tool to use and how to use it correctly. In addition, how to read and identify proper scale. Gizmos and PhET are helpful interactive tools to visually explain each concept.

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

www.explorellearning.com



Lesson Plan 1 Template

Content Area: Science **Lesson Title:** Properties of Waves **Time Frame:** 5 days

Lesson Components

21st Century Themes

- ☒ Global Awareness ☐ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☒ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☒ ICT Literacy

Interdisciplinary Connections: Mathematics

Integration of Technology:

- Students will use the Waves Gizmo to manipulate wavelength, frequency, amplitude, tension, and density and observe their effects on wave behavior.
- Students will use iMovie or another digital presentation tool to create a short explanation of wave properties using images, diagrams, and data collected during investigations.
- Students will evaluate digital models and simulations as representations of real-world wave phenomena and communicate findings using technology.

Equipment Needed:

- iPads
- Slinky toys
- String
- Stopwatches
- Meter sticks or measuring tapes
- Data tables and graph paper
- Lab notebooks
- Mystery lab materials and classroom science supplies

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Identify and describe the basic properties of waves, including wavelength, frequency, amplitude, and wave speed. • Differentiate between transverse and longitudinal waves.	Lesson Sequence 1. Anchoring Phenomenon: Students observe a slow-motion video of waves traveling through a stadium crowd and a slinky. Students discuss: "How can energy move across an entire system when	• Slinky investigation data sheet and conclusion questions. • Wave property diagrams and labeled models. • Wave speed calculations and graphing activities. • Gizmo investigation questions and data tables.



• Investigate how changing wavelength and frequency affects wave speed. • Calculate wave speed using measured wavelength and frequency data. • Develop and use models to explain how energy is transferred through waves. • Collect, organize, and analyze data from investigations and simulations. • Communicate evidence-based explanations of wave behavior using scientific vocabulary and digital tools. • Collaborate to design investigations and solve problems related to wave motion and energy transfer.	the individual people or coils barely move from their positions?" 2. Students participate in a class discussion to activate prior knowledge about waves they encounter every day, including sound, water waves, light, and earthquakes. 3. Students use slinky toys to create transverse and longitudinal waves and record observations about particle motion and energy transfer. 4. Students investigate how increasing frequency affects the number of waves produced over time and how increasing amplitude affects the amount of energy transferred. 5. Students use string and stopwatches to create waves of different frequencies and measure wavelength and period. 6. Students collect quantitative data and calculate wave speed using the relationship between wavelength and frequency. 7. Students use the Waves Gizmo to manipulate variables including amplitude, frequency, spring density, and tension and analyze	• Group digital presentation explaining a wave property. • Teacher observation of group discussions and investigations. • Exit ticket: "How does changing frequency or amplitude change the behavior of a wave?"
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| | <p>how each variable affects wave behavior.</p> <ol style="list-style-type: none"> 8. Students construct diagrams and models illustrating transverse and longitudinal waves and label amplitude, wavelength, and direction of energy transfer. 9. Student groups create a brief iMovie or digital presentation explaining one property of waves and present their findings to the class. 10. Students participate in a class debrief connecting wave properties to technologies such as medical imaging, communication systems, and earthquake monitoring. | |
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Differentiation:

- Tiered assignments will provide varying levels of scaffolding and support while maintaining common learning goals.
- Students may work individually, with partners, or in small groups based on readiness and instructional needs.
- Visual models, demonstrations, and guided notes will support learners who require additional structure.
- Extension opportunities will allow advanced learners to investigate wave applications such as fiber optics, ultrasound, and seismic monitoring systems.
- Students may communicate understanding through written responses, diagrams, oral explanations, or digital presentations.
- Mini-lessons and teacher conferencing will be provided to reinforce concepts and address misconceptions.
- Sentence frames, data templates, and partially completed calculations will be available as needed.

Resources Provided:

- Textbook
- Waves Gizmo
- iMovie or digital presentation software



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ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

- Lab supplies
- Slinky toys
- String
- Stopwatches
- Meter sticks
- Graph paper and data tables
- Videos of real-world wave phenomena



Lesson Plan 2 Template

Content Area: Science

Lesson Title: Interactions of Waves

Time Frame: 5 days

Lesson Components

21st Century Themes

- ☒ Global Awareness ☐ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☒ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☒ ICT Literacy

Interdisciplinary Connections: Mathematics

Integration of Technology:

- Students will use the Ripple Tank Gizmo to investigate reflection, refraction, diffraction, interference, standing waves, and resonance.
- Students will manipulate variables such as wavelength, amplitude, barriers, and damping to observe how waves interact under different conditions.
- Students will use iPads to record observations, collect data, and communicate evidence-based explanations of wave interactions.
- Students will analyze digital simulations and compare virtual models to physical wave investigations.

Equipment Needed:

- iPads
- Ripple tanks
- Water
- Small rocks or pebbles
- Assorted barriers and objects
- Construction paper
- Markers
- Meter sticks or rulers
- Data tables and lab notebooks
- Safety goggles
- Classroom lab materials and supplies

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Identify and compare reflection, refraction, and diffraction.	Lesson Sequence 1. Anchoring Phenomenon: Students watch videos of ocean waves bending around a jetty, echoes in a	• "Waves Can Travel" lab data sheet and conclusion questions.



- Describe constructive and destructive interference.
- Identify and describe standing waves and resonance.
- Investigate how waves interact with barriers, openings, and other waves.
- Develop and use models to explain wave behavior and energy transfer.
- Collect, analyze, and interpret data from physical and digital investigations.
- Construct evidence-based explanations of wave interactions using observations and data.
- Collaborate to solve problems and communicate findings about wave phenomena and their applications.

- canyon, and noise-canceling headphones. Students discuss: "Why do waves sometimes bounce, bend, spread out, or even seem to disappear?"
2. Students participate in a class discussion connecting prior knowledge of water waves, sound waves, and light waves to the observed phenomena.
 3. Students complete the "Waves Can Travel" lab by creating a model ocean using ripple tanks and generating small waves with rocks or hand disturbances.
 4. Students investigate wave reflection by observing waves bouncing off barriers and recording changes in direction.
 5. Students investigate diffraction by creating openings of different widths and observing how waves spread after passing through gaps.
 6. Students investigate refraction by placing submerged objects into the ripple tank and observing changes in wave speed and direction.
 7. Students create constructive and destructive interference patterns by generating waves from two different sources and observing areas of reinforcement and cancellation.

- Ripple Tank Gizmo lab packet and data tables.
- Student-generated diagrams of wave interactions.
- Group explanations of reflection, refraction, diffraction, and interference phenomena.
- Teacher observations during investigations and discussions.
- Pre-assessment and post-assessment of wave interaction concepts.
- Exit ticket: "Describe one real-world example of wave interaction and explain the type of interaction taking place."



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| | <ol style="list-style-type: none">8. Students use construction paper and markers to create diagrams modeling reflection, refraction, diffraction, and interference patterns observed during investigations.9. Students use the Ripple Tank Gizmo to explore additional scenarios involving barriers, multiple wave sources, and changes in wavelength and damping.10. Students compare observations from physical models and digital simulations and discuss how scientists and engineers use wave behavior in communication technologies, medical imaging, and earthquake monitoring systems.11. Student groups communicate findings through diagrams, discussions, and evidence-based explanations. | |
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Differentiation:

- Tiered assignments will provide varying levels of support and complexity while maintaining common learning goals.
- Students may work independently, with partners, or in collaborative groups based on readiness and instructional needs.
- Visual models, demonstrations, and guided notes will support students who require additional scaffolding.
- Extension opportunities will allow advanced learners to investigate technologies that rely on wave interactions, such as medical ultrasound, sonar, fiber optics, and noise-canceling devices.
- Students may demonstrate understanding through written explanations, diagrams, oral presentations, or digital products.
- Mini-lessons and teacher conferencing will be provided to reinforce concepts and address misconceptions.



- Sentence starters, partially completed diagrams, and graphic organizers will be available as needed.

Resources Provided:

- Textbook
- Ripple Tank Gizmo
- iPads
- Ripple tanks
- Lab supplies and glassware
- Safety goggles
- Construction paper and markers
- Data tables and lab notebooks
- Videos and images of real-world wave interactions



Lesson Plan 3 Template

Content Area: Science

Lesson Title: Seismic Waves

Time Frame: 5 days

Lesson Components

21st Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☒ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☒ ICT Literacy

Interdisciplinary Connections: Mathematics

Integration of Technology:

- Students will use the "Earthquake Proof Homes" Gizmo to investigate how building design can reduce damage from seismic events.
- Students will use iPads to analyze seismic data, determine earthquake epicenters, and communicate findings.
- Students will view and analyze the California Earthquake video to observe real-world impacts of seismic waves and engineering responses.
- Students will use digital maps and simulations to model earthquake detection and mitigation strategies.

Equipment Needed:

- iPads
- "Earthquake Proof Homes" Gizmo
- Earthquake recording station materials
- Seismograph models or templates
- Slinkies and ropes for wave modeling
- Meter sticks or rulers
- Stopwatches
- String and compasses for triangulation activities
- Maps of earthquake recording stations
- Graph paper
- Lab materials and data sheets
- Colored pencils and markers
- Safety goggles

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Describe how earthquakes generate seismic waves	Lesson Sequence 1. Anchoring Phenomenon: Students watch short video	• "Making Waves" lab conclusion questions.



through the release of energy in Earth's crust. • Identify and compare the characteristics of P-waves, S-waves, and surface waves. • Explain how a seismograph records seismic activity. • Analyze seismic data to determine the distance between an earthquake and a recording station. • Use data from multiple recording stations to locate an earthquake epicenter through triangulation. • Develop and use models to explain wave behavior and energy transfer during earthquakes. • Evaluate how engineers design structures and technologies to reduce the impacts of earthquakes on communities. • Communicate scientific findings using data, evidence, and models.	clips of buildings shaking during an earthquake and discuss: "How can scientists locate an earthquake that happens hundreds of miles away, and how can engineers design buildings that better withstand earthquakes?" 2. Students participate in a class discussion about earthquakes they have heard about and brainstorm how energy might travel through Earth. 3. Students complete the "Making Waves" lab by using slinkies and ropes to model longitudinal and transverse wave motion and relate these models to seismic waves. 4. Students compare the movement of P-waves and S-waves and determine which type of wave travels faster. 5. Students participate in the "Earthquake Recording Station" lab by analyzing arrival times of primary and secondary waves to calculate the distance from an earthquake's epicenter. 6. Students perform a hands-on triangulation activity by using compasses, string, and maps to locate the epicenter of an earthquake using data from three recording stations.	• "Earthquake Recording Station" lab packet and data tables. • Epicenter triangulation maps and conclusion questions. • Seismograph model diagrams and annotations. • Group discussions and presentations of engineering solutions. • Teacher observations during investigations and data analysis. • Pre-assessment and post-assessment questions. • Exit ticket: "Why do scientists need information from several recording stations to locate an earthquake's epicenter?"
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| | <ol style="list-style-type: none">7. Students examine seismograph models and create simple diagrams showing how ground motion is recorded.8. Students analyze the California Earthquake video and discuss how seismic data help communities prepare for and respond to earthquakes.9. Students investigate the "Earthquake Proof Homes" Gizmo and test how different building designs and materials affect structural stability during simulated earthquakes.10. Student groups evaluate engineering trade-offs, including safety, materials, and cost considerations when designing earthquake-resistant structures.11. Student groups communicate findings through diagrams, data analysis, and evidence-based explanations. | |
|--|--|--|

Differentiation:

- Tiered assignments will provide varying levels of support and complexity while maintaining common learning goals.
- Students may work independently, with partners, or in collaborative groups based on readiness and instructional needs.
- Visual models, demonstrations, and guided notes will support students who require additional scaffolding.
- Graphic organizers and partially completed data tables will be available as needed.
- Extension opportunities will allow advanced learners to investigate famous earthquakes, compare engineering solutions from different countries, or evaluate emerging earthquake prediction technologies.
- Students may demonstrate understanding through written explanations, diagrams, oral presentations, digital products, or physical models.



- Mini-lessons and teacher conferencing will be provided to reinforce concepts and address misconceptions.

Resources Provided:

- Textbook
- "Earthquake Proof Homes" Gizmo
- California Earthquake video
- iPads
- Earthquake recording station materials
- Slinkies and wave models
- Maps and triangulation materials
- Lab supplies and data sheets
- Graph paper and colored pencils



Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson Strongly, Moderately or Weakly meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging and require higher order thinking and problem solving skills	☒	☐	☐
Allow for student choice	☒	☐	☐
Provide scaffolding for acquiring targeted knowledge/skills	☒	☐	☐
Integrate global perspectives	☐	☒	☐
Integrate 21st century skills	☒	☐	☐
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	☒	☐	☐
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	☒	☐	☐
Are varied to address different student learning styles and preferences	☒	☐	☐
Are differentiated based on student needs	☒	☐	☐
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	☐	☒	☐
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	☒	☐	☐
Provide opportunities for student reflection and self-assessment	☒	☐	☐
Provide data to inform and adjust instruction to better meet the varying needs of learners	☐	☒	☐

Curriculum Design Template

Content Area: Science	Grade Level: 6	Unit Title: Waves and Electromagnetic Radiation
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Created: 2026

Board Approved on:



Unit Overview Template

Content Area: Science

Grade Level: 6

Unit Title: Energy and Ecosystems

Unit Summary: During the course of this unit students will explore the different combinations of factors that interact sometimes, causing dramatic changes in ecosystems. Resources that are necessary for humans to meet their needs are found in nature. Humans can have both positive and negative effects on these natural resources.

Primary Interdisciplinary Connections: Mathematics

21st Century Themes ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ ICT Literacy
☒ Information Literacy ☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy

Unit Rationale: All the factors - biotic and abiotic - in an ecosystem interact to define the system and change it. Living things interact in ways to obtain energy for growth and reproduction. Biomes are regional ecosystems defined by climate and soil.

Career Readiness (Standard 9):

- 9.1.8.CR1: Compare and contrast the role of philanthropy, volunteer service, and charities in community development and the quality of life in a variety of cultures.
- 9.1.8.CR2: : Compare various ways to give back through strengths, passions, goals, and other personal factors.
- 9.1.8.CR3 Relate the importance of consumer, business, and government responsibility to the economy and personal finance
- 9.1.8.CR4: Examine the implications of legal and ethical behaviors when making financial decisions
- 9.1.12.CFR.1: Compare and contrast the role of philanthropy, volunteer service, and charities in community development and quality of life in a variety of cultures.
- 9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGL.2).
- 9.4.CT.3: : Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
- 9.1.2.CAP.1: Make a list of different types of jobs and describe the skills associated with each job.
- 9.1.2.CAP.3 Define entrepreneurship and social entrepreneurship.
- 9.2.5.CAP.1: Evaluate personal likes and dislikes and identify careers that might be suited to personal likes.
- 9.2.5.CAP.3: Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
- 9.2.8.CAP.3:: Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.
- 9.4.2.DC.2: Explain the importance of respecting digital content of others
- 9.4.2.DC.3: Explain how to be safe online and follow safe practices when using the internet (e.g., 8.1.2.NI.3, 8.1.2.NI.4). •
- 9.4.2.DC.4: Compare information that should be kept private to information that might be made public
- 9.4.2.IML.1: Identify a simple search term to find information in a search engine or digital resource
- 9.4.2.IML.2: Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10).



- 9.4.2.TL.1: Identify the basic features of a digital tool and explain the purpose of the tool (e.g., 8.2.2.ED.1).
- 9.4.2.TL.2: Create a document using a word processing application.
- 9.4.2.TL.3: Enter information into a spreadsheet and sort the information. •
- 9.4.2.TL.4: Navigate a virtual space to build context and describe the visual content.
- 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2).
- 9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem (e.g., 2.1.5.CHSS.1, 4-ESS3-1).
- 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

Learning Targets

Standards: MS-LS1 & 2

Content Statements: Ecosystems: Interactions, Energy, and Dynamics

CPI#:

Cumulative Progress Indicator (CPI):

MS-LS1-4	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.
MS-LS1-5	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
MS-LS1-6	Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.
MS-LS1-7	Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
MS-LS2-1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
MS-LS2-2	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
MS-LS2-3	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
MS-LS2-4	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
MS-LS2-5	Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
8.2.8.ED.2	Identify the steps in the design process that could be used to solve a problem
6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
6.SP.B.5	Summarize numerical data sets in relation to their context, such as by:



- Reporting the number of observations.
- Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
- Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
- Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Science and Engineering Practices:

Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

- Develop a model to describe unobservable mechanisms. (MS-LS1-7)
- Develop a model to describe phenomena. (MS-LS2-3)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific knowledge, principles, and theories.

- Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-LS1-5), (MS-LS1-6)
- Construct an explanation that includes qualitative or quantitative relationships between variables that predict phenomena. (MS-LS2-2)

Engaging in Argument from Evidence

Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).

- Use an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-LS1-4)
- Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-LS2-4)
- Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (MS-LS2-5)

Analyzing and Interpreting Data

Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.



- Analyze and interpret data to provide evidence for phenomena. (MS-LS2-1)

Disciplinary Core Ideas (DICs):

LS1.B: Growth and Development of Organisms

- Animals engage in characteristic behaviors that increase the odds of reproduction. (MS-LS1-4)
- Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. (MS-LS1-4)
- Genetic factors as well as local conditions affect the growth of the adult plant. (MS-LS1-5)

LS1.C: Organization for Matter and Energy Flow in Organisms

- Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. (MS-LS1-6)
- Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (MS-LS1-7)

PS3.D: Energy in Chemical Processes and Everyday Life

- The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen. (secondary to MS-LS1-6)
- Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (secondary to MS-LS1-7)

LS2.A: Interdependent Relationships in Ecosystems Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1) In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1)

- Growth of organisms and population increases are limited by access to resources. (MS-LS2-1)
- Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2)

LS2.B: Cycle of Matter and Energy Transfer in Ecosystems

- Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial



environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3)

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4)
- Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. (MS-LS2-5)

LS4.D: Biodiversity and Humans

- Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (secondary to MS-LS2-5)

ETS1.B: Developing Possible Solutions

- There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (secondary to MS-LS2-5)

Crosscutting Concepts:

Patterns

- Patterns can be used to identify cause and effect relationships. (MS-LS2-2)

Cause and Effect

- Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS1-4), (MS-LS1-5)
- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-LS2-1)

Energy and Matter

- Matter is conserved because atoms are conserved in physical and chemical processes. (MS-LS1-7)
- Within a natural system, the transfer of energy drives the motion and/or cycling of matter. (MS-LS1-6)
- The transfer of energy can be tracked as energy flows through a natural system. (MS-LS2-3)

Stability and Change

- Small changes in one part of a system might cause large changes in another part. (MS-LS2-4), (MS-LS2-5)

Connections to Engineering, Technology, and Applications of Science



Influence of Science, Engineering, and Technology on Society and the Natural World

- The use of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus, technology use varies from region to region and over time. (MS-LS2-5)

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

- Science knowledge is based upon logical connections between evidence and explanations. (MS-LS1-6)
- Science disciplines share common rules of obtaining and evaluating empirical evidence. (MS-LS2-4)

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

- Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS-LS2-3)

Science Addresses Questions About the Natural and Material World

- Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-LS2-5)

Unit Essential Questions:

- What are ecosystems?
- How do organisms get energy?
- How do organisms interact?
- What are biomes?

Unit Enduring Understandings:

- Organisms and populations are dependent on their environmental interactions both with other living things and nonliving factors, any of which can limit their growth.
- Competitive, predatory, and mutually beneficial interactions vary across ecosystems but the patterns are shared.
- The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem.
- Food webs model how matter and energy are transferred among producers, consumers, and decomposers as the three groups interact within an ecosystem.
- Ecosystem characteristics vary over time. Disruptions to any part of an ecosystem can lead to shifts in all of its populations.
- The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health.

Unit Learning Targets:

Students will....

- Compare different climates.
- Describe how an ecosystem works.



- Explain how climate affects ecosystem diversity.
- Learn how animals obtain nutrients.
- Identify an ecosystem's energy source.
- Describe how energy moves through an ecosystem.
- Observe how organisms help each other.
- Describe how organisms compete within an ecosystem.
- Explain symbiotic relationships.
- Describe a biome.
- Learn about different biomes.
- Explain how plants and animals are adapted to live in different biomes.



Evidence of Learning

Summative Assessment: Unit Assessment and Labs

Equipment Needed: Student iPads, laboratory materials and supplies, safety equipment, measuring tools, calculators

Teacher Resources: Teacher laptop, textbook, laboratory materials and supplies, safety equipment, measuring tools, calculators

Formative Assessments:

- Exit/Admit cards
- Class discussion/observation
- Self assessing lab activities
- Lab reports/summary questions
- Test/Quiz/Unit Exam
- Online Gizmo questions
- Homework
- Adult/student modeling
- Peer/Self Assessments
- Presentations
- Kinesthetic Assessments



Lesson Plans

Lesson	Time Frame
Lesson 1: What are ecosystems?	5 days
Lesson 2: How do organisms get energy and interact?	5 days
Lesson 3: What are biomes?	5 days

Teacher Notes: In order to help obtain accurate measurements it is important the teacher focuses on breaking down which tool to use and how to use it correctly. In addition, how to read and identify proper scale. Gizmos and PhET are helpful interactive tools to visually explain each concept.

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

www.explorelearning.com



Lesson Plan 1 Template

Content Area: Science Lesson Title: What are Ecosystems? Time Frame: 5 days

Lesson Components

21st Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☒ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☒ ICT Literacy

Interdisciplinary Connections: Mathematics

Integration of Technology:

- Students will use the Pond Ecosystem Gizmo to investigate relationships among temperature, dissolved oxygen, and aquatic organisms.
- Students will use the Forest Ecosystem Gizmo to explore interactions among organisms and environmental factors within ecosystems.
- Students will use iPads to analyze climate data, create graphs, conduct research, and communicate findings.
- Students will use iMovie or other digital presentation tools to create an Ecology Picture Project that explains ecosystem components and interactions.

Equipment Needed:

- iPads
- Pond Ecosystem Gizmo
- Forest Ecosystem Gizmo
- Climate data tables
- Graph paper
- Colored pencils and markers
- Poster paper or chart paper
- Ecosystem photographs and organism cards
- Lab notebooks and data sheets
- Textbook
- Classroom lab materials and supplies

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Compare the climates of different regions and identify patterns in	Lesson Sequence 1. Anchoring Phenomenon: Students view images and videos of a tropical rainforest and a local	• "Comparing Climates" graphs and conclusion questions.



temperature and precipitation. • Describe the biotic and abiotic components of ecosystems. • Explain how organisms interact with one another and with their physical environment. • Investigate how climate influences biodiversity and ecosystem health. • Analyze relationships between environmental conditions and organism survival. • Develop and use models to explain interactions within ecosystems. • Collect, graph, and interpret ecological data to identify patterns and draw conclusions. • Communicate scientific explanations using evidence gathered from investigations and simulations.	New Jersey forest and discuss: "Why can one ecosystem support thousands of different organisms while another supports fewer species?" 2. Students brainstorm the living and nonliving things that make up ecosystems and identify examples from local environments. 3. Students participate in the "Comparing Climates" lab by analyzing monthly temperature and rainfall data from New Jersey and a tropical rainforest ecosystem. 4. Students construct graphs of climate data and identify patterns that may influence the types and numbers of organisms living in each ecosystem. 5. Students use the Pond Ecosystem Gizmo to investigate how changes in temperature and oxygen levels affect the organisms that can survive in aquatic environments. 6. Students manipulate environmental variables and observe changes in fish populations and ecosystem conditions. 7. Students use the Forest Ecosystem Gizmo to explore interactions among plants, animals,	• Pond Ecosystem Gizmo online assessment and data tables. • Forest Ecosystem Gizmo investigation responses. • Ecology Picture Project rubric and presentation. • Teacher observations during investigations and discussions. • Student explanations of relationships among organisms and environmental factors. • Pre-assessment and post-assessment questions. • Exit ticket: "How do changes in climate affect the organisms that can survive in an ecosystem?"
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- decomposers, and environmental factors.
8. Students create an "Ecology Picture Project" by constructing a model, diagram, or digital presentation illustrating the relationships among organisms and abiotic factors within an ecosystem.
 9. Student groups compare ecosystems from around the world and discuss how environmental changes can impact biodiversity and ecosystem stability.
 10. Students communicate findings through presentations, diagrams, and evidence-based explanations.

Differentiation:

- Tiered assignments will provide varying levels of support and complexity while maintaining common learning goals.
- Students may work independently, with partners, or in collaborative groups based on readiness and instructional needs.
- Visual models, graphic organizers, and guided notes will support students who require additional scaffolding.
- Climate data tables may be modified by reducing data points or providing partially completed graphs.
- Extension opportunities will allow advanced learners to investigate human impacts on ecosystems, compare global biodiversity hotspots, or analyze ecological changes caused by climate shifts.
- Students may demonstrate understanding through written explanations, diagrams, oral presentations, digital products, or physical ecosystem models.
- Mini-lessons and teacher conferencing will be provided to reinforce concepts and address

Resources Provided:

- Textbook
- Pond Ecosystem Gizmo
- Forest Ecosystem Gizmo
- iPads



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- Climate data tables
- Graph paper and colored pencils
- Ecosystem photographs and organism cards
- Lab supplies and data sheets



Lesson Plan 2 Template

Content Area: Science Lesson Title: How do Organisms Get Energy and Interact? Time Frame: 5 days

Lesson Components

21st Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☒ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☒ ICT Literacy

Interdisciplinary Connections: Mathematics

Integration of Technology:

- Students will use the Food Web Gizmo to investigate how energy flows through ecosystems and how changes in populations affect ecosystem stability.
- Students will use iPads to record observations, analyze data, and communicate findings from investigations.
- Students will view an owl pellet video to observe how scientists study predator-prey relationships and energy transfer within ecosystems.
- Students will use digital resources to research examples of symbiotic relationships and ecosystem interactions.

Equipment Needed:

- iPads
- Food Web Gizmo
- Owl pellets
- Owl pellet dissection tools (forceps, probes, trays)
- Identification charts for bones and prey species
- Gloves and safety goggles
- Hydra and Hydra-Daphnia Microslides
- Microscopes and prepared slides
- Lab notebooks and data sheets
- Colored pencils and markers
- Textbook
- Classroom lab materials and supplies

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Explain how organisms obtain energy and	Lesson Sequence 1. Anchoring Phenomenon: Students observe a	• Owl pellet packet and identification charts.



nutrients needed for survival. • Identify the Sun as the primary source of energy for most ecosystems. • Describe how energy moves through food chains and food webs. • Investigate predator-prey relationships and how organisms depend on one another for survival. • Describe how organisms compete for limited resources within ecosystems. • Identify and explain different types of symbiotic relationships, including mutualism, commensalism, and parasitism. • Analyze how changes to one population can affect the entire ecosystem. • Develop and use models to explain interactions among organisms and the flow of energy through ecosystems. • Communicate scientific explanations using evidence collected from investigations and simulations.	photograph of a thriving ecosystem and then examine an image of the same ecosystem after the disappearance of one species. Students discuss: "How can the loss of just one organism affect an entire ecosystem?" 2. Students brainstorm where organisms get their energy and create an initial model of a simple food chain. 3. Students participate in "The Diet of Owls" investigation by dissecting owl pellets and identifying bones and remains of prey organisms. 4. Students use identification charts to determine what the owl consumed and construct food chains showing how energy moved from producers to consumers. 5. Students observe Microslides of a hydra and a hydra interacting with Daphnia to investigate predator-prey interactions and relationships among organisms. 6. Students discuss how organisms may cooperate, compete, or depend on one another for survival. 7. Students use the Food Web Gizmo to manipulate populations of hawks, snakes, rabbits, and grass and observe how changes affect energy flow and population stability.	• Hydra and Daphnia lab packet and observation notes. • Food Web Gizmo online assessment and data tables. • Student-created food chains and food web models. • Group discussions and presentations explaining ecosystem interactions. • Teacher observations during investigations and simulations. • Pre-assessment and post-assessment questions. • Exit ticket: "Why can a change in one population affect many other organisms in an ecosystem?"
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| | <ol style="list-style-type: none">8. Students introduce environmental changes and disease into the simulation and analyze the resulting effects on ecosystem dynamics.9. Student groups create food web models that illustrate energy transfer and interactions among organisms.10. Students communicate findings through diagrams, data tables, and evidence-based explanations. | |
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Differentiation:

- Tiered assignments will provide varying levels of support and complexity while maintaining common learning goals.
- Students may work independently, with partners, or in collaborative groups based on readiness and instructional needs.
- Visual models, food web templates, vocabulary supports, and guided notes will support students who require additional scaffolding.
- Graphic organizers and partially completed food chains and food webs will be available as needed.
- Extension opportunities will allow advanced learners to investigate keystone species, invasive species, or human impacts on food webs and ecosystem stability.
- Students may demonstrate understanding through written explanations, diagrams, oral presentations, digital products, or physical ecosystem models.
- Mini-lessons and teacher conferencing will be provided to reinforce concepts and address misconceptions.
- Students may choose to communicate findings through posters, presentations, videos, or digital infographics.

Resources Provided:

- Textbook
- Food Web Gizmo
- Owl pellet video
- iPads
- Owl pellets and dissection materials
- Identification charts and data sheets
- Hydra and Hydra-Daphnia Microslides
- Microscopes and lab supplies
- Safety goggles



Lesson Plan 3 Template

Content Area: Science Lesson Title: What are biomes? Time Frame: 5 days

Lesson Components

21st Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections: Mathematics

Integration of Technology:

- Students will use the Prairie Ecosystem Gizmo to investigate how populations within a biome change over time and how organisms depend on one another for survival.
- Students will use Go Temp! probes to collect and compare environmental data, such as temperature, and relate these conditions to different biomes.
- Students will use iPads to research global biomes, collect evidence, and create digital presentations explaining biome characteristics and adaptations.
- Students will use digital maps, images, and videos to examine the geographic distribution of biomes around the world.

Equipment Needed:

- iPads
- Prairie Ecosystem Gizmo
- Go Temp! probes
- World biome maps
- Reading station materials and informational texts
- Thermometers and climate data cards
- Chart paper and colored pencils
- Lab notebooks and data sheets
- Poster materials
- Safety goggles
- Textbook
- Classroom lab materials and supplies

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Define a biome and describe the characteristics that distinguish one biome from another.	Lesson Sequence 1. Anchoring Phenomenon: Students compare images of a cactus in a desert, a polar bear in the Arctic, and a monkey in a tropical	• Biome lab packet and climate comparison charts.



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| <ul style="list-style-type: none">• Explain how temperature, precipitation, and geographic location influence the formation of biomes.• Identify and compare major terrestrial biomes throughout the world.• Analyze how plants and animals have structural and behavioral adaptations that allow them to survive in different environments.• Investigate feeding relationships and the movement of energy within ecosystems found in different biomes.• Interpret graphical data to identify patterns and changes in populations over time.• Develop and use models to explain interactions between environmental conditions and living organisms.• Communicate scientific explanations using evidence gathered from investigations, simulations, and research. | <p>rainforest. Students discuss: "Why can certain organisms survive in one part of the world but not in another?"</p> <ol style="list-style-type: none">2. Students participate in a World Biome Activity by examining maps, climate data, and photographs to identify factors that create different biomes throughout the globe.3. Students use Go Temp! probes to measure environmental conditions and compare their data to climate conditions found in various biomes.4. Students rotate through World Biome Reading Stations to investigate the climate, organisms, and adaptations associated with major terrestrial biomes.5. Students create a biome comparison chart that summarizes climate conditions, representative organisms, and adaptations for survival.6. Students use the Prairie Ecosystem Gizmo to investigate feeding relationships among grasses, prairie dogs, ferrets, and foxes within a prairie biome.7. Students manipulate populations within the simulation and analyze how changes affect energy flow and ecosystem stability. | <ul style="list-style-type: none">• World Biome Reading Station notes and graphic organizers.• Prairie Ecosystem Gizmo online assessment and data tables.• Interpretation of population bar graphs and line graphs.• Biome PowerPoint activity or alternative presentation product.• Group presentations explaining organism adaptations and biome characteristics.• Teacher observations during investigations and discussions.• Pre-assessment and post-assessment questions.• Exit ticket: "How do environmental conditions determine which organisms can survive in a biome?" |
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| | <ol style="list-style-type: none">8. Students interpret bar graphs and line graphs to identify trends in population changes over time.9. Student groups create models, posters, or digital presentations explaining how environmental conditions shape biodiversity within a selected biome.10. Students communicate findings through presentations and evidence-based discussions. | |
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Differentiation:

- Tiered assignments will provide varying levels of support and complexity while maintaining common learning goals.
- Students may work independently, with partners, or in collaborative groups based on readiness and instructional needs.
- Visual supports, vocabulary cards, guided notes, and partially completed graphic organizers will support students who require additional scaffolding.
- Reading materials may be differentiated by complexity level and supplemented with videos and images.
- Extension opportunities will allow advanced learners to investigate the effects of climate change, human activities, and conservation efforts on global biomes and biodiversity.
- Students may demonstrate understanding through written explanations, diagrams, oral presentations, digital products, or physical biome models.
- Mini-lessons and teacher conferencing will be provided to reinforce concepts and address misconceptions.
- Students may choose to communicate findings through posters, presentations, videos, infographics, or three-dimensional biome models.

Resources Provided:

- Textbook
- Prairie Ecosystem Gizmo
- Go Temp! probes
- iPads
- World biome maps and climate data cards
- Reading station materials and informational texts
- Lab supplies and safety goggles
- Graph paper and data sheets
- iMovie and digital presentation tools



Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson Strongly, Moderately or Weakly meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging and require higher order thinking and problem solving skills	☒	☐	☐
Allow for student choice	☒	☐	☐
Provide scaffolding for acquiring targeted knowledge/skills	☒	☐	☐
Integrate global perspectives	☐	☒	☐
Integrate 21st century skills	☒	☐	☐
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	☒	☐	☐
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	☒	☐	☐
Are varied to address different student learning styles and preferences	☒	☐	☐
Are differentiated based on student needs	☒	☐	☐
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	☐	☒	☐
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	☒	☐	☐
Provide opportunities for student reflection and self-assessment	☒	☐	☐
Provide data to inform and adjust instruction to better meet the varying needs of learners	☐	☒	☐

Curriculum Design Template

Content Area: Science	Grade Level: 6	Unit Title: Energy and Ecosystems
Created: 2026	Board Approved on:	



SPRINGFIELD PUBLIC SCHOOLS

**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
GLOBAL SKILLS**

IEP AND 504 ACCOMMODATIONS AND MODIFICATIONS FOR EARLY CHILDHOOD AND ELEMENTARY SCHOOL STUDENTS:

Large print textbooks
Textbooks for at-home use
Additional time for assignments
Review of directions
Use of mnemonics
Have student restate information
Concrete examples
Adaptive writing utensils
Support auditory presentations with visuals
Use of a study carrel
Assistance in maintaining uncluttered space
Weekly home-school communication tools (notebook, daily log, phone calls or email messages)
Space for movement or breaks
Study sheets and teacher outlines
Extra visual and verbal cues and prompts
Math sheets with highlighted instructions
Graph paper to assist in organizing or lining up math problems
Use of computers and calculators
Books on tape
Graphic organizers
Quiet corner or room to calm down and relax when anxious
Preferential seating
Alteration of the classroom arrangement
Reduction of distractions
Answers to be dictated
Hands-on activities
Use of manipulatives
No penalty for spelling errors or sloppy handwriting
Follow a routine/schedule
Alternate quiet and active time
Teach time management skills
Rest breaks
Verbal and visual cues regarding directions and staying on task
Agenda book and checklists
Adjusted assignment timelines
Visual daily schedule



SPRINGFIELD PUBLIC SCHOOLS

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
GLOBAL SKILLS

Varied reinforcement procedures
Immediate feedback
Work-in-progress check
Personalized examples

TESTING AND ASSESSMENT ACCOMMODATIONS AND MODIFICATIONS:

Answers to be dictated
Frequent rest breaks
Additional time
Oral testing
Untimed tests
Choice of test format (multiple-choice, essay, true-false)
Alternate ways to evaluate (projects or oral presentations instead of written tests)
Accept short answers
Open-book tests
Read test and directions to student
Provide study outline prior to tests
Highlight key directions
Test in alternative site
Use of calculator
Extra credit option
Preview test procedures
Simplified test wording; rephrased test questions and/or directions

GENERAL ACCOMMODATIONS AND MODIFICATIONS:

Use of alternative books or materials on the topic being studied
Computerized spell-check support
Word bank of choices for answers to test questions
Provision of calculator and/or number line for math tests
Reworded questions in simpler language
Projects instead of written reports
Highlighting important words or phrases in reading assignments
Modified workload or length of assignments/tests
Modified time demands
Modified grades based on IEP

BEHAVIOR ACCOMMODATIONS MODIFICATIONS:



SPRINGFIELD PUBLIC SCHOOLS

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
GLOBAL SKILLS

Breaks between tasks
Cue expected behavior
Daily feedback to student
Have contingency plans
Use de-escalating strategies
Use positive reinforcement
Use proximity/touch control
Use peer supports and mentoring
Model expected behavior by adults
Have parent sign homework
Have parent sign behavior chart
Set and post class rules
Chart progress and maintain data



SPRINGFIELD PUBLIC SCHOOLS

**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
GLOBAL SKILLS**

IEP AND 504 ACCOMODATIONS AND MODIFICATIONS FOR MIDDLE AND HIGH SCHOOL STUDENTS:

Large print textbooks
Textbooks for at-home use
Additional time for assignments
A locker with adapted lock
Review of directions
Review sessions
Use of mnemonics
Have student restate information
Provision of notes or outlines
Concrete examples
Adaptive writing utensils
Support auditory presentations with visuals
Weekly or bi-weekly home-school communication
Space for movement or breaks
Study sheets and teacher outlines
Extra visual and verbal cues and prompts
Lab and math sheets with highlighted instructions
Graph paper to assist in organizing or lining up math problems
Use of tape recorder for lectures
Use of Interactive notebook
Use of a scribe
Use of computers and calculators
Books on tape
Graphic organizers
Quiet corner or room to calm down and relax when anxious
Preferential seating
Alteration of the classroom arrangement
Reduction of distractions
Answers to be dictated
Hands-on activities
Ability to type all assignments
Follow a routine/schedule
Teach time management and organizational skills
Rest breaks
Verbal and visual cues regarding directions and staying on task
Agenda book and checklists
Daily check-in with case manager or special education teacher
Adjusted assignment timelines
Visual daily schedule



SPRINGFIELD PUBLIC SCHOOLS

**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
GLOBAL SKILLS**

Varied reinforcement procedures
Immediate feedback
Work-in-progress check
Personalized examples

TESTING AND ASSESSMENT ACCOMMODATIONS AND MODIFICATIONS:

Answers to be dictated
Frequent rest breaks
Additional time
Oral testing
Choice of test format (multiple-choice, essay, true-false)
Alternate ways to evaluate (projects or oral presentations instead of written tests)
Accept short answers
Open-book or open-note tests
Read test and directions to student
Provide study guides prior to tests
Highlight key directions
Test in alternative site
Use of calculator
Extra credit option
Pace long-term projects
Preview test procedures
Simplified test wording; rephrased test questions and/or directions

GENERAL ACCOMMODATIONS AND MODIFICATIONS:

Allow outlining, instead of writing for an essay or major project
Use of alternative books or materials on the topic being studied
Computerized spell-check support
Word bank of choices for answers to test questions
Provision of calculator for math tests
Film or video supplements in place of reading text
Reworded questions in simpler language
Projects instead of written reports
Highlighting important words or phrases in reading assignments
Modified workload or length of assignments/tests
Modified time demands



SPRINGFIELD PUBLIC SCHOOLS

**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
GLOBAL SKILLS**

Pass/no pass option
Modified grades based on IEP

BEHAVIOR ACCOMMODATIONS FOR STUDENTS:

Breaks between tasks
Cue expected behavior
Daily feedback to student
Have contingency plans
Use de-escalating strategies
Use positive reinforcement
Use proximity/touch control
Use peer supports and mentoring
Model expected behavior by adults
Have parent sign homework
Set and post class rules
Chart progress and maintain data



Accommodations and Modifications for ESL Students

- Give tests orally
- Give instructions/directions in writing and orally
- Assign a peer tutor, same language or English speaking
- Allow use of bilingual/translation dictionary
- Provide summaries of text or study guides of particular chapters
- Allow errors in speaking
- Allow errors in writing
- Accept writing in first language
- Highlight key vocabulary
- Reduce amount of work required
- Assess comprehension through demonstration or other alternative means (gestures, drawings)
- Rephrase questions, directions, and explanations
- Reduce multiple choices on assessments
- Provide study guides and/ or outlines
- Shorten reading assignments
- Allow extended time for test/project completion
- Use of audio books
- Use of graphic organizers
- Use reduced text, so that print is not dense
- Use visuals/pictures throughout lesson/unit/assignment
- Adapt homework to reflect language proficiency/home support
- Adapt homework to reflect home support
- Provide hands-on activities and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Use of translation dictionaries to locate words in the native language
- Use anecdotal records and portfolio of work as forms of assessment
- Use story retellings to assess comprehension



What Does the Gifted and Talented Experience Look Like?

Springfield Public Schools

Mission Statement

The Gifted and Talented Program of the Springfield Public Schools aims to provide a meaningful and rigorous education that instills the value of lifelong learning and empowers all students to reach their full potential and become self-fulfilled creative leaders in accordance with the comprehensive standards of our state. We accomplish this by offering challenging, real-world experiences in a student-centered environment.

We recognize that students come from diverse socioeconomic, cultural, and ethnic backgrounds, and the mission of the gifted and talented program is to provide opportunities for students to explore their intellectual, creative, and artistic gifts and talents within the classroom and with beyond-the-classroom experiences. It is essential to provide diverse, appropriate, and ongoing learning experiences and environments that incorporate students' academic, psychological, and social needs. Our responsibility is to provide students with educational alternatives that teach, challenge, and expand their knowledge, while simultaneously stressing the development of independent and self-directed learners who continuously generate questions, analyze, synthesize, and evaluate information and ideas.

New Jersey Administrative Code 6A:8-3.1 defines students who are gifted and talented as those students who possess or demonstrate high levels of ability in one or more content areas when compared to their chronological peers in the local district and who require modification of their educational program if they are to achieve in accordance with their capabilities.

Goals:

To support our mission, we have established the following goals to guide our work:

- To infuse into the general education program a broad range of activities for high-level learning that will challenge all students to perform at advanced levels, and provide extended opportunities, resources, and support in particular areas where student interest or talent is demonstrated.
- To provide a continuum of gifted education services that will strengthen the total school program, offer enriching and challenging learning opportunities for all students, and provide specialized learning experiences
- To promote achievement of students' best potentials and increased ability.

Through a productive and collaborative relationship among the building principals, classroom teachers, and the Gifted and Talented teacher, our schools can create programming that will enhance the learning experience for every student and serve the unique and specialized needs of students currently demonstrating gifted behaviors.

Elements of the Schoolwide Enrichment Model, W.I.N (What I Need), differentiated instruction, advanced classes, or individual programs into a student's regular instruction program are integral to this overarching framework for gifted education in the Springfield School District.

Reference Board Policy and Regulation 2464 – Gifted and Talented Pupils (M)

Early Childhood Center

Edward V. Walton

Schoolwide Virtual Enrichment

All first and second grade students have access to the [Gifted and Talented Virtual Classroom](#). This virtual classroom is a space for students to complete various challenges and enrichment opportunities at their own pace. Students can receive feedback and additional adaptable resources to meet their individual learning needs. The virtual classroom design expands accessibility to enrichment resources and allows students to choose learning activities according to their unique interests and abilities. The purpose of the activities is to encourage problem-solving, develop critical thinking

skills, and expand curiosity and imagination. Activities are aligned to the New Jersey Student Learning Standards.

Gifted and Talented Teacher as a Resource

The Gifted and Talented teacher serves as a resource to all teachers within Edward V. Walton School. Teachers seeking resources for their high-ability learners will receive additional support from the Gifted and Talented teacher in various ways. This support may include additional units of study, challenging resources, and student projects.

Elementary Schools

James Caldwell

Thelma L. Sandmeier

The goal is to engage small groups of students in intensive learning experiences through standards-based, rigorous, and relevant units of study that supplement, not supplant, the grade-level curriculum and support students' unique learning needs.

Enrichment Experience Grade 3

Beginning in third grade, the G&T teacher will cycle through all classrooms to work on problem-solving and enrichment tasks with students. Driven by assessment data, academic performance, student interest, and teacher observation, small groups of students will meet with the G&T teacher during W.I.N. (What I Need) periods throughout the week that the teacher is assigned to their classroom teacher. Groupings will be flexible and monitored to best meet each student's needs throughout the school year. Activities will include brain teasers, puzzles, strategic thinking, problem-solving, and STEM challenges.

Targeted Gifted and Talented Programing Grades 4-5

Students may become identified as Gifted and Talented in fourth grade. Students that are identified may receive support from the G&T Teacher for up to five periods (200 minutes) a week during W.I.N. (What I Need) periods. Identified students will meet to explore grade-level content while incorporating depth and complexity in a student-centered, problem-based environment. The Gifted and Talented Program aims to provide students with various advanced and challenging learning experiences across content areas to promote independent thinking skills, refine critical thinking and communication skills, cultivate joy in learning, and expand student interests through problem-solving. The instruction that students receive incorporates 21st Century Skills and advanced content that is challenging, hands-on, and relevant to the real world.

Strategies and Practices that Support Gifted and Talented Students

- Adjusted Pace of Lessons
- Inquiry-Based Instruction
- Higher-Order Thinking Activities
- Interest-Based Content
- Real World Problem Solving/Problem Based Learning
- Independent Study/Passion Projects
- Units of Study with Like-Minded Peers

Schoolwide Virtual Enrichment

All JCS and TLS students have access to grade level-specific [Gifted and Talented Virtual Classrooms](#). These virtual classrooms are a space for students to complete various challenges and enrichment opportunities at their own pace. Students are able to receive feedback and additional opportunities based on their needs. The virtual classrooms have expanded the accessibility of enrichment resources directly to the students and allows for students to choose opportunities according to their interests and abilities. The purpose of the activities is to encourage problem solving, develop critical thinking skills, and expand curiosity and imagination in conjunction with the New Jersey Student Learning Standards.

Gifted and Talented Teacher as a Resource

In addition to classroom support, the Gifted and Talented teacher also serves as a resource to all teachers in the building. Teachers that are seeking resources for their high ability learners will receive additional support from the Gifted and Talented teacher in various ways. This may include additional units of study, challenging resources, student projects, and meeting with the G&T teacher as needed.

Additional Enrichment Opportunities

Across all grade levels 3-5, as recommended by the classroom teacher, students exhibiting a need for additional enrichment may have the opportunity to meet with the G&T teacher as the schedule allows. Groupings will be flexible and monitored to best meet the students' needs throughout the school year. Activities will include, brain teasers, puzzles, strategic thinking activities, problem-solving challenges, and STEM challenges. Students engage in an extended process of asking questions, using resources, and developing answers that lead to thinking about what and how they are learning. Students are held accountable for how they work and use their time by demonstrating their learning through products or presentations.

Students self-select to participate in individual and/or group projects based on interest and commitment. The classroom teacher and/or the enrichment teacher will help guide and monitor student exploration of chosen topics, facilitating their learning with resources and teaching of needed skills.

Secondary Schools
Florence M. Gaudineer Middle School
Jonathan Dayton High School

Grades 6-12: Access to specific content programs with higher levels of academic challenges (i.e. Pre-Algebra, Accelerated Communication Arts, and Advanced Placement Classes)

Dual Credit Courses provide students the opportunity to obtain high school credit, and college credit, simultaneously through partnerships with several institutions.

Project Lead the Way (PLTW) students become builders of technology by engaging in real world activities. Students are empowered as design thinkers collaborating on real world projects.

Gifted and Talented Identification Criteria

The Springfield Schools Gifted and Talented Program recognizes that students require differentiated learning experiences beyond the core curriculum being taught because of their advanced abilities in one or more content areas. These students may also have other cognitive qualities such as curiosity, creativity, motivation, leadership, and passion that require modifications to their academic experience.

Multiple Measures of Eligibility

Kindergarten through grade twelve identification process for gifted and talented students includes multiple measures. Multiple measures may include but are not limited to: achievement test scores; grades; student performance or products; intelligence testing; parent, student, and/or teacher recommendation; and other appropriate measures. The identification methodology is developmentally appropriate, non-discriminatory, and related to the programs and services offered by the Springfield School District. The identification procedures are reviewed annually.

According to N.J.A.C. 6A:8-3.1, all public school districts must have a board-approved gifted and talented identification process and provide services for identified students enrolled in the grades of that school district. The regulations require that identification and services be made available to students in grades K-12.

When students are recommended for the Gifted and Talented Program there are multiple measures that are considered to determine if services are necessary and appropriate. The assessments used are as follows:

- Cognitive Abilities Test (CogAT)
- Classroom Performance/Student Portfolios
- DRA2 Level
- iReady Diagnostic Scores
- Gifted Indicators Checklist
- Start Strong/NJSLA Assessment Data

The N.J.A.C. requires that students be compared to their chronological peers in the local school district. The New Jersey Department of Education has not established state-level criteria for identifying students who are gifted, such as mandated tests or assessments, grade point averages, or IQ scores. Local school districts must use multiple measures to identify students.

Procedures

<https://www.straussesmay.com/seportal/Public/DistrictPolicy.aspx?policyid=2464&id=b8a33a9f505e4998a6db3fb8e1de778b>

Gifted and Talented Program Identification Matrix

Minimum Score Required for Consideration: 14 Points

1 Point	2 Points	3 Points
Cogat Assessment Overall Stanine Score of a 7	Cogat Assessment Overall Stanine Score of an 8	Cogat Assessment Overall Stanine Score of a 9
iReady Math Assessment Just Below Current Grade Level	iReady Math Assessment On Grade Level	iReady Math Assessment ½ Year + Above Current Level
iReady ELA On Grade Level	iReady ELA ½ Year Above Current Level	iReady ELA One Full Grade Level + Above Current Level
NJSLA Math Approaching Expectations	NJSLA Math Met Expectations	NJSLA Math Exceed Expectations
NJSLA ELA Approaching Expectations	NJSLA ELA Met Expectations	NJSLA ELA Exceed Expectations
HOPE Teacher Rating Scale Raw Score: 11 - 29	HOPE Teacher Rating Scale Raw Score: 30 - 49	HOPE Teacher Rating Scale Raw Score: 50-66

Team meetings present the opportunity to review data and assess the educational needs of all students. Teacher provides examples of student work exhibiting above and beyond grade level expectations, creativity, leadership, critical and abstract thinking. Programs for gifted and talented students will be periodically evaluated for their continuing efficacy and adjusted accordingly. The parent of any student identified as gifted or talented shall be consulted regarding any program designed to address the student's particular needs.

Resource Links

https://riversideinsights.com/cognitive_abilities_test

<https://www.curriculumassociates.com/programs/i-ready-learning>

<https://www.nj.gov/education/assessment/resources/>

<https://www.routledge.com/HOPE-Teacher-Rating-Scale-Involving-Teachers-in-Equitable-Identification/Gentry-Pereira-Peters-McIntosh-Fugate/p/book/9781618214522#:~:text=The%20HOPE%20Teacher%20Rating%20Scale,making%20it%20easy%20to%20use.>

Gifted and talented student: The "[*Strengthening Gifted and Talented Education Act*](#)" defines a gifted and talented student as a "student who possesses or demonstrates a high level of ability in one or more content areas when compared to their chronological peers in the school district and who require modifications of their educational program if they are to achieve in accordance with their capabilities."

Twice-exceptional (2E) students: A twice-exceptional (2E) student is defined as "a student who is both gifted and a student with a disability. These students may also be referred to as having dual exceptionalities or as being gifted with learning disabilities (GT/LD). This also applies to students who are gifted with ADHD or gifted with autism" (New Jersey Association for Gifted Children, www.nagc.org).

Instructional adaptation: An adjustment or modification to instruction enabling a student who is gifted and talented to participate in, benefit from, and demonstrate knowledge and application of the New Jersey Student Learning Standards in one or more content areas at the instructional level of the student, not just the student's grade level.

Identifying gifted and talented students: The focus of identification is to provide programming and services in which students' specific learning needs and potential are appropriately addressed and met. In every New Jersey school district, there are students who require modifications to the general education curriculum if they are to achieve in accordance with their abilities. By identifying a student's general intellectual ability, creativity, or specific academic area aptitudes, we are acknowledging that they need programming and services outside of the general education/grade level curriculum to advance their learning.

NJDOE Fast Facts

<https://www.nj.gov/education/standards/gifted/>

<https://www.nj.gov/education/standards/gifted/legislation.shtml>

Supplemental Resources/Programming for Gifted Students

Edward V. Walton

- PETS Program – Primary Education Thinking Skills
- Group Solutions/Group Solutions 2 – Cooperative Logic Activities
- Lollipop Logic
- Beginning Thinking Skills
- AIMS Education Programming

James Caldwell and Thelma L. Sandmeier

Math/ELA

- Project M3: Mentoring Mathematical Minds
- Junior Great Books
- AIMS Education Programming
- Borenson Hands on Equations
- BizWorld
- Perplexors
- Advanced Math Explorations grade 3-5
- Challenging Units for Gifted Learners (ELA and Math)
- Creative Curriculum Extenders
- Differentiated Lessons & Projects
- Challenge Math Grades 4+
- Differentiating Instruction with Menus (All Content Areas)
- Jacob's Ladder
- Genius Hour/Passion Project
- Spatial Reasoning
- Logic Puzzles, Brain Games, Analogies

STEM

- Engineering is Elementary
- Engineer Throughout the Year
- PBS Design Squad
- DefinedSTEM
- Project Lead the Way (PLTW)

Enrichment Events

Experience for all students to be enriched through events related to the curricular or extracurricular activities. Examples include after school clubs, PTA-sponsored events, leadership opportunities, visual and performing arts, and community service opportunities.