DENVILLE TOWNSHIP SCHOOL DISTRICT
Science K-8 Curriculum Guide

Denville Township School District

Science Curriculum Guide

Table of Contents

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Mission Statement

It is the mission of the Denville School District to educate and empower all students to excel.

Department Vision

It is the firm belief of the Denville Township School District Science Department that the progress and vitality of our nation is dependent on understanding the world and all its elements around us. Through questioning, experimenting, and problem solving we become deeper thinkers and creators with each new discovery found. The study of science needs to be a hands-on interactive experience for learners, so that they can bridge the abstract to concrete, and then to take concrete findings and develop critical thinking. Science is an art and it is our belief that we must encourage the artist to discover the world around them locally, as well as globally. We encourage our students to advocate for their communities by acting as ambassadors of the earth, so that we my build a more sustainable environment for the future.

Affirmative Action Compliance Statement

The Denville Township Schools are committed to the achievement of increased cultural awareness, respect, and equity among students, teachers, and community. We are pleased to present all students with information pertaining to possible career, professional or vocational opportunities which in no way restrict or limits option on the basis of race, color, creed, religion, sex, ancestry, national origin, or socioeconomic status.

Integrated Accommodations

For Students with IEPs, 504s, and/or Students at Risk of Failure

Use of manipulatives and representations for simultaneous processing • Use visual and multi-sensory formats • Use of assistive technology • Use of graphic organizers and prompts • Modification of student products • Testing accommodations • Authentic assessments • Small group instruction • Adjusting the pace of lessons

Gifted & Talented Students

Inquiry-based instruction • Independent study • Higher-order thinking skills and questions • Interest-based content • Student-driven lessons • Real-world projects and scenarios

English Language Learners

Pre-teaching of vocabulary and concepts • Visual learning, including graphic organizers • Use of cognates to increase comprehension • Teacher modeling • Pairing students with beginning English language skills with students who have more advanced English language skills • Scaffolding: sentence frames, think-pair-share, cooperative learning groups, teacher read-alouds • Use of assistive technology

Science
Kindergarten

Pacing Guide

Physical Science 60 days	**Earth Science 60 days**
Marking Period 1	**Marking Period 2**
Earth Science 60 days	**Life Science 60 days**
Marking Period 3	**Marking Period 4**

Unit 1 Physical Science: Measurement and Comparison

Unit 2 Earth Science: Weather and Seasons, Earth's Surface

Unit 3 Life Science: Senses, Plants and Animals

Grade: Kindergarten	**Unit:** Physical Science	**Time Frame:** 13-14 weeks
Essential Questions: ● How can we compare the height of two objects? ● What does it mean to be the same? ● What does it mean to be different? ● How can we put objects in order? ● How do we measure with a standard unit? ● Why is it important to record measurement data during an investigation? ● What is distance? ● How do we measure the distance between objects? ● How do objects move?		**Unit Sequence**: 1. Feeling the Difference 2. Comparing Two Objects 3. Comparison to a Standard 4. Placing Objects in Size Order 5. Measuring Rectangular Blocks 6. Measuring Objects 7. Objects and Distance 8. Measuring Distance 9. Measuring Distance -Movement 10. From Clay to Cubes: Making a Product
Natural Phenomena: ● A cardboard block feels different than a wooden block ● When you put two books side by side in a book case, they are different heights. ● After you color a picture with crayons, the colors are different heights ● We can arrange the class in height order ● If you push a toy car it will move ● If you play tug of war, the side that pulls harder wins.		
Disciplinary Core Ideas *PS2.A: Forces and Motion* ● Pushes and pulls can have different strengths and directions. ● Pushing and pulling on an object can change the speed and direction of its motion and can start or stop it. *PS2.B: Types of Interactions*		

- When objects touch or collide, they push on one another and can change motion.

PS3.C: Relationship Between Energy and Forces

- A bigger push or pull makes things speed up or slow down more quickly.

ETS1.A: Defining Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions.
- Asking questions, making observations, and gathering information are helpful in thinking about problems.
- Before beginning to design a solution, it is important to clearly understand the problem.

ETS1.C: Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

Scientific Practices

Asking Questions and Defining Problems
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communication Information

Crosscutting Concepts

Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

K-PS2-1: Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
K-PS2-2: Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.
K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through development of a new or improved object or tool.
K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Standards Correlations & Interdisciplinary Connections

NJSL State Standards for Mathematics:

- Measurement and Data: K.MD.1, K.MD.2, 1.MD.1, 1.MD.2, 1.MD.4, 2.MD.1, 2.MD.3, 2.MD.4
- Counting and Cardinality: K.CC.3, K.4

NJSL State Standards for English Language Arts

- Reading Standards for Informational Text K-5:
  - Key Ideas and Details: K.1
  - Craft and Structure: K.4
  - Integration of Knowledge and Ideas: K.7
  - Range of Reading and Level of Text Complexity: K.7
- Speaking and Listening Standards K-5:
  - Comprehension and Collaboration: K.1
  - Presentation of Knowledge and Ideas: K.4

Assessments:

Formative:
Labs
Quizzes
Activities
Homework

Summative:
Benchmarks
Projects

Resources:

Textbook: Knowing Science: Kindergarten

- Physical Science
  - Lesson 1: Feeling the Difference
  - Lesson 2: Comparing Two Objects
  - Lesson 3: Comparison to a Standard
  - Lesson 4: Placing Objects in Size Order
  - Lesson 5: Measuring Rectangular Blocks
  - Lesson 6: Measuring Objects
  - Lesson 7: Objects and Distance
  - Lesson 8: Measuring Distance
  - Lesson 9: Measuring Distance-Movement
  - Lesson 10: From Clay to Cubes: Making a Product

Other Resources:

- BrainPop Jr.
- Discovery Streaming
- Trade Books

Additional Activities:

- Investigating Properties of Water

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
☐ Global Awareness ☐ Environmental Literacy ☐ Health Literacy ☐ Civic Literacy ☒ Financial, Economic, Business, and Entrepreneurial Literacy	☒ Critical Thinking and Problem Solving ☐ Creativity and Innovation ☐ Collaboration, Teamwork, and Leadership ☐ Cross-cultural and Interpersonal Communication ☐ Accountability, Productivity, and Ethics
8.1 Educational Technology Standards	**8.2 Technology Education, Engineering, Design & Computational Thinking - Programming**
☒ 8.1.A Technology Operations and Concepts ☐ 8.1.B Creativity and Innovation ☐ 8.1.C Communication and Collaboration ☐ 8.1.D Digital Citizenship ☐ 8.1.E Research and Information Fluency ☐ 8.1.F Critical Thinking, Problem Solving & Decision Making	☐ 8.2.A The Nature of Technology: Creativity and Innovation ☐ 8.2.B Technology and Society ☒ 8.2.C Design ☐ 8.2.D Abilities for a Technological World ☐ 8.2.E Computational Thinking: Programming

Career Ready Practices	
☒ CRP1.	Act as a responsible and contributing citizen and employee
☒ CRP2.	Apply appropriate academics and technical skills
☐ CRP3.	Attend to personal health and financial well-being
☒ CRP4.	Communicate clearly and effectively with reason
☐ CRP5.	Consider the environmental, social and economic impacts of decisions
☐ CRP6.	Demonstrate creativity and innovation
☐ CRP7.	Employ valid and reliable research strategies
☐ CRP8.	Utilize critical thinking to make sense of problems and persevere in solving them
☐ CRP9.	Model integrity, ethical leadership, and effective management
☐ CRP10.	Plan education and career paths aligned to personal goals
☐ CRP11.	Use technology to enhance productivity
☐ CRP12.	Work productively in teams while using global cultural competence

Grade: Kindergarten	**Unit:** Earth Science	**Time Frame:** 8 weeks

Essential Questions:

- What is weather?
- What is temperature?
- What is wind speed?
- What is precipitation?
- What can sky conditions tell us about the weather?
- What makes a rainbow?
- What does a weather forecaster do?
- How do the four seasons differ?
- How can a model of Earth help us learn about it?
- How does a map represent Earth's features?

Unit Sequence:

1. Watching the Weather
2. Stormy Weather Ahead!
3. Comparing Seasons
4. Modeling the Earth
5. The Earth's Surface
6. Sunlight

Natural Phenomena:

- I went to Florida in December, and the temperature was still very hot.
- I was hot on the beach, so I sat under an umbrella.
- It rains in the summer, but doesn't snow.
- At lunchtime, I can see the sun in the sky
- The Atlantic Ocean is between America and Europe.
- When we stand in the sun, our skin feels warm.

Disciplinary Core Ideas

PS3.B: Conservation of Energy and Energy Transfer

- Sunlight warms Earth's surface.

ESS2.D: Weather and Climate

- Weather is a combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time.

ESS3.B: Natural Hazards

- Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events.

ETS1.A: Defining and Delimiting an Engineering Problem

- Asking questions, making observations, and gathering information are helpful in thinking about problems.

Scientific Practices

Asking Questions and Defining Problems
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communication Information

Crosscutting Concepts

Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

K-ESS2-1: Use and share observations of local weather conditions to describe patterns over time.
K-ESS3-2: Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.
K-PS3-1: Make observations to determine the effect of sunlight on Earth's surface.
K-PS3-2: Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.

Standards Correlations & Interdisciplinary Connections

NJSL State Standards for Mathematics:

- Counting and Cardinality: K.5, K.6
- Measurement and Data: K.MD.2

NJSL State Standards for English Language Arts

- Reading Standards for Literature K-5:
  - Key Ideas and Details: K.1, K.3
  - Craft and Structure: K.4
  - Integration of Knowledge of Ideas: K.7
- Reading Standards for Informational Text K-5:
  - Key Ideas and Details: K.1, K.2, K.3
  - Craft and Structure: K.4, K.5
  - Integration of Knowledge and Ideas: K.6, K.7
- Speaking and Listening Standards K-5:
  - Comprehension and Collaboration: K.1, K.2, K.3
  - Presentation of Knowledge and Ideas: K.6

Assessments:

Formative:
Labs
Quizzes
Activities
Homework

Summative:
Benchmarks
Projects

Resources:

Textbook: Knowing Science: Kindergarten

- Earth Science
  - Lesson 17: Watching the Weather
    - Sessions 1-7
  - Lesson 18: Stormy Weather Ahead!
    - Sessions 1-3
  - Lesson 19: Comparing Seasons
  - Lesson 20: Modeling the Earth
  - Lesson 21: The Earth's Surface
  - Lesson 22: Sunlight
    - Sessions 1-2

Other Resources:

- BrainPop Jr.
- Discovery Streaming
- Trade Books

Additional Activities:

- Weather Journal

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
☒ Global Awareness ☒ Environmental Literacy ☐ Health Literacy ☐ Civic Literacy ☐ Financial, Economic, Business, and Entrepreneurial Literacy	☒ Critical Thinking and Problem Solving ☐ Creativity and Innovation ☒ Collaboration, Teamwork, and Leadership ☐ Cross-cultural and Interpersonal Communication ☐ Accountability, Productivity, and Ethics
8.1 Educational Technology Standards	**8.2 Technology Education, Engineering, Design & Computational Thinking - Programming**
☒ 8.1.A Technology Operations and Concepts ☐ 8.1.B Creativity and Innovation ☐ 8.1.C Communication and Collaboration ☐ 8.1.D Digital Citizenship ☐ 8.1.E Research and Information Fluency ☒ 8.1.F Critical Thinking, Problem Solving & Decision Making	☒ 8.2.A The Nature of Technology: Creativity and Innovation ☒ 8.2.B Technology and Society ☒ 8.2.C Design ☐ 8.2.D Abilities for a Technological World ☐ 8.2.E Computational Thinking: Programming

Career Ready Practices	
☒ CRP1.	Act as a responsible and contributing citizen and employee
☒ CRP2.	Apply appropriate academics and technical skills
☐ CRP3.	Attend to personal health and financial well-being
☐ CRP4.	Communicate clearly and effectively with reason
☒ CRP5.	Consider the environmental, social and economic impacts of decisions
☐ CRP6.	Demonstrate creativity and innovation
☒ CRP7.	Employ valid and reliable research strategies
☒ CRP8.	Utilize critical thinking to make sense of problems and persevere in solving them
☐ CRP9.	Model integrity, ethical leadership, and effective management
☐ CRP10.	Plan education and career paths aligned to personal goals
☒ CRP11.	Use technology to enhance productivity
☒ CRP12.	Work productively in teams while using global cultural competence

Grade: Kindergarten	**Unit:** Life Science	**Time Frame:** 15 weeks
Essential Questions: ● How do your senses help you learn about the world around you? ● What is the difference between living and nonliving? ● What are the characteristics of all living things? ● What are the basic needs of plants? ● What are the basic needs of animals? ● What does seeds need to grow? ● Do different grow at different rates? ● Do plants grow in different habitats? ● How do animals use their senses to meet their basic needs? ● How do animals live in different habitats?		**Unit Sequence**: 1. Our Sensational Senses 2. Is it Alive? 3. How Does Your Garden Grow? 4. Plants and their Basic Needs 5. Animals and their Basic Needs 6. Taking Care of the Earth

- How can we take care of our Earth?

Natural Phenomena:

- A tennis ball feels different than a basketball.
- A lemon and banana taste different.
- I watered my tomato plant and it grew tomatoes.
- A bird builds a nest for its family in a tree.
- Prairie dogs dig holes underground to live in.

Disciplinary Core Ideas

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

- All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.

ESS2.E: Bio geology

- Plants and animals can change their environment.

ESS3.A: Natural Resources

- Living things need water, air, and resources from the land and they live in places that have the things they need. Humans use natural resources for everything they do.

ESS3.C: Human Impacts on Earth Systems

- Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

Scientific Practices

Asking Questions and Defining Problems
Developing and Using Models
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Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communication Information

Crosscutting Concepts

Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

K-LS1-1: Use observations to describe patterns of what plants and animals (including humans) need to survive.
K-ESS2-2: Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.
K-ESS3-1: Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.
K-ESS3-3: Communicate solutions that will reduce the impact of humans on land, water, air, and/or living things in the local environment.

Standards Correlations & Interdisciplinary Connections

NJSL State Standards for English Language Arts

- Reading Standards for Informational Text K-5:
  - Key Ideas and Details: K.1, K.2, K.3
  - Craft and Structure: K.4, K.5
  - Integration of Knowledge and Ideas: K.7, K.8, K.9
- Writing:
  - Text Types and Purpose: K.2
  - Research to Build and Present Knowledge: K.8
  - Responding to Literature: K.11
- Speaking and Listening Standards K-5:
  - Comprehension and Collaboration: K.1, K.2, K.3
  - Presentation of Knowledge and Ideas: K.4, K.5, K.6

Assessments:

Formative:
Labs
Quizzes
Activities
Homework

Summative:
Benchmarks
Projects

Resources:

Textbook: Knowing Science: Kindergarten

- Life Science
  - Lesson 11: Our Sensational Senses
    - Sessions 1-6
  - Lesson 12: Is it Alive?
    - Sessions 1-4
  - Lesson 13: How Does Your Garden Grow?
    - Sessions 1- 4
  - Lesson 14: Plants and their Basic Needs
    - Sessions 1-7
  - Lesson 15: Animals and their Basic Needs
    - Sessions 1-8
  - Lesson 16: Taking Care of the Earth

Other Resources:

- BrainPop Jr.
- Discovery Streaming
- Sesame Street Website
  - Cookie Monster Who's Alive?
  - Kermit Song: It's Alive; Stones Don't Grow
- Trade Books

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
☒ Global Awareness ☒ Environmental Literacy ☒ Health Literacy ☐ Civic Literacy ☐ Financial, Economic, Business, and Entrepreneurial Literacy	☒ Critical Thinking and Problem Solving ☐ Creativity and Innovation ☒ Collaboration, Teamwork, and Leadership ☒ Cross-cultural and Interpersonal Communication ☐ Accountability, Productivity, and Ethics

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Career Ready Practices	
☐ CRP1.	Act as a responsible and contributing citizen and employee
☒ CRP2.	Apply appropriate academics and technical skills
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☒ CRP4.	Communicate clearly and effectively with reason
☒ CRP5.	Consider the environmental, social and economic impacts of decisions
☐ CRP6.	Demonstrate creativity and innovation
☐ CRP7.	Employ valid and reliable research strategies
☐ CRP8.	Utilize critical thinking to make sense of problems and persevere in solving them
☐ CRP9.	Model integrity, ethical leadership, and effective management
☐ CRP10.	Plan education and career paths aligned to personal goals
☒ CRP11.	Use technology to enhance productivity
☒ CRP12.	Work productively in teams while using global cultural competence

Science
Grade 1

Pacing Guide

Physical Science 60 days	**Earth and Space Science 60 days**
Marking Period 1	**Marking Period 2**
Earth and Space Science 60 days	**Life Science 60 days**
Marking Period 3	**Marking Period 4**

Unit 1 Physical Science: Forces and Motion

Unit 2 Earth and Space Science: Fossils and the Changing Earth

Unit 3 Life Science: Life Cycles

Grade: 1	**Unit:** Physical Science	**Time Frame:** 13-14 weeks
Essential Questions: ● Why do we need a standard unit? ● How do we measure length and height? ● Why do some objects feel heavier than others? ● How do we measure distance? ● How can we represent distance an object travels on a diagram? ● What is a push? ● What is a pull? ● Can forces change the shape of objects? ● What is gravity and how does it affect motion? ● What are balanced and unbalanced forces? ● What causes sound? ● Why do we need light? ● What happens when light interacts with objects?		**Unit Sequence**: 1. Ready, Set, Measure! 2. Binary Comparison of Weight 3. What's Gravity Got to Do with It? 4. Weighing with a Double Pan Balance 5. What is Motion and How Do We Measure It? 6. Mapping Motion 7. Forces Make Things Move 8. More About Forces 9. Forces in Balance 10. Good Vibrations!- The Science of Sound 11. Light All Around
Natural Phenomena: ● To measure a crayon, you would use a ruler, but to measure a couch, use a tape measure ● A baseball and a wiffleball are about the same size, but a wiffle ball is lighter ● A shopping cart doesn't move until you push it ● A drawer opens and closes ● A mom pushes a baby in a swing. ● When you go underwater, you can still hear sound but it's harder ● Blinds help make a room darker		

Disciplinary Core Ideas

PS4.A: Wave Properties

- Sound can make matter vibrate, and vibrating matter can make sound.

PS4.B: Electromagnetic Radiation

- Objects can be seen if light is available to illuminate them or if they give off their own light.
- Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam.

PS4.C: Information Technologies and Instrumentation

- People also use a variety of devices to communicate (send and receive information) over long distances.

ETS1.A: Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering.
- Asking questions, making observations, and gathering information are helpful in thinking about problems.
- Before beginning to design a solution, it is important to clearly understand the problem.

Scientific Practices

Asking Questions and Defining Problems
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Structure and Function
Stability and Change

Performance Expectations

1-PS4-1: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.
1-PS4-2: Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.
1-PS4-3: Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.
1-PS4-4: Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.
K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through development of a new or improved object or tool.

Standards Correlations & Interdisciplinary Connections

NJSL State Standards for Mathematics:

- Measurement and Data: 1.MD.2, 1.MD.4, 2.MD.1, 2.MD.3, 2.MD.4, 2.MD.10, 3.MD.3

NJSL State Standards for English Language Arts

- Reading Standards for Literature K-5:
  - Key Ideas and Details: 1.1
  - Craft and Structure: 1.5
- Reading Standards for Informational Text K-5:
  - Key Ideas and Details: 1.1, 1.2, 1.3
  - Craft and Structure: 1.4, 1.6
  - Range of Reading and Level of Text Complexity: 1.10
- Speaking and Listening Standards K-5:
  - Comprehension and Collaboration: 1.1a, 1.1b, 1.1c, 1.2, 1.3
  - Presentation of Knowledge and Ideas: 1.5, 1.6

Assessments:

Formative:
Labs
Quizzes
Activities
Homework

Summative:

Resources:

Textbook: Knowing Science: First Grade

- Physical Science
  - Lesson 1: Ready, Set, Measure!
  - Lesson 2: Binary Comparison of Weight
  - Lesson 3: What's Gravity Got to Do with It?
  - Lesson 4: Weighing with a Double Pan Balance
  - Lesson 5: What is Motion and how do we Measure it?

Benchmarks Projects	○ Lesson 6: Mapping Motion ○ Lesson 7: Forces Make Things Move ○ Lesson 8: More About Forces ○ Lesson 9: Forces in Balance ○ Lesson 10: Good Vibrations! -The Science of Sound ○ Lesson 11: Light All Around *Other Resources:* ● BrainPop Jr. ● Discovery Streaming ● Trade Books *Additional Activities:* ● Color and Light

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

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☒ CRP8.	Utilize critical thinking to make sense of problems and persevere in solving them
☐ CRP9.	Model integrity, ethical leadership, and effective management
☐ CRP10.	Plan education and career paths aligned to personal goals
☒ CRP11.	Use technology to enhance productivity
☒ CRP12.	Work productively in teams while using global cultural competence

Grade: 1	**Unit:** Earth & Space Science	**Time Frame:** 14 weeks

Essential Questions:

- How do the layers of the Earth differ from one another?
- How can we measure the thickness of the Earth's layers?
- What are fossils?
- How can we tell what organism made a fossil?
- How do wind and water shape the land?
- What makes day and night?
- What makes seasons?
- What are the phases of the moon?

Unit Sequence:

1. Inside our Earth
2. Fun with Fossils!
3. Shaping the Land with Water, Wind and Ice
4. Seeing Patterns Around Us
5. Protecting the Planet

Natural Phenomena:

- Fossils of plants and animals can be found in rocks
- On the east coast of the USA, the shores are sandy
- During the day, you can see the sun in the sky, but at night you can't
- The moon changes shape throughout the month

Disciplinary Core Ideas

ESS1.A: The Universe and its Stars

- Patterns of the motion of the sun, moon, and the stars in the sky can be observed, described, and predicted.

ESS1.B: Earth and the Solar System

- Seasonal patterns of sunrise and sunset can be observed, described and predicted.

Scientific Practices

Asking Questions and Defining Problems
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communication Information

Crosscutting Concepts

Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

1-ESS1-1: Use observations of the sun, moon, and stars to describe patterns that can be predicted.
1-ESS1-2: Make observations at different times of year to relate the amount of daylight to the time of year.

Standards Correlations & Interdisciplinary Connections

NJSL State Standards for Mathematics:

- Geometry: K.G.2, K.G.3
- Measurement and Data: 2.MD.1, 1.MD.4

NJSL State Standards for English Language Arts

- Reading Standards for Informational Text K-5:
  - Key Ideas and Details:1.1, 1.2, 1.3
  - Craft and Structure: 1.4, 1.5, 1.6
  - Integration of Knowledge and Ideas:1.7
- Speaking and Listening Standards K-5:
  - Comprehension and Collaboration: 1.1, 1.2
  - Presentation of Knowledge and Ideas: 1.4, 1.6

Assessments:

Formative:
Labs
Quizzes
Activities

Resources:

Textbook: Knowing Science: First Grade

- Earth & Space Science
  - Lesson 17: Inside our Earth
    - Sessions 1-2

Homework **Summative:** Benchmarks Projects	○ Lesson 18: Fun with Fossils! ▪ Sessions 1-3 ○ Lesson 19: Shaping the Land with Water, Wind, and Ice ▪ Sessions 1-2 ○ Lesson 20: Seeing Patterns Around Us ▪ Sessions 1-5 ○ Lesson 21: Protecting the Planet ▪ Session 1 ▪ Extending the lesson Activity *Other Resources:* ● BrainPop Jr. ● Discovery Streaming ● Trade Books *Additional Activities:* ● Moon Calendar

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
☒ Global Awareness ☒ Environmental Literacy ☐ Health Literacy ☐ Civic Literacy ☐ Financial, Economic, Business, and Entrepreneurial Literacy	☒ Critical Thinking and Problem Solving ☐ Creativity and Innovation ☒ Collaboration, Teamwork, and Leadership ☒ Cross-cultural and Interpersonal Communication ☐ Accountability, Productivity, and Ethics

8.1 Educational Technology Standards	8.2 Technology Education, Engineering, Design & Computational Thinking - Programming
☐ 8.1.A Technology Operations and Concepts ☐ 8.1.B Creativity and Innovation ☒ 8.1.C Communication and Collaboration ☐ 8.1.D Digital Citizenship ☐ 8.1.E Research and Information Fluency ☒ 8.1.F Critical Thinking, Problem Solving & Decision Making	☐ 8.2.A The Nature of Technology: Creativity and Innovation ☐ 8.2.B Technology and Society ☐ 8.2.C Design ☒ 8.2.D Abilities for a Technological World ☐ 8.2.E Computational Thinking: Programming

Career Ready Practices	
☐ CRP1.	Act as a responsible and contributing citizen and employee
☒ CRP2.	Apply appropriate academics and technical skills
☐ CRP3.	Attend to personal health and financial well-being
☐ CRP4.	Communicate clearly and effectively with reason
☐ CRP5.	Consider the environmental, social and economic impacts of decisions
☐ CRP6.	Demonstrate creativity and innovation
☒ CRP7.	Employ valid and reliable research strategies
☒ CRP8.	Utilize critical thinking to make sense of problems and persevere in solving them
☐ CRP9.	Model integrity, ethical leadership, and effective management
☐ CRP10.	Plan education and career paths aligned to personal goals
☒ CRP11.	Use technology to enhance productivity
☐ CRP12.	Work productively in teams while using global cultural competence

Grade: 1	Unit: Life Science	Time Frame: 8 weeks

Essential Questions:
- How can nature give humans ideas?
- How does nature help humans solve problems?
- Why do some animals live in families?
- What is the purpose of a family?
- What is a life cycle?
- How do animals move?
- How does an animal's movements relate to its physical structures?

Unit Sequence:
1. Dash, Leap, Soar, and Swim- How Do Animals Move?
2. The Circle of Life- Animal Life Cycles
3. Getting Together- Animals that Live in Groups
4. Inspired by Nature

Natural Phenomena:
- A cheetah is the fastest land animal
- A tadpole lives in a pond before it becomes a frog
- Wolves live in a wolf pack
- Bees live in a colony, some live in a beehive, some in the ground
- Horses live in a herd
- Butterflies migrate during the winter months
- Bears hibernate during the cold winter months

Disciplinary Core Ideas

LS1.A: Structure and Function
- All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.

LS1.B: Growth and Development of Organisms
- Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive.

LS1.D: Information Processing
- Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs.

LS3.A: Inheritance of Traits
- Young animals are very much, but not exactly, like their parents. Plants also are very much, but not exactly, like their parents.

LS3.B: Variation of Traits
- Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways.

ETS1.A: Defining and Delimiting Engineering Problems
- A situation that people want to change or create can be approached as a problem to be solved through engineering.
- Asking questions, making observations, and gathering information are helpful in thinking about problems.
- Before beginning to design a solution, it is important to clearly understand the problem.

Scientific Practices
Asking Questions and Defining Problems
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communication Information

Crosscutting Concepts
Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

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

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

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

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

Standards Correlations & Interdisciplinary Connections

NJSL State Standards for English Language Arts

- Reading Standards for Informational Text K-5:
  - Key Ideas and Details: 1.1, 1.2, 1.3
  - Craft and Structure: 1.4, 1.5, 1.6
  - Integration of Knowledge and Ideas: 1.7
- Speaking and Listening Standards K-5:
  - Comprehension and Collaboration: 1.1a, 1.1b, 1.1c, 1.3
  - Presentation of Knowledge and Ideas: 1.4, 1.5, 1.6
- Writing Standards K-5:
  - Text Types and Purposes: 1.2
  - Research to Build and Present Knowledge: 1.7, 1.8

Assessments:
Formative:
Labs
Quizzes
Activities
Homework

Summative:
Benchmarks
Projects

Resources:
Textbook: Knowing Science: First Grade

- Life Science
  - Lesson 12: Dash, Leap, Soar and Swim- How Do Animals Move?
    - Sessions 1-3
  - Lesson 13: The Circle of Life - Animal Life Cycles
    - Session 1
    - Session 3
    - Session 4
    - Session 5
  - Lesson 14: Getting Together- Animals that Live in Groups
    - Sessions 1-6
  - Lesson 16: Inspired by Nature
    - Session 1
    - Session 4

Other Resources:

- BrainPop Jr.
- Discovery Streaming
- Trade Books

Additional Activities:

- Life Cycle of Mealworms
- Butterfly Larvae
- Chicken Life Cycle Plate

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
☒ Global Awareness	☒ Critical Thinking and Problem Solving
☒ Environmental Literacy	☐ Creativity and Innovation
☐ Health Literacy	☒ Collaboration, Teamwork, and Leadership
☐ Civic Literacy	☒ Cross-cultural and Interpersonal Communication
☐ Financial, Economic, Business, and Entrepreneurial Literacy	☐ Accountability, Productivity, and Ethics

8.1 Educational Technology Standards	8.2 Technology Education, Engineering, Design & Computational Thinking - Programming
☐ 8.1.A Technology Operations and Concepts ☐ 8.1.B Creativity and Innovation ☒ 8.1.C Communication and Collaboration ☐ 8.1.D Digital Citizenship ☐ 8.1.E Research and Information Fluency ☒ 8.1.F Critical Thinking, Problem Solving & Decision Making	☐ 8.2.A The Nature of Technology: Creativity and Innovation ☐ 8.2.B Technology and Society ☐ 8.2.C Design ☒ 8.2.D Abilities for a Technological World ☐ 8.2.E Computational Thinking: Programming

Career Ready Practices	
☐ CRP1.	Act as a responsible and contributing citizen and employee
☒ CRP2.	Apply appropriate academics and technical skills
☐ CRP3.	Attend to personal health and financial well-being
☐ CRP4.	Communicate clearly and effectively with reason
☐ CRP5.	Consider the environmental, social and economic impacts of decisions
☐ CRP6.	Demonstrate creativity and innovation
☒ CRP7.	Employ valid and reliable research strategies
☒ CRP8.	Utilize critical thinking to make sense of problems and persevere in solving them
☐ CRP9.	Model integrity, ethical leadership, and effective management
☐ CRP10.	Plan education and career paths aligned to personal goals
☒ CRP11.	Use technology to enhance productivity
☐ CRP12.	Work productively in teams while using global cultural competence

Science
Grade 2

Pacing Guide

Physical Science 60 days	**Earth Science 60 days**
Marking Period 1	**Marking Period 2**
Earth Science 60 days	**Life Science 60 days**
Marking Period 3	**Marking Period 4**

Unit 1 Physical Science: Matter, Measurement and Classification

Unit 2 Earth Science: Dynamic Earth

Unit 3 Life Science: Plants, Ecosystems and Habitats

Grade: 2	**Unit:** Physical Science	**Time Frame:** 13 weeks
Essential Questions: ● Why do we need a standard unit? ● How do we measure length and width? ● What is matter? ● What are the states of matter? ● How is matter constructed? ● How and why does water change from one phase to another? ● How can we sequence objects from heaviest to lightest? ● Does changing the shape of an object change its weight? ● Why do equal volumes of different substances have different weights?		**Unit Sequence**: 1. Measure Up!- A Review of Linear Measurement 2. Measuring Motion and Distance- A Review 3. Matter Matters- Exploring the Properties of Matter 4. The Building Blocks of Matter 5. When States of Matter Change 6. Sorting by Weight (Classification) 7. Sequential Sorting by Weight 8. Measuring with a Double Pan Balance 9. Using Standard Weights 10. Watching How a Calibrated Scale Works 11. Weighing with a Calibrated Scale 12. Conservation of Mass 13. Introduction to Density 14. More about Density
Natural Phenomena: ● Not all books are the same height ● An ice cube can melt and be refrozen ● When a lid is on a pot of boiling water, water droplets collect on the lid ● A golf ball feels heavier than a ping pong ball ● A cup of cotton balls feels lighter than a cup of sand ● Some bowling balls float, while others sink		

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter

- Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties.
- Different properties are suited to different purposes.
- A great variety of objects can be built up from a small set of pieces.

PS1.B: Chemical Reactions

- Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible and sometimes they are not.

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for problem's solutions to other people.

ETS1.C: Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

Scientific Practices

Asking Questions and Defining Problems
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communication Information

Crosscutting Concepts

Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

2-PS1-1: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
2-PS1-2: Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.
2-PS1-3: Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.
2-PS1-4: Construct an argument with evidence that some changes caused by heating and cooling can be reversed and some cannot.
K-2-ETS1-2: Develop a simple sketch, drawing or physical model to illustrate how the shape of an object helps its function as needed to solve a given problem.
K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Standards Correlations & Interdisciplinary Connections

NJSL State Standards for Mathematics:

- Measurement and Data: 2.MD.1, 2.MD.3, 2.MD.4, 2.MD.9, 2.MD.10, 3.MD.1, 3.MD.2
- Counting and Cardinality:

NJSL State Standards for English Language Arts

- Conventions of Standard English: 2.1
- Knowledge of Language: 2.3

Assessments:

Formative:
Labs
Quizzes
Activities
Homework

Summative:
Benchmarks
Projects

Resources:

Textbook: Knowing Science: Second Grade

- Engineering, Technology, and the Applications of Sciences
  - Lesson 1: Measure Up!- A Review of Linear Measurement
  - Lesson 2: Measuring Motion and Distance - A Review
- Physical Science
  - Lesson 3: Matter Matters- Exploring the Properties of Matter
  - Lesson 4: The Building Blocks of Matter
  - Lesson 5: When States of Matter Change
  - Lesson 6: Sorting by Weight (Classification)
  - Lesson 7: Sequential Sorting by Weight
  - Lesson 8: Measuring with a Double Pan Balance
  - Lesson 9: Using Standard Weights
  - Lesson 10: Watching How a Calibrated Scale Works

	○ Lesson 11: Weighing with a Calibrated Scale ○ Lesson 12: Conservation of Mass ○ Lesson 13: Introduction to Density ○ Lesson 14: More about Density *Other Resources:* ● BrainPop Jr. ● Discovery Streaming ● Trade Books *Additional Activities:* ● Investigating Properties of Water

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
☐ Global Awareness ☒ Environmental Literacy ☐ Health Literacy ☐ Civic Literacy ☐ Financial, Economic, Business, and Entrepreneurial Literacy	☒ Critical Thinking and Problem Solving ☒ Creativity and Innovation ☒ Collaboration, Teamwork, and Leadership ☐ Cross-cultural and Interpersonal Communication ☐ Accountability, Productivity, and Ethics

8.1 Educational Technology Standards	8.2 Technology Education, Engineering, Design & Computational Thinking - Programming
☒ 8.1.A Technology Operations and Concepts ☐ 8.1.B Creativity and Innovation ☒ 8.1.C Communication and Collaboration ☐ 8.1.D Digital Citizenship ☒ 8.1.E Research and Information Fluency ☒ 8.1.F Critical Thinking, Problem Solving & Decision Making	☒ 8.2.A The Nature of Technology: Creativity and Innovation ☒ 8.2.B Technology and Society ☒ 8.2.C Design ☒ 8.2.D Abilities for a Technological World ☐ 8.2.E Computational Thinking: Programming

Career Ready Practices	
☐ CRP1.	Act as a responsible and contributing citizen and employee
☒ CRP2.	Apply appropriate academics and technical skills
☐ CRP3.	Attend to personal health and financial well-being
☒ CRP4.	Communicate clearly and effectively with reason
☒ CRP5.	Consider the environmental, social and economic impacts of decisions
☐ CRP6.	Demonstrate creativity and innovation
☒ CRP7.	Employ valid and reliable research strategies
☐ CRP8.	Utilize critical thinking to make sense of problems and persevere in solving them
☐ CRP9.	Model integrity, ethical leadership, and effective management
☐ CRP10.	Plan education and career paths aligned to personal goals
☒ CRP11.	Use technology to enhance productivity
☒ CRP12.	Work productively in teams while using global cultural competence

Grade: 2	**Unit:** Earth Science	**Time Frame:** 10 weeks

Essential Questions:

- Why do objects appear smaller when they are farther away, and bigger when they are close?
- How do models help us understand the movement of Earth's crust?
- What are earthquakes?
- How do strong and light winds affect various materials?
- How do fast and slow water flow rates affect the movement of sediment?
- How can we slow down erosion?

Unit Sequence:

1. Why is the Sun So Small in the Sky?
2. Earth's Dynamic Surface
3. Earthquakes!
4. Shaping the Earth's Surface
5. Extreme Weather

Natural Phenomena:

- Some street signs can only be read as you drive closer to them
- I couldn't see who was waving at me until i walked toward them
- Earthquakes happen more frequently in certain parts of the world
- Earthquakes can be mapped on a world map and patterns can be seen
- The Grand Canyon has the Colorado River running through it

Disciplinary Core Ideas

ESS1.C: The History of Planet Earth

- Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe.

ESS2.A: Earth Materials and Systems

- Wind and water can change the shape of the land.

ESS2.B: Plate Tectonics and Large-Scale System Interactions

- Maps show where things are located. One can map the shapes and kinds of land and water in any area.

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

- Water is found in the ocean, rivers, lakes and ponds. Water exists as solid ice and in liquid form.

ETS1.C: Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

Scientific Practices

Asking Questions and Defining Problems
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communication Information

Crosscutting Concepts

Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
2-ESS2-1: Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.
2-ESS2-2: Develop a model to represent the shapes and kinds of land and bodies of water in an area.
2-ESS2-3: Obtain information to identify where water is found on Earth and that it can be solid or liquid.

Standards Correlations & Interdisciplinary Connections

NJSL State Standards for Mathematics:

- Measurement and Data: 2.MD.9

NJSL State Standards for English Language Arts

- Reading Standards for Literature K-5:
  - Key Ideas and Details: 2.1
  - Integration of Knowledge and Ideas: 2.7
- Reading Standards for Informational Text K-5:

- Key Ideas and Details: 2.1, 2.2
- Craft and Structure: 2.4, 2.5, 2.6
- Integration of Knowledge and Ideas: 2.7

- Speaking and Listening Standards K-5:
  - Comprehension and Collaboration: 2.1, 2.2, 2.3

Assessments:

Formative:
Labs
Quizzes
Activities
Homework

Summative:
Benchmarks
Projects

Resources:

Textbook: Knowing Science: Second Grade

- Earth and Space Science
  - Lesson 20: Why is the Sun So Small in the Sky?
    - Sessions 1-2
  - Lesson 21: Earth's Dynamic Surface
    - Sessions 1-2
  - Lesson 22: Earthquakes!
  - Lesson 23: Shaping the Earth's Surface
    - Sessions 1-3
    - Extending the Lesson Activity
  - Lesson 24: Extreme Weather
    - Sessions 1-5
    - Extending the Lesson: Activity 1

Other Resources:

- BrainPop Jr.
- Discovery Streaming
- Trade Books

Additional Activities:

- Earthquakes!

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

8.1 Educational Technology Standards	**8.2 Technology Education, Engineering, Design & Computational Thinking - Programming**
☒ 8.1.A Technology Operations and Concepts	☒ 8.2.A The Nature of Technology: Creativity and Innovation
☐ 8.1.B Creativity and Innovation	☒ 8.2.B Technology and Society
☒ 8.1.C Communication and Collaboration	☒ 8.2.C Design
☐ 8.1.D Digital Citizenship	☒ 8.2.D Abilities for a Technological World
☒ 8.1.E Research and Information Fluency	☐ 8.2.E Computational Thinking: Programming
☒ 8.1.F Critical Thinking, Problem Solving & Decision Making	

Career Ready Practices	
☐ CRP1.	Act as a responsible and contributing citizen and employee
☒ CRP2.	Apply appropriate academics and technical skills
☐ CRP3.	Attend to personal health and financial well-being
☒ CRP4.	Communicate clearly and effectively with reason
☒ CRP5.	Consider the environmental, social and economic impacts of decisions
☐ CRP6.	Demonstrate creativity and innovation
☒ CRP7.	Employ valid and reliable research strategies
☐ CRP8.	Utilize critical thinking to make sense of problems and persevere in solving them
☐ CRP9.	Model integrity, ethical leadership, and effective management
☐ CRP10.	Plan education and career paths aligned to personal goals
☒ CRP11.	Use technology to enhance productivity
☒ CRP12.	Work productively in teams while using global cultural competence

Grade: 2	**Unit:** Life Science	**Time Frame:** 10 weeks

Essential Questions

- How do living and nonliving things differ?
- What are the basic needs of all living things?
- How do different organisms get their basic needs met?
- How do living things adapt to their habitats?
- How does energy move through a food web?
- How can a habitat change?
- How do humans and animals live together?
- How do human decisions affect an ecosystem

Unit Sequence:

1. Plant Munchies- What Plants Need to Survive
2. Habitat, Sweet Habitat
3. Adaptations and Interdependency
4. Eat or be Eaten- Food Chains
5. Habitats Change

Natural Phenomena:

- A polar bear hunts on water, but lives on land
- A hummingbird sips nectar from a flower with its tongue
- Predators have eyes in front of their head, for example a lion
- A deer only needs plants
- Humans eat both plants and animals

Disciplinary Core Ideas

LS2.A: Interdependent Relationships in Ecosystems

- Plants depend on water and light to grow.
- Plants depend on animals for pollination or to move their seeds around.

LS3.D: Biodiversity and Humans

- There are many different kinds of living things in any area, and they exist in different places on land and in water.

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

Scientific Practices

Asking Questions and Defining Problems
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communication Information

Crosscutting Concepts

Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

2-LS2-1: Plan and conduct an investigation to determine if plants need sunlight and water to grow.
2-LS2-2: Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.
2-LS4-1: Make observations of plants and animals to compare the diversity of life in different habitats.

Standards Correlation & Interdisciplinary Connections:

NJSL State Standards for Mathematics:

- Measurement and Data: 2.MD.1, 2.MD.4

NJSL State Standards for English Language Arts

- Reading Standards for Informational Text K-5:
  - Key Ideas and Details: 2.1, 2.2
  - Craft and Structure: 2.4, 2.5, 2.6
  - Integration of Knowledge and Ideas: 2.7
  - Range of Reading and Level of Text Complexity: 2.10

Assessments:

Formative:
Labs

Resources:

Textbook: Knowing Science: Second Grade

- Life Science

Quizzes Activities Homework **Summative:** Benchmarks Projects	○ Lesson 15: Plant Munchies: What Plants Need to Survive ▪ Session 1 ▪ Session 2 ▪ Session 3 ● #5 Popcorn Garden Activity ▪ Session 4 ▪ Session 5 ○ Lesson 16: Habitat, Sweet Habitat ○ Lesson 17: Adaptations and Interdependency ○ Lesson 18: Eat or Be Eaten- Food Chains ○ Lesson 19: Habitats Change *Other Resources:* ● BrainPop Jr. ● Discovery Streaming ● Trade Books *Additional Activities:* ● Popcorn Garden

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
☒ Global Awareness ☐ Environmental Literacy ☐ Health Literacy ☐ Civic Literacy ☐ Financial, Economic, Business, and Entrepreneurial Literacy	☒ Critical Thinking and Problem Solving ☐ Creativity and Innovation ☒ Collaboration, Teamwork, and Leadership ☒ Cross-cultural and Interpersonal Communication ☐ Accountability, Productivity, and Ethics

8.1 Educational Technology Standards	8.2 Technology Education, Engineering, Design & Computational Thinking - Programming
☒ 8.1.A Technology Operations and Concepts ☒ 8.1.B Creativity and Innovation ☐ 8.1.C Communication and Collaboration ☒ 8.1.D Digital Citizenship ☒ 8.1.E Research and Information Fluency ☐ 8.1.F Critical Thinking, Problem Solving & Decision Making	☒ 8.2.A The Nature of Technology: Creativity and Innovation ☒ 8.2.B Technology and Society ☒ 8.2.C Design ☒ 8.2.D Abilities for a Technological World ☐ 8.2.E Computational Thinking: Programming

Career Ready Practices	
☐ CRP1.	Act as a responsible and contributing citizen and employee
☒ CRP2.	Apply appropriate academics and technical skills
☐ CRP3.	Attend to personal health and financial well-being
☒ CRP4.	Communicate clearly and effectively with reason
☒ CRP5.	Consider the environmental, social and economic impacts of decisions
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☐ CRP10.	Plan education and career paths aligned to personal goals
☒ CRP11.	Use technology to enhance productivity
☒ CRP12.	Work productively in teams while using global cultural competence

Science
Grade 3

Pacing Guide

Force and Interactions 60 days	**Weather and Climate 60 days**
Marking Period 1	**Marking Period 2**
Weather and Climate 60 days	**Life Cycles and Traits 60 days**
Marking Period 3	**Marking Period 4**

Unit 1 Forces and Interactions

Unit 2 Weather and Climate

Unit 3 Life Cycles and Traits

Integrated Accommodations

For Students with IEPs, 504s, and/or Students at Risk of Failure

Use of manipulatives and representations for simultaneous processing • Use visual and multi-sensory formats • Use of assistive technology • Use of graphic organizers and prompts • Modification of student products • Testing accommodations • Authentic assessments • Small group instruction • Adjusting the pace of lessons

Gifted & Talented Students

Inquiry-based instruction • Independent study • Higher-order thinking skills and questions • Interest-based content • Student-driven lessons • Real-world projects and scenarios

English Language Learners

Pre-teaching of vocabulary and concepts • Visual learning, including graphic organizers • Use of cognates to increase comprehension • Teacher modeling • Pairing students with beginning English language skills with students who have more advanced English language skills • Scaffolding: sentence frames, think-pair-share, cooperative learning groups, teacher read-alouds • Use of assistive technology

Grade: 3	**Unit:** Forces and Interactions	**Time Frame:** 12-13 weeks

Essential Questions:

- How can we measure length and width with standard units?
- What is distance and how do we measure it?
- How do we measure how long it takes an object to move?
- What is a force and how does it make objects move?
- What can stop an object in motion or change the direction of the motion?
- What is the difference between balanced and unbalanced forces?
- How can we create balanced forces that keep an object at rest?
- What are contact and noncontact forces?
- What is friction and how does it affect motion?
- What objects are attracted to magnets?
- How do magnets interact with each other?
- How do magnets make things move?

Unit Sequence:

1. Measure That! - A Review of Linear Measurement
2. Measuring Distance and Motion - A Review
3. Balanced and Unbalanced Forces
4. Let's Move!
5. Contact and Noncontact Forces
6. Magnets Make Things Move

Natural Phenomena:

- A toy car did not move until it was pushed by the child.
- When a soccer ball is kicked on grass, over time it slows down and stops.
- Two children playing on a seesaw
- Students playing tug of war
- The rockin roller coaster in Disney World is run by magnets

Disciplinary Core Ideas

PS2.A: Forces and Motion

- Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion.
- The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it.

PS2.B: Types of Interactions

- Objects in contact exert forces on each other.
- Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other.

ETS1.B: Developing Possible Solutions

- Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.

Scientific Practices

Asking Questions and Defining Problems
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communication Information

Crosscutting Concepts

Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

3-PS2-1: Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
3-PS2-2: Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

3-PS2-3: Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.
3-PS2-4: Define a simple design problem that can be solved by applying scientific ideas about magnets.
3-5-ETS1-2:: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Standards Correlations & Interdisciplinary Connections:

NJSL State Standards for Mathematics:

- Measurement and Data: 1.MD.2, 1.MD.4, 2.MD.1

NJSL State Standards for English Language Arts

- Speaking and Listening Standards K-5:
  - Comprehension and Collaboration: 3.1
  - Presentation of Knowledge and Ideas: 3.4
- Writing Standards K-5:
  - Text Types and Purposes: 3.2.a, 3.2.b, 3.2.d
  - Range of Writing: 3.10

Assessments:

Formative:
Labs
Quizzes
Activities
Homework

Summative:
Benchmarks
Projects

Resources:

Textbook: Knowing Science: Third Grade

- Unit 1: Forces and Interactions
  - Lesson 1,1:Measure That!- A Review of Linear Measurement
  - Lesson 1.2: Measuring Distance and Motion - A Review
  - Lesson 1.3: Let's Move!
  - Lesson 1.4: Balanced and Unbalanced Forces
  - Lesson 1.5: Contact and Noncontact Forces
  - Magnets Make Things Move

Other Resources:

- BrainPop Jr.
- Discovery Streaming
- Trade Books
- Mystery Science

Additional Activities:

- Simple Machines

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
☒ Global Awareness ☒ Environmental Literacy ☐ Health Literacy ☐ Civic Literacy ☐ Financial, Economic, Business, and Entrepreneurial Literacy	☒ Critical Thinking and Problem Solving ☐ Creativity and Innovation ☒ Collaboration, Teamwork, and Leadership ☒ Cross-cultural and Interpersonal Communication ☐ Accountability, Productivity, and Ethics

8.1 Educational Technology Standards	8.2 Technology Education, Engineering, Design & Computational Thinking - Programming
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☒ 8.1.E Research and Information Fluency ☒ 8.1.F Critical Thinking, Problem Solving & Decision Making	

Career Ready Practices	
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☒ CRP11.	Use technology to enhance productivity
☒ CRP12.	Work productively in teams while using global cultural competence

Grade: 3	**Unit:** Weather and Climate	**Time Frame:** 9-10 weeks

Essential Questions:

- What are the ingredients of weather?
- How is weather measured?
- How does the water cycle affect weather?
- What role do clouds play in weather?
- How do meteorologists forecast the weather?
- What is climate?
- Where are Earth's biomes?
- What are tornadoes?
- What are hurricanes?
- What are winter storms?

Unit Sequence:

1. What is Weather?
2. Climate and Biomes
3. Extreme Weather

Natural Phenomena:

- In New Jersey, there are four seasons
- Near the equator in the rainforest it rains a lot
- Clouds are in the sky when it rains
- Not all biomes have four seasons
- Different parts of the United States are more likely to receive tornadoes

Disciplinary Core Ideas

ESS2.D: Weather and Climate

- Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.
- Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.

Scientific Practices

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Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communication Information

Crosscutting Concepts

Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
3-ESS2-2: Obtain and combine information to describe climates in different regions of the world.

Standards Correlations & Interdisciplinary Connections:

NJSL State Standards for Mathematics:

- Measurement and Data: 3.MD.4

NJSL State Standards for English Language Arts

- Reading Standards for Informational Text K-5:
  - Key Ideas and Details: 3.1, 3.2, 3.3
  - Craft and Structure: 3.4, 3.5
  - Integration of Knowledge and Ideas: 3.7, 3.9
- Speaking and Listening Standards K-5:
  - Comprehension and Collaboration: 3.1, 3.2, 3.3
  - Presentation of Knowledge and Ideas: 3.4, 3.6

Assessments:

Formative:
Labs
Quizzes
Activities
Homework

Summative:
Benchmarks
Projects

Resources:

Textbook: Knowing Science: Third Grade

- Unit 3: Weather and Climate
  - Lesson 3.1: What is Weather?
    - Sessions 1-7
  - Lesson 3.2: Climate and Biomes
    - Sessions 1-3
    - Extension Activity
  - Lesson 3.3: Extreme Weather
    - Sessions 1-3

Other Resources:

- BrainPop Jr.
- Discovery Streaming
- Trade Books

Additional Activities:

- Water Cycle Activities
- Earth's Biomes Videos

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
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Career Ready Practices	
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☐ CRP10.	Plan education and career paths aligned to personal goals
☒ CRP11.	Use technology to enhance productivity
☒ CRP12.	Work productively in teams while using global cultural competence

Grade: 3	**Unit:** Life Cycles and Traits	**Time Frame:** 9-10 weeks
Essential Questions: ● What is a life cycle? ● How are plant life cycles similar? ● How are animal life cycles alike and different? ● What is inside a seed? ● How do plants spread their seeds? ● What are ways to make new plants? ● What is an amphibian? ● What are the stages in the life cycle of a frog? ● What are traits?		**Unit Sequence**: 1. Introducing...Life Cycles! 2. Frog Life Cycles 3. Plant Life Cycles 4. Nature or Nurture- Traits in Animals and Plants 5. Animal Communities 6. Fossils Tell Stories of Prehistoric Life on Earth

- How can we learn about our own inherited traits?
- Do plants inherit traits too?
- How does trait variation help animals survive?
- Why do animals form groups?
- How do animals communicate by smell?
- How do animals communicate with sound?
- How do animals communicate by sight?
- What is a fossil?
- How are fossils formed?
- Where are fossils found?

Natural Phenomena:

- Plants and animals have life cycles
- As a child grows, they lose their baby teeth
- A chick hatches from an egg, and hens lay eggs
- Maple trees have seeds that resemble helicopters, that twirl to the ground when they fall
- Burdock seeds can get stuck to animals to move
- Frogs lose their tails when they are no longer a tadpole
- My parents and siblings all have blue eyes, so do I
- Zebras live in herds
- My dog went outside at night, and got sprayed by a skunk
- An imprint of a leaf was found in a rock

Disciplinary Core Ideas

LS1.B: Growth and Development of Organisms

- Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles.

LS2.C: Ecosystem Dynamics, Functioning and Resilience

- When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move to the transformed environment, and some die.

LS2.D: Social Interactions and Group Behavior

- Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size.

LS3.A: Inheritance of Traits

- Many characteristics of organisms are inherited from their parents.
- Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment.

LS3.B: Variation of Traits

- Different organisms vary in how they look and function because they have different inherited information.
- The environment also affects the traits that an organism develops.

LS4.A: Evidence of Common Ancestry and Diversity

- Some kinds of plants and animals that once lived on Earth are no longer found anywhere.
- Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments.

LS4.B: Natural Selection

- Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing.

LS4.C: Adaptation

- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all .

LS4.D: Biodiversity and Humans

- Populations live in a variety of habitats, and change in those habitats affects the organisms living there.

Scientific Practices

Asking Questions and Defining Problems
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking

Crosscutting Concepts

Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation

Constructing Explanations and Designing Solutions Engaging in Argument from Evidence Obtaining, Evaluating, and Communication Information	Structure and Function Stability and Change

Performance Expectations

3-LS1-1: Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
3-LS2-1:: Construct an argument that some animals form groups that help members survive.
3-LS3-1: Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.
3-LS3-2: Use evidence to support the explanation that traits can be influenced by the environment.
3-LS4-1: Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.
3-LS4-2: Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.
3-LS4-3: Construct an argument with evidence that in a particular habitat some organisms can survive well, others less well, and some cannot survive at all.
3-LS4-4: Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

Standards Correlations & Interdisciplinary Connections:

NJSL State Standards for English Language Arts

- Reading Standards for Informational Text K-5:
  - Key Ideas and Details: 3.1, 3.2
  - Craft and Structure: 3.4, 3.5
  - Integration of Knowledge and Ideas: 3.7, 3.8, 3.9
- Speaking and Listening Standards K-5:
  - Comprehension and Collaboration: 3.1
- Writing Standards K-5:
  - Text Types and Purposes: 3.2
  - Research to Build and Present Knowledge: 3.7, 3.8

Assessments:

Formative:
Labs
Quizzes
Activities
Homework

Summative:
Benchmarks
Projects

Resources:

Textbook: Knowing Science: Third Grade

- Unit 2: Life Cycles and Traits
  - Lesson 2.1: Introducing...Life Cycles!
  - Lesson 2.2: Plant Life Cycles
  - Lesson 2.3: Frog Life Cycles
  - Lesson 2.4: Nature or Nurture- Traits in Animals and Plants
  - Lesson 2.5: Animal Communities
  - Lesson 2.6: Fossils Tell Stories of Prehistoric Life on Earth

Other Resources:

- BrainPop Jr.
- Discovery Streaming
- Trade Books

Additional Activities:

- Butterfly Life Cycles

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
☒ Global Awareness	☒ Critical Thinking and Problem Solving
☒ Environmental Literacy	☒ Creativity and Innovation
☐ Health Literacy	☒ Collaboration, Teamwork, and Leadership
☐ Civic Literacy	☐ Cross-cultural and Interpersonal Communication
☐ Financial, Economic, Business, and Entrepreneurial Literacy	☐ Accountability, Productivity, and Ethics

8.1 Educational Technology Standards	8.2 Technology Education, Engineering, Design & Computational Thinking - Programming
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☒ CRP11.	Use technology to enhance productivity
☐ CRP12.	Work productively in teams while using global cultural competence

Science
Grade 4

Pacing Guide

Energy **45 days**	**Waves** **45 days**
Marking Period 1	**Marking Period 2**
Earth's Surface Processes **45 days**	**Structure and Function** **45 days**
Marking Period 3	**Marking Period 4**

Unit 1 Energy: Forces and Motions, Renewable and Non-renewable Energy

Unit 2 Waves

Unit 3 Earth's Surface Processes: Soil, Erosion, Volcanoes and Earthquakes

Unit 4 Structure and Function: Classification, Living Systems

Integrated Accommodations

For Students with IEPs, 504s, and/or Students at Risk of Failure
Use of manipulatives and representations for simultaneous processing • Use visual and multi-sensory formats • Use of assistive technology • Use of graphic organizers and prompts • Modification of student products • Testing accommodations • Authentic assessments • Small group instruction • Adjusting the pace of lessons

Gifted & Talented Students
Inquiry-based instruction • Independent study • Higher-order thinking skills and questions • Interest-based content • Student-driven lessons • Real-world projects and scenarios

English Language Learners
Pre-teaching of vocabulary and concepts • Visual learning, including graphic organizers • Use of cognates to increase comprehension • Teacher modeling • Pairing students with beginning English language skills with students who have more advanced English language skills • Scaffolding: sentence frames, think-pair-share, cooperative learning groups, teacher read-alouds • Use of assistive technology

Grade: 4	**Unit:** Energy	**Time Frame:** 9 weeks

Essential Questions:

- What is distance and how do we measure it?
- How do we measure motion?
- How are energy and motion related?
- How are energy and motion related?
- How does the energy cycle work?
- How does energy create motion?
- What is the relationship between energy and unbalanced/balanced forces?
- What does it mean if an energy source is renewable? Nonrenewable?
- How do we convert one form of energy into another form?

Unit Sequence:

1. Review of Distance and Motion
2. Energy and Motion
3. The Energy Cycle
4. Researching Renewable and Nonrenewable Energy Sources
5. Balanced and Unbalanced Forces
6. Transferring and Using Energy

Natural Phenomena:

- Solar panels are installed on houses to collect energy to convert to electricity
- A bike won't move unless the pedals are pushed.
- Whichever team pulls harder, wins tug of war
- Some towns use wind and solar energy, when it's sunny they use solar, but when it's windy and cloudy they collect wind energy

Disciplinary Core Ideas

PS3.A: Definitions of Energy

- The faster a given object is moving, the more energy it possesses.
- Energy can be moved from place to place by moving objects or through sound, light, or electric currents.

PS3.B: Conservation of Energy and Energy Transfer

- Energy is present whenever there are moving objects, sound, light or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced.
- Light also transfers energy from place to place.
- Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy.

PS3.C: Relationship Between Energy and Forces

- When objects collide, the contact forces transfer energy so as to change the object's motions.

PS3.D: Energy in Chemical Processes and Everyday Life

- The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use.

ESS3.A: Natural Resources

- Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not.

ETS1.A: Defining Engineering Problems

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.

Scientific Practices	Crosscutting Concepts
Asking Questions and Defining Problems	Patterns
Developing and Using Models	Cause and Effect
Planning and Carrying Out Investigations	Scale, Proportion, Quantity
Analyzing and Interpreting Data	Systems and System Models
Using Mathematics and Computational Thinking	Energy and Matter: Flows, Cycles, and Conservation
Constructing Explanations and Designing Solutions	Structure and Function
Engaging in Argument from Evidence	Stability and Change
Obtaining, Evaluating, and Communication Information	

Performance Expectations

4-PS3-1:: Use evidence to construct an explanation relating the speed of an object to the energy of that object.
4-PS3-2: Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
4-PS3-3: Ask questions and predict outcomes about the changes in energy that occur when objects collide.
4-PS3-4: Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
4-ESS3-1: Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Standards Correlations & Interdisciplinary Connections:

NJSL State Standards for Mathematics:

- Measurement and Data: 3.MD.4

NJSL State Standards for English Language Arts

- Reading Standards for Informational Text K-5:
  - Key Ideas and Details: 4.1, 4.2, 4.3
  - Craft and Structure: 4.4
  - Integration of Knowledge and Ideas: 4.7
- Speaking and Listening Standards K-5:
  - Comprehension and Collaboration: 4.1
  - Presentation of Knowledge and Ideas: 4.4, 4.5
- Writing Standards K-5:
  - Text Types and Purposes: 4.2.a, 4.2.b, 4.2.c, 4.2.d, 4.2.e
  - Production and Distribution of Writing: 4.4, 4.5
  - Research to Build and Present Knowledge: 4.7, 4.8
  - Range of Writing: 4.10

Assessments:

Formative:
Labs
Quizzes
Activities
Homework

Summative:
Benchmarks
Projects

Resources:

Textbook: Knowing Science: Fourth Grade

- Unit 1: Energy
  - Lesson 1.1: Review of Distance and Motion
  - Lesson 1.2: Energy and Motion
  - Lesson 1.3: The Energy Cycle
  - Lesson 1.4: Balanced and Unbalanced Forces
  - Lesson 1.5: Researching Renewable and Nonrenewable Energy Sources
  - Lesson 1.6: Transferring and Using Energy

Other Resources:

- BrainPop Jr.
- Discovery Streaming
- Trade Books

Additional Activities:

- FOSS Electrical Circuits
- Potential and Kinetic Energy

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
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☐ Financial, Economic, Business, and Entrepreneurial Literacy	☐ Accountability, Productivity, and Ethics

8.1 Educational Technology Standards	8.2 Technology Education, Engineering, Design & Computational Thinking - Programming
☒ 8.1.A Technology Operations and Concepts ☒ 8.1.B Creativity and Innovation ☒ 8.1.C Communication and Collaboration ☐ 8.1.D Digital Citizenship ☐ 8.1.E Research and Information Fluency ☐ 8.1.F Critical Thinking, Problem Solving & Decision Making	☒ 8.2.A The Nature of Technology: Creativity and Innovation ☒ 8.2.B Technology and Society ☐ 8.2.C Design ☐ 8.2.D Abilities for a Technological World ☐ 8.2.E Computational Thinking: Programming

Career Ready Practices	
☒ CRP1.	Act as a responsible and contributing citizen and employee
☒ CRP2.	Apply appropriate academics and technical skills
☐ CRP3.	Attend to personal health and financial well-being
☐ CRP4.	Communicate clearly and effectively with reason
☐ CRP5.	Consider the environmental, social and economic impacts of decisions
☒ CRP6.	Demonstrate creativity and innovation
☒ CRP7.	Employ valid and reliable research strategies
☒ CRP8.	Utilize critical thinking to make sense of problems and persevere in solving them
☐ CRP9.	Model integrity, ethical leadership, and effective management
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☒ CRP11.	Use technology to enhance productivity
☐ CRP12.	Work productively in teams while using global cultural competence

Grade: 4	**Unit: Waves**	**Time Frame: 9 weeks**
Essential Questions: ● What are waves? ● How do we describe waves? ● How does light travel? ● How does light behave? ● How do we know that sound travels along waves? ● What is a code? ● What is the difference between digital and analog information?		**Unit Sequence**: 1. Amplitude and Wavelength 2. How We See 3. Using Waves to Transfer Information
Natural Phenomena: ● If you point a flashlight at a mirror, the light bounces off ● Sunlight goes through glass to reach plants in a greenhouse ● My can lays on the floor in a sunny patch that's near a window		

Disciplinary Core Ideas

PS4.A: Wave Properties

- Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets the beach.
- Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks).

PS4.B: Electromagnetic Radiation

- An object can be seen when light reflected from its surface enters the eyes.

PS4.C: Information Technologies and Instrumentation

- Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information- convert it from digitized form to voice- and vice versa.

ETS1.A: Defining and Delimiting Engineering Problems

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.

ETS1.B: Developing Possible Solutions

- Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to more improved designs.
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.

ETS1.C: Optimizing the Design Solution

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.

Scientific Practices

Asking Questions and Defining Problems
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communication Information

Crosscutting Concepts

Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

4-PS4-1: Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.
4-PS4-2: Develop a model to describe that light reflecting from objects and entering the eye allow objects to be seen.
4-PS4-3: Generate and compare multiple solutions that use patterns to transfer information.
3-5-ETS1-1: Define a simple design problem reflecting a need or want that includes specified criteria for success and constraints on materials, time or cost.
3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of a problem.
3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Standards Correlations & Interdisciplinary Connections:

NJSL State Standards for English Language Arts

- Reading Standards for Informational Text K-5:
  - Key Ideas and Details: 4.1, 4.2, 4.3
  - Craft and Structure: 4.4
  - Integration of Knowledge and Ideas: 4.7
- Speaking and Listening Standards K-5:
  - Comprehension and Collaboration: 4.1a, 4.1c, 4.1d, 4.2
  - Presentation of Knowledge and Ideas: 4.4

Assessments:

Formative:

Resources:

Textbook: Knowing Science: Fourth Grade

Labs Quizzes Activities Homework **Summative:** Benchmarks Projects	● Unit 4: Waves ○ Lesson 4.1: Amplitude and Wavelength ▪ Sessions 1 -2 ○ Lesson 4.2: How We See ▪ Sessions 1-3 ○ Lesson 4.3: Using Waves to Transfer Information ▪ Sessions 1-4 *Other Resources:* ● BrainPop Jr. ● Discovery Streaming ● Mystery Science ● Trade Books ● Amplify Science

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
☒ Global Awareness ☒ Environmental Literacy ☐ Health Literacy ☐ Civic Literacy ☐ Financial, Economic, Business, and Entrepreneurial Literacy	☒ Critical Thinking and Problem Solving ☐ Creativity and Innovation ☒ Collaboration, Teamwork, and Leadership ☐ Cross-cultural and Interpersonal Communication ☐ Accountability, Productivity, and Ethics

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Grade: 4	Unit: Earth's Surface Processes	Time Frame: 11 weeks

Essential Questions:

- What is it like inside the Earth?
- What is Pangaea?
- What are the main types of fossils?
- How does geologic time represent Earth's history?
- What is soil?
- What is in soil?
- What is weathering?
- Where does acid rain come from?
- What is erosion?
- How does glacier change Earth's surface?
- Where are Earth's landforms found?
- How are the four main types of mountains formed?
- How are landforms represented on maps?
- What causes "fast changes" in Earth's surfaces?
- How can we create models of natural disasters?

Unit Sequence:

1. Beneath our Feet
2. Fossils Tell a Story
3. What is Soil?
4. Weathering and Erosion
5. Patterns in Earth's Features
6. Volcanoes, Tsunamis, and Earthquakes - Oh My!

Natural Phenomena:

- Magma rises up from volcanoes and cools into rock
- The fossils of the same species have been found on multiple continents
- When you dig a hole in the sand, it's easier than digging a hole in the yard
- A statue made of rock started to lose its nose
- Mountain ranges can be found in the middle and coasts of continents

Disciplinary Core Ideas

ESS1.C: The History of Planet Earth

- Local, regional, and global patterns of rock formations reveal changes over time due to earth force, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed.

ESS2.A: Earth Materials and Systems

- Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.

ESS2.B: Plate Tectonics and Large-Scale System Interactions

- The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth.

ESS2.E: Bio geology

- Living things affect the physical characteristics of their regions

ESS3.B: Natural Hazards

- A variety of hazards result from natural processes. Humans cannot eliminate the hazards but can take steps to reduce their impacts.

ETS1.B: Designing Solutions to Engineering Problems

- Testing a solution involves investigating how well it performs under a range of likely conditions.

Scientific Practices

Asking Questions and Defining Problems
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communication Information

Crosscutting Concepts

Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

4-ESS1-1: Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.
4-ESS2-1: Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind or vegetation.
4-ESS2-2: Analyze and interpret data from maps to describe patterns of Earth's features.
4-ESS3-2: Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

Standards Correlations & Interdisciplinary Connections:

NJSL State Standards for English Language Arts

- Reading Standards for Informational Text K-5:
  - Key Ideas and Details: 4.1, 4.2, 4.3
  - Craft and Structure: 4.4, 4.5
  - Integration of Knowledge and Ideas: 4.7, 4.9
- Speaking and Listening Standards K-5:
  - Comprehension and Collaboration: 4.1, 4.2
  - Presentation of Knowledge and Ideas: 4.4

Assessments:

Formative:
Labs
Quizzes
Activities
Homework

Summative:
Benchmarks
Projects

Resources:

Textbook: Knowing Science: Fourth Grade

- Unit 3: Earth's Surface Processes
  - Lesson 3.1: Beneath our Feet
    - Sessions 1-5
  - Lesson 3.2: Fossils Tell a Story
    - Sessions 1-6
  - Lesson 3.3: What is Soil?
    - Sessions 1-2
  - Lesson 3.4: Weathering and Erosion
    - Sessions 1-8
  - Lesson 3.5: Patterns in Earth's Features
    - Sessions 1-4
  - Lesson 3.6: Volcanoes, Tsunamis and Earthquakes- Oh My!
    - Sessions 1-5

Other Resources:

- BrainPop Jr.
- Discovery Streaming
- Trade Books

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
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☒ Global Awareness	☒ Critical Thinking and Problem Solving
☒ Environmental Literacy	☒ Creativity and Innovation
☐ Health Literacy	☒ Collaboration, Teamwork, and Leadership
☐ Civic Literacy	☐ Cross-cultural and Interpersonal Communication
☐ Financial, Economic, Business, and Entrepreneurial Literacy	☐ Accountability, Productivity, and Ethics

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☒ 8.1.B Creativity and Innovation	☒ 8.2.B Technology and Society
☒ 8.1.C Communication and Collaboration	☐ 8.2.C Design

☐ 8.1.D Digital Citizenship ☐ 8.1.E Research and Information Fluency ☒ 8.1.F Critical Thinking, Problem Solving & Decision Making	☒ 8.2.D Abilities for a Technological World ☐ 8.2.E Computational Thinking: Programming

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Grade: 4	**Unit: Structure and Function**	**Time Frame: 6-7 weeks**

Essential Questions:

- What are a crayfish's physical structures?
- How do an animal's physical structures help it to survive?
- How do animals' senses help with survival?
- How does a plant meet its basic needs for survival?
- What is the function of plant roots?
- What is the function of plant stems?
- What is the function of flowers?
- How do plant structures work together?
- How do plants respond to changes in temperature?
- How do different types of plants respond to the seasons?
- How do animals respond to seasonal changes?

Unit Sequence:

1. Animal Classification
2. Physical Structures, Survival, and Crayfish
3. Plant Structures and Survival
4. Plant and Animal Seasonal Responses

Natural Phenomena:

- Carnations can change colors if they are dipped in colored water
- Whales migrate to breed
- Squirrels store food before the winter, so they have food to eat over winter
- Deciduous trees lose their leaves in the fall to prepare for the winter

Disciplinary Core Ideas

LS1.A: Structure and Function

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

LS1.D: Information Processing

- Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions.

ETS1.A: Defining and Delimiting Engineering Problems

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.

ETS1.B: Developing Possible Solutions

- Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to more improved designs.
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.

ETS1.C: Optimizing the Design Solution

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.

Scientific Practices

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Obtaining, Evaluating, and Communication Information

Crosscutting Concepts

Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
4-LS1-2: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
3-5-ETS1-1: Define a simple design problem reflecting a need or want that includes specified criteria for success and constraints on materials, time or cost.
3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of a problem.
3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Standards Correlations & Interdisciplinary Connections:

NJSL State Standards for English Language Arts

- Reading Standards for Informational Text K-5:
  - Key Ideas and Details: 4.1, 4.2
  - Craft and Structure: 4.4, 4.5
  - Integration of Knowledge and Ideas: 4.7, 4.8
- Writing Standards K-5:
  - Research to Build and Present Knowledge: 4.8

Assessments:

Formative:
Labs
Quizzes
Activities
Homework

Summative:
Benchmarks
Projects

Resources:

Textbook: Knowing Science: Fourth Grade

- Unit 2: Structure and Function
  - Lesson 2.1: Animal Classification
  - Lesson 2.2: Physical Structures, Survival, and Crayfish
  - Lesson 2.3: Plant Structures and Survival
  - Lesson 2.4: Plant and Animal Seasonal Responses

Other Resources:

- BrainPop Jr.
- Discovery Streaming
- Trade Books

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
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21st Century Themes	21st Century Skills
☒ Global Awareness ☐ Environmental Literacy ☐ Health Literacy ☐ Civic Literacy ☐ Financial, Economic, Business, and Entrepreneurial Literacy	☒ Critical Thinking and Problem Solving ☒ Creativity and Innovation ☒ Collaboration, Teamwork, and Leadership ☐ Cross-cultural and Interpersonal Communication ☐ Accountability, Productivity, and Ethics

8.1 Educational Technology Standards	8.2 Technology Education, Engineering, Design & Computational Thinking - Programming
☒ 8.1.A Technology Operations and Concepts ☒ 8.1.B Creativity and Innovation ☒ 8.1.C Communication and Collaboration ☐ 8.1.D Digital Citizenship ☒ 8.1.E Research and Information Fluency ☒ 8.1.F Critical Thinking, Problem Solving & Decision Making	☒ 8.2.A The Nature of Technology: Creativity and Innovation ☒ 8.2.B Technology and Society ☒ 8.2.C Design ☐ 8.2.D Abilities for a Technological World ☐ 8.2.E Computational Thinking: Programming

Career Ready Practices	
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Science
Grade 5

Pacing Guide

Structure, Properties, and Interactions of Matter 45 days	Space Systems: Stars and the Solar System 45 days
Marking Period 1	**Marking Period 2**
Earth Surface Processes 45 days	**Matter and Energy in Organisms and Ecosystems**
Marking Period 3	**45 days**

Unit 1 Structure, Properties, and Interactions of Matter

Unit 2 Space Systems: Stars and the Solar System

Unit 3 Earth Surface Processes

Unit 4 Matter and Energy in Organisms and Ecosystems

Integrated Accommodations

For Students with IEPs, 504s, and/or Students at Risk of Failure

Use of manipulatives and representations for simultaneous processing • Use visual and multi-sensory formats • Use of assistive technology • Use of graphic organizers and prompts • Modification of student products • Testing accommodations • Authentic assessments • Small group instruction • Adjusting the pace of lessons

Gifted & Talented Students

Inquiry-based instruction • Independent study • Higher-order thinking skills and questions • Interest-based content • Student-driven lessons • Real-world projects and scenarios

English Language Learners

Pre-teaching of vocabulary and concepts • Visual learning, including graphic organizers • Use of cognates to increase comprehension • Teacher modeling • Pairing students with beginning English language skills with students who have more advanced English language skills • Scaffolding: sentence frames, think-pair-share, cooperative learning groups, teacher read-alouds • Use of assistive technology

Grade: 5	**Unit:** Structure, Properties, and Interactions of Matter	**Time Frame:** 9-10 weeks

Essential Questions:

- What is weight, and how can we compare the weights of different objects?
- Is matter made up of small particles, even if we cannot see the particles with the naked eye?
- Which materials reflect light and which materials refract light?
- Which materials conduct heat better than others?
- Which materials can conduct electricity?
- Which materials do magnets attract?
- Do electric charges attract or repel?
- What are physical changes in matter?
- What are chemical changes in matter?

Unit Sequence:

1. Weighty Measures- A Review of Weight and Measurement
2. Matter is Made up of Small Particles
3. Properties of Matter
4. States of Matter- Nothing Gets Lost
5. Can Matter Change?

Natural Phenomena:

- I burned my hand on my cast iron pan
- I put gloves on in the winter to stay warm
- I rubbed my hands together while watching the football game on a cool fall day
- To make molded chocolate bars, the chocolate chips are melted and then cooled

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter

- Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and its effects of air on larger particles or objects.
- The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish.
- Measurements of a variety of properties can be used to identify materials.

PS1.B: Chemical Reactions

- When two or more different substances are mixed, a new substance with different properties may be formed.
- No matter what reaction or change in properties occurs, the total weight of the substances does not change.

Scientific Practices

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Crosscutting Concepts

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Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

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

Standards Correlations & Interdisciplinary Connections:

NJSL State Standards for English Language Arts

- Speaking and Listening Standards K-5:
  - Comprehension and Collaboration: 5.1.c, 5.1.d
- Writing Standards K-5:
  - Text Type and Purposes: 5.2.b
  -

Assessments: **Formative:** Labs Quizzes Activities Homework **Summative:** Benchmarks Projects	**Resources**: Textbook: Knowing Science: Fifth Grade ● Unit 1: Structure, Properties, and Interactions of Matter ○ Lesson 1.1: Weighty Measures- A Review of Weight and Measurement ○ Lesson 1.2: Matter is Made up of Small Particles ○ Lesson 1.3: Properties of Matter ○ Lesson 1.4: States of Matter-Nothing Gets Lost ▪ Extending Lesson Activity ○ Lesson 1.5: Can Matter Change? *Other Resources:* ● BrainPop Jr. ● Discovery Streaming ● Trade Books *Additional Activities:* ● Reflection/Refraction ● Properties of Matter Project ● Physical/Chemical Changes

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
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- Students will select from authentic literature at their independent and instructional reading levels.
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Grade: 5	**Unit:** Space Systems: Stars and the Solar System	**Time Frame:** 8 weeks

Essential Questions:

- What happens when you drop an object?
- Does the size of an object make a difference in how quickly it falls?
- How does air resistance affect falling objects?
- How does our Sun compare to other stars?
- Why do stars appear so different in the night sky?
- What predictable patterns result from Earth's rotation and revolution?
- How do shadow patterns give clues about Earth's rotation and revolution?
- How do moon phases indicate the passage of time?
- How do star patterns change with seasons?

Unit Sequence:

1. Which Way is Down?
2. Our Sun, the Star!
3. Predictable Patterns
4. How Far away are the Sun and Other Stars?

Natural Phenomena:

- Skydivers fall out of planes for fun
- During the fall, I got hit on the head with an acorn
- I can see the moon change shape over a period of time
- I can see constellations in the sky at different times during the year
- My shadow changes size during the day

Disciplinary Core Ideas

PS2.B: Types of Interactions

- The gravitational force on Earth acting on an object near Earth's surface pulls that object toward the planet's center.

ESS1.A: The Universe and its Stars

- The sun is a star that appears larger and brighter than other stars because if is closer. Stars range greatly in their distance from Earth.

ESS1.B: Earth and the Solar System

- The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth around an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year.

Scientific Practices

Asking Questions and Defining Problems
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communication Information

Crosscutting Concepts

Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

5-PS2-1: Support an argument that the gravitational force exerted by Earth on objects is directed down.
5-ESS1-1: Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth.
5-ESS1-2: Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

Standards Correlations & Interdisciplinary Connections:

NJSL State Standards for English Language Arts

- Reading Standards for Informational Text K-5::
  - Key Ideas and Details: 5.1, 5.2, 5.3
  - Craft and Structure: 5.4, 5.5
  - Integration of Knowledge and Ideas: 5.7, 5.9
- Speaking and Listening Standards K-5:

- Comprehension and Collaboration: 5.1, 5.2
- Writing Standards:
  - Research to Build and Present Knowledge: 5.7

Assessments:

Formative:
Labs
Quizzes
Activities
Homework

Summative:
Benchmarks
Projects

Resources:

Textbook: Knowing Science: Fifth Grade

- Unit 4: Space Systems: Stars and the Solar System
  - Lesson 4.1: Which Way is Down?
    - Sessions 1-4
  - Lesson 4.2: Our Sun, the Star!
    - Sessions 1-2
  - Lesson 4.3: Predictable Patterns
    - Sessions 1-4
  - Lesson 4.4: How Far Away Are the Sun and Other Stars?

Other Resources:

- BrainPop Jr.
- Discovery Streaming
- Trade Books

Additional Activities:

- Relative Distance of Space Objects
- Moon Phases Demonstration
- Constellations
- Earth, Moon, Sun Relationships
- Make your Own Sundial
- Myths associated with Constellations
- Historical tools to measure time

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
☒ Global Awareness	☒ Critical Thinking and Problem Solving
☐ Environmental Literacy	☒ Creativity and Innovation
☐ Health Literacy	☒ Collaboration, Teamwork, and Leadership
☐ Civic Literacy	☐ Cross-cultural and Interpersonal Communication
☐ Financial, Economic, Business, and Entrepreneurial Literacy	☐ Accountability, Productivity, and Ethics

8.1 Educational Technology Standards	8.2 Technology Education, Engineering, Design & Computational Thinking - Programming
☒ 8.1.A Technology Operations and Concepts	☒ 8.2.A The Nature of Technology: Creativity and Innovation
☒ 8.1.B Creativity and Innovation	☒ 8.2.B Technology and Society
☒ 8.1.C Communication and Collaboration	☐ 8.2.C Design
☐ 8.1.D Digital Citizenship	☐ 8.2.D Abilities for a Technological World
☒ 8.1.E Research and Information Fluency	☐ 8.2.E Computational Thinking: Programming
☒ 8.1.F Critical Thinking, Problem Solving & Decision Making	

Career Ready Practices	
☐ CRP1.	Act as a responsible and contributing citizen and employee
☒ CRP2.	Apply appropriate academics and technical skills
☐ CRP3.	Attend to personal health and financial well-being
☒ CRP4.	Communicate clearly and effectively with reason
☒ CRP5.	Consider the environmental, social and economic impacts of decisions
☐ CRP6.	Demonstrate creativity and innovation
☐ CRP7.	Employ valid and reliable research strategies
☒ CRP8.	Utilize critical thinking to make sense of problems and persevere in solving them
☐ CRP9.	Model integrity, ethical leadership, and effective management
☐ CRP10.	Plan education and career paths aligned to personal goals
☒ CRP11.	Use technology to enhance productivity
☐ CRP12.	Work productively in teams while using global cultural competence

Grade: 5	**Unit:** Earth Surface Processes	**Time Frame:** 8 weeks

Essential Questions:

- How does a system work?
- What is the difference between static and dynamic systems?
- How do Earth's systems interact?
- Why is the hydrosphere the most important system on Earth?
- How can we represent the distribution of water on Earth?
- Where does the hydrosphere interact with the Earth's other spheres?
- What is a model?
- What are Earth's material resources?
- What are Earth's energy resources?
- How do humans dispose of their waste?
- How do humans pollute Earth's systems?
- How can we protect our material and energy resources?

Unit Sequence:

1. Systems
2. Earth's Systems
3. The Hydrosphere
4. Kids as Curators
5. Human Impact on Earth's Systems

Natural Phenomena:

- The tropical coral reef biomes are located near the equator
- Sand is often found on beaches on the East Coast of the US
- The west coast of the US has more steep beaches, with rocky sand
- Renewable resources cut down on the usage of nonrenewable
- Both the Atlantic and the Pacific Oceans have garbage patches

Disciplinary Core Ideas

ESS2.A: Earth Materials and Systems

- Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.

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

- Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.

ESS3.C: Human Impacts on Earth Systems

- Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

Scientific Practices

Asking Questions and Defining Problems
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communication Information

Crosscutting Concepts

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Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

5-ESS2-1:: Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
5-ESS2-2: Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.
5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Standards Correlations & Interdisciplinary Connections:

NJSL State Standards for Mathematics:

- Numbers and Operations in Base Ten: 5.3

NJSL State Standards for English Language Arts

- Reading Standards for Informational Text K-5:
  - Key Ideas and Details: 5.1, 5.2, 5.3
  - Craft and Structure: 5.4, 5.5
  - Integration of Knowledge and Ideas: 5.7, 5.9
- Speaking and Listening Standards K-5:
  - Comprehension and Collaboration: 5.1, 5.2
- Writing:
  - Text Type and Purposes: 5.2
  - Production and Distribution of Writing: 5.4, 5.5, 5.6
  - Research to Build and Present Knowledge: 5.7, 5.8, 5.9
  - Range of Writing: 5.10

Assessments:

Formative:
Labs
Quizzes
Activities
Homework

Summative:
Benchmarks
Projects

Resources:

Textbook: Knowing Science: Fifth Grade

- Unit 3: Earth Surface Processes
  - Lesson 3.1: Systems
  - Lesson 3.2: Earth's Systems
  - Lesson 3.3: The Hydrosphere
  - Lesson 3.4: Kids as Curators
  - Lesson 3.5: Human Impact on Earth's Systems

Other Resources:

- BrainPop Jr.
- Discovery Streaming
- Trade Books
- Mystery Science
- Amplify Science

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
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Career Ready Practices	
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☒ CRP11.	Use technology to enhance productivity
☐ CRP12.	Work productively in teams while using global cultural competence

Grade: 5	**Unit:** Matter and Energy in Organisms and Ecosystems	**Time Frame:** 10-11 weeks

Essential Questions:

- What is interdependency?
- What is photosynthesis?
- What are the characteristics of a food web?
- How can I show relationships in a food web?
- What role do decomposers play in an ecosystem?
- How do limiting factors affect an ecosystem?
- What are an owl's adaptations for obtaining nutrients?
- How can I show an owl's place in a food web?
- How does a worm move about?
- How does a worm react to light?
- What are the benefits of composting?

Unit Sequence:

1. Food Webs and Energy
2. Owl Pellets
3. Wiggly Worms

Natural Phenomena:

- The fish were dying in the pond, but the plants were overpopulating
- An apple core was on the ground in the woods, and the next year it couldn't be found
- There are "balls of fur" on the ground in the woods
- After it rains, there are worms on the sidewalks

Disciplinary Core Ideas

PS3.D: Energy in Chemical Processes and Everyday Life

- The energy released from food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water)

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

- Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.
- Plants acquire their material for growth chiefly from air and water.

LS2.A: Interdependent Relationships in Ecosystems

- The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plant parts and animals) and therefore operate as "decomposers". Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types of each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.

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

- Matter cycles between the air and soil and among plants, animals, and microbes as these organisms' live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment.

Scientific Practices

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Crosscutting Concepts

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Cause and Effect
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Structure and Function
Stability and Change

Performance Expectations

5-PS3-1: Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.
5-LS1-1: Support an argument that plants get the materials they need for growth chiefly from air and water.
5-LS2-1: Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Standards Correlations & Interdisciplinary Connections:

NJSL State Standards for English Language Arts

- Reading Standards for Informational Text K-5:
  - Key Ideas and Details: 5..2, 5.3
  - Craft and Structure: 5.4, 5.5
  - Integration of Knowledge and Ideas: 5.7, 5.8, 5.9, 5.10
- Writing Standards K-5:
  - Text Types and Purposes: 5.2
  - Research to Build and Present Knowledge: 5.7, 5.8, 5.9

Assessments:

Formative:
Labs
Quizzes
Activities
Homework

Summative:
Benchmarks
Projects

Resources:

Textbook: Knowing Science: Fifth Grade

- Unit 2: Matter and Energy in Organisms and Ecosystems
  - Lesson 2.1: Food Webs and Energy
    - Sessions 1-9
  - Lesson 2.2: Owl Pellets
    - Sessions 1-4
  - Lesson 2.3: Wiggly Worms

Other Resources:

- BrainPop Jr.
- Discovery Streaming
- Trade Books
- Mystery Science
- Amplify Science

Additional Activities:

- Ecosystems Games
- Animal Relationships in an Ecosystem
- Composting Awareness

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
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21st Century Themes	21st Century Skills
☒ Global Awareness ☒ Environmental Literacy ☐ Health Literacy ☐ Civic Literacy ☐ Financial, Economic, Business, and Entrepreneurial Literacy	☒ Critical Thinking and Problem Solving ☐ Creativity and Innovation ☒ Collaboration, Teamwork, and Leadership ☐ Cross-cultural and Interpersonal Communication ☒ Accountability, Productivity, and Ethics

8.1 Educational Technology Standards	8.2 Technology Education, Engineering, Design & Computational Thinking - Programming
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☒ 8.1.F Critical Thinking, Problem Solving & Decision Making	

Career Ready Practices	
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☐ CRP3.	Attend to personal health and financial well-being
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☐ CRP9.	Model integrity, ethical leadership, and effective management
☐ CRP10.	Plan education and career paths aligned to personal goals
☒ CRP11.	Use technology to enhance productivity
☐ CRP12.	Work productively in teams while using global cultural competence

Science
Grade 6

Pacing Guide

Energy in Waves 60 days	**Forces and Interactions 30 days**
Marking Period 1	**Marking Period 2**
Astronomy 65 days	**Ecosystems 45 days**
Marking Period 3	**Marking Period 4**

Unit 1 Energy in Waves: Waves, Light, Sound, Heat

Unit 2 Forces and Interactions: Electricity and Magnetism

Unit 3 Astronomy: Earth, Moon, Sun, Stars, Celestial Bodies

Unit 4 Ecosystems: Biomes; Interactions within Ecosystems, Human Impact on the Environment

Integrated Accommodations

For Students with IEPs, 504s, and/or Students at Risk of Failure

Use of manipulatives and representations for simultaneous processing • Use visual and multi-sensory formats • Use of assistive technology • Use of graphic organizers and prompts • Modification of student products • Testing accommodations • Authentic assessments • Small group instruction • Adjusting the pace of lessons

Gifted & Talented Students

Inquiry-based instruction • Independent study • Higher-order thinking skills and questions • Interest-based content • Student-driven lessons • Real-world projects and scenarios

English Language Learners

Pre-teaching of vocabulary and concepts • Visual learning, including graphic organizers • Use of cognates to increase comprehension • Teacher modeling • Pairing students with beginning English language skills with students who have more advanced English language skills • Scaffolding: sentence frames, think-pair-share, cooperative learning groups, teacher read-alouds • Use of assistive technology

Grade: 6th Grade	**Unit:** Energy in Waves	**Time Frame:** Marking Period 1

Essential Questions:

- What are waves?
- How can we describe a wave?
- What is sound?
- How do sound waves travel and interact?
- What is the relationship between various EM waves?
- How does light interact with matter?
- How do mirrors work?
- What is energy?
- How is temperature related to kinetic energy?
- What is the relationship between heat and temperature?
- How can energy be transferred from one material to another?
- What constitutes useful scientific evidence?

Unit Sequence:

1. Wave Properties
2. Wave Interactions
3. Sound
4. Electromagnetic Waves
5. Light
6. Thermal Energy

Natural Phenomena:

- Sound of a locker slamming (in nearby hallway vs. far away)
- Depending on where you sit in a classroom you can hear and see the board better or worse.
- Lightning & thunder (see before you hear)
- Sunshine warms me, especially when wearing black.
- Ocean Waves and surfing
- My expensive noise cancelling headphones work better than the ones from the dollar store.
- Waves have different wavelengths.
- Waves and tides- at the beach, the water approaches me on the sand, and then moves away.
- When a cat rubs against my leg while purring, I can hear it and feel it.
- Sometimes there is a double rainbow.
- The waves on the beach change.
- Two different radios play the same station in different rooms – there is a discernible lag.
- In my house, the basement is cool and the attic is hot.
- Turf fields are hotter in the summer than grass fields.
- Floating on a surfboard, past the breakers, the waves move into the shore but the surfboard just moves up and down.
- “SPF” stops skin from burning when in the sun.
- My car is much hotter if I Park it in the sun than in the shade. Dark seats and closed windows make this worse.
- Road smooth or rough and noise made while driving
- Sun tanning and use of sunscreen
- The pool water feels cold when I first jump in, but after a while it feels warmer than the air temp.

Disciplinary Core Ideas

PS4.A Wave Properties

- A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude.
- Sound wave needs a medium through which it is transmitted.

PS4.B Electromagnetic Radiation

- 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 light travels can be traced as straight lines, except at surfaces between different transparent materials where the light path bends.
- A wave models 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.

PS4.C Information Technologies and Instrumentation

- Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information.

PS3.A Definitions of Energy

- The term "heat" as used in everyday language refers both to thermal energy and the transfer of that thermal energy from one object to another. In science, heat is used only for this second meaning; it refers to the energy transferred due to the temperature difference between two objects.

PS3.B Conservation of Energy and Energy Transfer

- Energy is transferred out of hotter regions or objects and into colder ones. .

ETS1.A Defining and Delimiting an Engineering Problem

- Successful design solutions have precise task criteria and constraints that take into consideration scientific principles and knowledge.

ETS1.B Developing Possible Solutions

- A solution needs to be tested and modified in order to improve it based on criteria and constraints.
- Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors.
- Models of all kinds are important for testing solutions.

Scientific Practices

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Obtaining, Evaluating, and Communication Information

Crosscutting Concepts

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Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

MS-PS1-4 Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
MS-PS4-1 Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy of in a wave.
MS-PS4-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
MS-PS4-3 Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.
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-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.

Standards Correlations & Interdisciplinary Connections:

NJSL Companion Standards for English Language Arts

Key Ideas and Details

RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Craft and Structure

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.

RST.6-8.5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.

RST.6-8.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

Integration of Knowledge and Ideas

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

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

RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Assessments:

Formative:
Labs
Quizzes
Projects
Presentations
Homework

Summative:
Unit test
Benchmarks
Projects
Presentations

Resources:

Textbook: Module L Waves and Their Applications

- Unit 1 - Waves
  - Lesson 1 - Introduction to Waves
  - Lesson 2 - Behavior of Mechanical Waves
  - Lesson 3 - Light Waves
  - Lesson 4 - Behavior of Light Waves
- Unit 2 - Information Transfer
  - Lesson 1 - Communication and Waves
  - Lesson 3 - Communication Technology

Textbook - Energy & Energy Transfer - Module I

- Unit 2 - Energy Transfer
  - Lesson 1 - Changes in Energy
  - Lesson 2 - Temperature and Heat
  - Lesson 3 - Thermal Energy Transfer in Systems

Sample Activities:

- Engineer a container to keep an ice cube cold the longest
- Light Shows & Reflections Lab
- Electroscope Illustration-Conduction, Friction & Induction
- Burner Lab -Heat Transfer

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
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- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

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☒ Environmental Literacy	☒ Creativity and Innovation
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☐ Financial, Economic, Business, and Entrepreneurial Literacy	☐ Accountability, Productivity, and Ethics

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Career Ready Practices	
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Grade: 6th Grade	**Unit:** Forces & Interactions	**Time Frame:** Marking Period 2

Essential Questions

- What makes something electrically charged?
- What flows through an electric wire?
- How do electric circuits work?
- What is magnetism?

Unit Sequence:

1. Electricity
2. Electrical Energy
3. Magnetism

Natural Phenomena:

- Maglev Trains
- Balloons make my hair stand up and stick to clothing.
- Using a switch to turn on and off lights
- Static cling- my socks stick to my fleece when they come out of the dryer
- All the doors in the house have to be shut in order for our alarm to be turned on
- When one light bulb goes out in a school building, all the light bulbs don't all go out.

Disciplinary Core Ideas

PS2.B: Types of Interactions

- Electric and magnetic (electromagnetic) forces can be attractive or repulsive, and their sizes depend on the magnitudes of the charges, currents, or magnetic strengths involved and on the distances between the interacting objects.
- Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of objects have large- e.g. Earth and the sun.
- Forces that act at a distance (electric, magnetic, and gravitational) can be explained by fields that extend through space and can be mapped by their effect on a test object (a charged, object, or a ball respectively).

Scientific Practices	Crosscutting Concepts
Asking Questions and Defining Problems Developing and Using Models Planning and Carrying Out Investigations Analyzing and Interpreting Data Using Mathematics and Computational Thinking Constructing Explanations and Designing Solutions Engaging in Argument from Evidence Obtaining, Evaluating, and Communication Information	Patterns Cause and Effect Scale, Proportion, Quantity Systems and System Models Energy and Matter: Flows, Cycles, and Conservation Structure and Function Stability and Change

Performance Expectations:

MS-PS2-3 Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.
MS-PS2-4 Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.
MS-PS2-5 Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.
MS-PS1-1: Develop models to describe the atomic composition of simple molecules and extended structures.
MS-PS1-3: Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
MS - PS1 -4: Develop a model that predicts and describes changes in particle motion, temperature, and a state of a pure substance when thermal energy is added or removed.
MS-PS1 -2: Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
MS-PS1-5: Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

Standards Correlations & Interdisciplinary Connections:

NJSL Companion Standards for English Language Arts

Key Ideas and Details

RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Craft and Structure

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.

RST.6-8.5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.

RST.6-8.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

Integration of Knowledge and Ideas

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

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

RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Assessments:	**Resources**:
Formative: Labs	Textbook: Forces, Motion and Fields - Module K ● Unit 2 - Electric and Magnetic Forces

Quizzes Projects Presentations Homework **Summative:** Unit test Benchmarks Projects Presentations	○ Lesson 1 - Magnetic Forces ○ Lesson 2 - Electric Forces ○ Lesson 3 - Fields ○ Lesson 4 - Electromagnetism *Sample Activities:* ● Magnet investigations (iron filings to illustrate magnetic fields) ● Circuit Lab ● Gravity wells

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
☒ Global Awareness	☒ Critical Thinking and Problem Solving
☒ Environmental Literacy	☒ Creativity and Innovation
☐ Health Literacy	☒ Collaboration, Teamwork, and Leadership
☐ Civic Literacy	☒ Cross-cultural and Interpersonal Communication
☐ Financial, Economic, Business, and Entrepreneurial Literacy	☐ Accountability, Productivity, and Ethics

8.1 Educational Technology Standards	8.2 Technology Education, Engineering, Design & Computational Thinking - Programming
☒ 8.1.A Technology Operations and Concepts	☒ 8.2.A The Nature of Technology: Creativity and Innovation
☐ 8.1.B Creativity and Innovation	☒ 8.2.B Technology and Society
☒ 8.1.C Communication and Collaboration	☐ 8.2.C Design
☐ 8.1.D Digital Citizenship	☒ 8.2.D Abilities for a Technological World
☒ 8.1.E Research and Information Fluency	☐ 8.2.E Computational Thinking: Programming
☒ 8.1.F Critical Thinking, Problem Solving & Decision Making	

Career Ready Practices

☒ CRP1.	Act as a responsible and contributing citizen and employee
☒ CRP2.	Apply appropriate academics and technical skills
☐ CRP3.	Attend to personal health and financial well-being
☒ CRP4.	Communicate clearly and effectively with reason
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☐ CRP6.	Demonstrate creativity and innovation
☒ CRP7.	Employ valid and reliable research strategies
☒ CRP8.	Utilize critical thinking to make sense of problems and persevere in solving them
☐ CRP9.	Model integrity, ethical leadership, and effective management
☐ CRP10.	Plan education and career paths aligned to personal goals
☒ CRP11.	Use technology to enhance productivity
☐ CRP12.	Work productively in teams while using global cultural competence

Grade: 6th Grade	**Unit:** Astronomy	**Time Frame:** Marking Period 3

Essential Questions

- What makes up the universe?
- What are some properties of stars?
- How do stars change over time?
- How have people modeled the solar system?
- Why is gravity important in the solar system?
- What are the properties of the sun?
- What is the known about the terrestrial planets?
- What is known about the gas giant planets?
- What is found in the solar system besides the sun, planets, and moons?
- How are Earth's days, years, and seasons related to the way Earth moves in space?
- How do Earth, the moon, and the sun affect each other?
- What causes tides?

Unit Sequence:

1. Model of the universe
2. Structure of universe
3. Stars (include sun)
4. Formation of the solar system
5. Solar system (planets, moons, dwarf planets, asteroids, comets)
6. Earth-moon-sun system (seasons, eclipses, tides)

Natural Phenomena:

- Star patterns
- Longer daylight hours
- Sunrise/sunset
- Shooting stars
- Sun's angle for a solar collector
- The moon changed shape
- Twinkling stars
- Moon seen during the day
- Solar/lunar eclipse
- Early at night fewer stars are seen, but several hours later, more appear

Disciplinary Core Ideas

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.
- Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe.

ESS1.B Earth and the Solar System

- The solar systems 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.
- The model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over 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.
- The solar system appears to have formed from a disk of dust and gas, drawn together by gravity.

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

- Global movements of water and its changes in form are propelled by sunlight and gravity.

PS4.B: Electromagnetic Radiation

- 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 transparent materials (e.g. air and water, air and glass) where the light path bends.
- However, because light can travel through space, it cannot be a matter wave, like sound or water waves.

PS2.B: Types of Interactions

- Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass- e.g. Earth, and the Sun.
- Forces that act at a distance (electric, magnetic, and gravitational) can be explained by fields that extend through space and can be mapped by their effect on a test object (a charged, or a ball, respectively).

Scientific Practices	Crosscutting Concepts
Asking Questions and Defining Problems Developing and Using Models Planning and Carrying Out Investigations Analyzing and Interpreting Data Using Mathematics and Computational Thinking Constructing Explanations and Designing Solutions Engaging in Argument from Evidence Obtaining, Evaluating, and Communication Information	Patterns Cause and Effect Scale, Proportion, Quantity Systems and System Models Energy and Matter: Flows, Cycles, and Conservation Structure and Function Stability and Change

Performance Expectations

MS-ESS1-1 Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases.
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.
MS-PS4-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.
MS-PS2-4 Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.
MS-PS2-5 Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.
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.

Standards Correlations & Interdisciplinary Connections:

NJSL Companion Standards for English Language Arts

Key Ideas and Details

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Craft and Structure

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RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Assessments:	**Resources**:
Formative: Labs Quizzes	Textbook: Space Science - Module H ● Unit 1 - Patterns in the Solar System ○ Lesson 1 - The Earth-Moon-Sun System

Projects Presentations Homework **Summative:** Unit test Benchmarks Projects Presentations	○ Lesson 2 - Seasons ● Unit 2 - The Solar System and the Universe ○ Lesson 1 - Formation of the Solar System ○ Lesson 2 - Earth and the Solar System ○ Lesson 3 - Earth's Place in the Universe ○ Lesson 4 - Gravity in the Universe *Sample Activities:* ● Jupiter's Moons Activity ● Modeling Moon Phases ● Earth Moon Sun System (Scale & Modeling Eclipses) ● Modeling the Scale of the Solar System (Planet Size & Distance)

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
☒ Global Awareness	☒ Critical Thinking and Problem Solving
☒ Environmental Literacy	☒ Creativity and Innovation
☐ Health Literacy	☒ Collaboration, Teamwork, and Leadership
☐ Civic Literacy	☒ Cross-cultural and Interpersonal Communication
☐ Financial, Economic, Business, and Entrepreneurial Literacy	☐ Accountability, Productivity, and Ethics

8.1 Educational Technology Standards	8.2 Technology Education, Engineering, Design & Computational Thinking - Programming
☐ 8.1.A Technology Operations and Concepts	☒ 8.2.A The Nature of Technology: Creativity and Innovation
☒ 8.1.B Creativity and Innovation	☒ 8.2.B Technology and Society
☒ 8.1.C Communication and Collaboration	☐ 8.2.C Design
☐ 8.1.D Digital Citizenship	☒ 8.2.D Abilities for a Technological World
☐ 8.1.E Research and Information Fluency	☐ 8.2.E Computational Thinking: Programming
☒ 8.1.F Critical Thinking, Problem Solving & Decision Making	

Career Ready Practices	
☒ CRP1.	Act as a responsible and contributing citizen and employee
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☐ CRP12.	Work productively in teams while using global cultural competence

Grade: 6th Grade	**Unit:** Interactions Within Ecosystems	**Time Frame**: Marking Period 4

Essential Questions

- How are different parts of the environment connected?
- How does energy flow through an ecosystem?
- What determines a population's size?
- How do organisms interact?
- How do humans impact Earth's ecosystems?
- How can Earth's resources be used wisely?

Unit Sequence

- Biomes
- Interactions of Living Things
- Human Impact on the Environment

Natural Phenomena:

- I went for a walk at 630am and a black bear passed my path
- Plants are different on East and West Coasts
- Venus Fly trap
- Deep sea fish look freaky (sharp teeth, bioluminescent, strange body shape)
- The tree frog is endangered to NJ (human interactions)
- Where do humans fit into the environment?
- How do parts of the environment interact with each other?
- What happens if an organism is removed from a food web?
- What is the effect of introducing a new species to an area that it is not native to?

Disciplinary Core Ideas

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.
- 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.
- Growth of organisms and population increases are limited by access to resources.
- Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations 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.

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.

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.
- 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.

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 examples.

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.

ESS3.C. Human Impacts on Earth Systems

- Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative & positive) for different living things.
- Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.

Scientific Practices	Crosscutting Concepts
Asking Questions and Defining Problems Developing and Using Models Planning and Carrying Out Investigations Analyzing and Interpreting Data Using Mathematics and Computational Thinking Constructing Explanations and Designing Solutions Engaging in Argument from Evidence Obtaining, Evaluating, and Communication Information	Patterns Cause and Effect Scale, Proportion, Quantity Systems and System Models Energy and Matter: Flows, Cycles, and Conservation Structure and Function Stability and Change

Performance Expectations

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.
MS-ESS3-2 Analyze and interpret data on natural hazards to to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Standards Correlations & Interdisciplinary Connections:

NJSL Companion Standards for English Language Arts

Key Ideas and Details

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RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Assessments:	**Resources**:
Formative: Labs Quizzes	Textbook - Ecology and the Environment - Module C ● Unit 2 -Relationships in Ecosystems ○ Lesson 1- Parts of an Ecosystem

Projects Presentations Homework **Summative:** Unit test Benchmarks Projects Presentations	○ Lesson 2- Resource Availability in Ecosystems ○ Lesson 3- Patterns of Interaction ● Unit 3 - Ecosystem Dynamics ○ Lesson 1 - Biodiversity in Ecosystems ○ Lesson 2 - Changes in Ecosystems ○ Lesson 3 - Maintaining Biodiversity *Sample Activities:* ● Project Learning Tree Carbon Cycle ● Project Learning Tree ● Project Wet ● Project Wild ● Project Wild Aquatic ● Succession Comic Strip ● Forest Layers Booklet

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
☒ Global Awareness ☒ Environmental Literacy ☐ Health Literacy ☐ Civic Literacy ☐ Financial, Economic, Business, and Entrepreneurial Literacy	☒ Critical Thinking and Problem Solving ☐ Creativity and Innovation ☒ Collaboration, Teamwork, and Leadership ☒ Cross-cultural and Interpersonal Communication ☐ Accountability, Productivity, and Ethics

8.1 Educational Technology Standards	8.2 Technology Education, Engineering, Design & Computational Thinking - Programming
☒ 8.1.A Technology Operations and Concepts ☐ 8.1.B Creativity and Innovation ☒ 8.1.C Communication and Collaboration ☐ 8.1.D Digital Citizenship ☒ 8.1.E Research and Information Fluency ☐ 8.1.F Critical Thinking, Problem Solving & Decision Making	☐ 8.2.A The Nature of Technology: Creativity and Innovation ☐ 8.2.B Technology and Society ☒ 8.2.C Design ☐ 8.2.D Abilities for a Technological World ☐ 8.2.E Computational Thinking: Programming

Career Ready Practices	
☐ CRP1.	Act as a responsible and contributing citizen and employee
☒ CRP2.	Apply appropriate academics and technical skills
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Science
Grade 7

Pacing Guide

Energy, Forces, & Interactions 45 days	**History of Earth 45 days**
Marking Period 1	**Marking Period 2**
History of Earth 20 days	**Weather & Climate 65 days**
Marking Period 3	**Marking Period 4**

Unit 1	Energy, Forces, & Interactions: Motion, Speed, Velocity, Acceleration, Gravity, Friction, Kinetic Energy, Potential Energy
Unit 2	History of Earth: Weathering, Erosion, Deposition, Rock Cycle, Earth's Plates, Earth's Changing Surfaces, Earth History, Natural Hazards, Natural Resources, Human Population & Impacts
Unit 3	Weather & Climate: Earth's Atmosphere, Earth's Oceans, Water Cycle, Influences on Weather, Weather Prediction, Influences on Climate, Natural Hazards

Integrated Accommodations

For Students with IEPs, 504s, and/or Students at Risk of Failure

Use of manipulatives and representations for simultaneous processing • Use visual and multi-sensory formats • Use of assistive technology • Use of graphic organizers and prompts • Modification of student products • Testing accommodations • Authentic assessments • Small group instruction • Adjusting the pace of lessons

Gifted & Talented Students

Inquiry-based instruction • Independent study • Higher-order thinking skills and questions • Interest-based content • Student-driven lessons • Real-world projects and scenarios

English Language Learners

Pre-teaching of vocabulary and concepts • Visual learning, including graphic organizers • Use of cognates to increase comprehension • Teacher modeling • Pairing students with beginning English language skills with students who have more advanced English language skills • Scaffolding: sentence frames, think-pair-share, cooperative learning groups, teacher read-alouds • Use of assistive technology

Grade: 7th Grade	**Unit:** Energy, Forces, and Interactions	**Time Frame:** Marking Period 1

Essential Questions

- How are distance, time and speed related?
- How does motion change?
- How do forces affect motion?
- How do objects move under the influence of gravity?
- What happens when fluids exert pressure?
- How is work related to energy?
- What are kinetic and potential energy?
- How do simple machines work?

Unit Sequence

1. Motion
2. Speed
3. Acceleration
4. Forces
5. Gravity
6. Newton's Laws
7. Kinetic Energy
8. Potential Energy
9. Friction

Natural Phenomena:

- My cell phone fell out of pocket on a roller coaster.
- The faster the speed – the harder the impact force.
- The brakes on my bike are hot.
- My skateboard hits a rock and stops suddenly, I fall forward.
- When I slam my brakes, my body moves forward even when wearing a seatbelt.
- My twin nieces collide, after that, they fall backwards, in opposite directions.
- When you blow into a full juice box and release, juice comes out.

Disciplinary Core Ideas

PS2.A: Forces and Motion

- For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction. (Newton's third law)
- The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the object, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion.
- All positions of objects and the directions of forces and motions must be described in an arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared.

PS2.B Types of Interactions

- Gravitational forces are always attractive. There is a gravitational force between any two masses, but it is very small except when one or both of the objects have large mass-e.g. Earth and the sun.
- Forces that act at a distance (electric, magnetic, and gravitational) can be explained by fields that extend through space and can be mapped by their effect on a test object (a charged object, or a ball, respectively).

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.
- A system of objects may also contain stored (potential) energy, depending on their relative positions.
- 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.

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.
- 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.

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.

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 the characteristics may be incorporated into the new design.
- 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.

Scientific Practices	Crosscutting Concepts
Asking Questions and Defining Problems Developing and Using Models Planning and Carrying Out Investigations Analyzing and Interpreting Data Using Mathematics and Computational Thinking Constructing Explanations and Designing Solutions Engaging in Argument from Evidence Obtaining, Evaluating, and Communication Information	Patterns Cause and Effect Scale, Proportion, Quantity Systems and System Models Energy and Matter: Flows, Cycles, and Conservation Structure and Function Stability and Change

Performance Expectations

MS-ETS1-3 Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics that can be combined into a new solution to better meet the criteria for success.
MS-ETS1-4 Develop a mode to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
MS-PS2-1 Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.
MP-PS2 - 2 Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
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 - 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.

Standards Correlations & Interdisciplinary Connections:

NJSL Companion Standards for English Language Arts

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Craft and Structure

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RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Assessments:	**Resources**:
Formative: Labs Quizzes Projects Presentations Homework **Summative:** Unit test Benchmarks Projects Presentations	Textbook Module I: Energy & Energy Transfer ● Unit 1 - Energy ○ Lesson 1 - Introduction to Energy ○ Lesson 2 - Kinetic and Potential Energy ○ Lesson 3 -Transforming Potential Energy (optional) Textbook Module K: Forces, Motion and Fields ● Unit 1 - Forces and Motion ○ Lesson 1: Introduction to Forces ○ Lesson 2: Gravity and Friction ○ Lesson 3: Newton's Laws of Motion ○ Lesson 4: Collisions between Objects (optional) ***Sample Activities:*** ● Air Trolley ● Car Races ● PHET site - skate park, roller coaster ● Disney Roller Coaster(optional) ● Student created Newton's Laws of Motions videos (optional)

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
☒ Global Awareness ☒ Environmental Literacy ☐ Health Literacy ☐ Civic Literacy ☐ Financial, Economic, Business, and Entrepreneurial Literacy	☒ Critical Thinking and Problem Solving ☐ Creativity and Innovation ☒ Collaboration, Teamwork, and Leadership ☒ Cross-cultural and Interpersonal Communication ☐ Accountability, Productivity, and Ethics

8.1 Educational Technology Standards	8.2 Technology Education, Engineering, Design & Computational Thinking - Programming
☒ 8.1.A Technology Operations and Concepts ☐ 8.1.B Creativity and Innovation ☒ 8.1.C Communication and Collaboration ☐ 8.1.D Digital Citizenship ☐ 8.1.E Research and Information Fluency ☒ 8.1.F Critical Thinking, Problem Solving & Decision Making	☒ 8.2.A The Nature of Technology: Creativity and Innovation ☐ 8.2.B Technology and Society ☐ 8.2.C Design ☒ 8.2.D Abilities for a Technological World ☐ 8.2.E Computational Thinking: Programming

Career Ready Practices	
☒ CRP1.	Act as a responsible and contributing citizen and employee
☒ CRP2.	Apply appropriate academics and technical skills
☐ CRP3.	Attend to personal health and financial well-being
☒ CRP4.	Communicate clearly and effectively with reason
☒ CRP5.	Consider the environmental, social and economic impacts of decisions
☐ CRP6.	Demonstrate creativity and innovation
☐ CRP7.	Employ valid and reliable research strategies
☐ CRP8.	Utilize critical thinking to make sense of problems and persevere in solving them
☐ CRP9.	Model integrity, ethical leadership, and effective management
☒ CRP10.	Plan education and career paths aligned to personal goals
☒ CRP11.	Use technology to enhance productivity
☐ CRP12.	Work productively in teams while using global cultural competence

Grade: 7th Grade	**Unit:** History of Earth	**Time Frame**: Marking Period 2

Essential Questions

- How do wind, ice, and gravity change Earth's surface?
- How does water change Earth's surface?
- How does weathering change Earth's surface?
- How do matter and energy move through Earth's spheres?
- What are Earth's layers?
- What is plate tectonics?
- How do mountains form?
- How do volcanoes change Earth's surface?
- Why do earthquakes happen?
- How are seismic waves use to study earthquakes?
- How do we learn about Earth's History?
- How are the relative ages of rock measured?
- How is the absolute age of rock measured?
- What is the geologic time scale?
- What are minerals, how do they form, and how can they be identified?
- What is the rock cycle?
- How do rocks form?

Unit Sequence

1. Weathering, Erosion, Deposition
2. Rock Cycle
3. Plate tectonics
4. Earth's Changing Surface
5. Geologic Time Scale
6. Age of Earth's Rocks
    a. Dating: Relative and Absolute
2. Earth's History
3. Natural Hazards and Predictions

Natural Phenomena:

- There are more earthquakes, volcanoes, tsunamis on the west coast than the east coast of the US.
- There are no active volcanoes in NJ.
- There is lightning in a volcanic ash cloud.
- Window blinds (and windows) shake during an earthquake.
- Waves on the beach are big after an earthquake.
- There was a small earthquake in NJ.
- The Pacific Ring of Fire
- There are tiny rocks and big rocks on the beach.
- Some rocks look different on the inside when they are split open.
- Rocks come in different color.
- Some rocks are pretty, some rocks are ugly.
- Legend says this huge boulder was brought to the middle of the forests of Finland by giants. In reality, Kummakivi, which means "Strange Rock," was carried by a glacier before being left precariously on top of another rock during the last Ice Age, scientists believe.
- The orange domes of the Bungle Range pop out of the middle of the flat northwestern Australian landscape. Completely isolated, this bumpy mountains were relatively unknown until the 1980s.

Disciplinary Core Ideas

ESS1.C: The History of Planet Earth

- The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale.
- Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches.

ESS2.A Earth's Materials and Systems

- The planet's systems interact over scales that range from microscopic to global in size and operate over fractions of a second to billions of years which shape Earth's history and future.
- All earth processes are the result of energy flowing and matter cycling within and among the planet's systems. Energy is from the sun and earth's interior. This energy chemical and physical changes in Earth's materials and living organisms.

ESS2.B Plate Tectonics and Large Scale System Interactions

- Maps of ancient land and water patterns as seen in rocks and fossils show how Earth's plates have moved great distances, collided, and spread apart.

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

- Waters movements above and below the ground cause weathering and erosion which change the earth's surface and underground.

ESS3.A Natural Resources

- Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes.

ESS3.B Natural Hazards

- Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events.

ESS3.C Human Impacts on Earth Systems

- Typically as human populations and per-capita consumption of natural resources increase so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.
- Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of species. But changes to Earth's environment can have different impacts for different living things.

Scientific Practices

Asking Questions and Defining Problems
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communication Information

Crosscutting Concepts

Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

MS-ESS1-4. Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6 billion-year-old history.
MS-ESS2-3. Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.

Standards Correlations & Interdisciplinary Connections:

NJSL Companion Standards for English Language Arts

Key Ideas and Details

RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Craft and Structure

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.

RST.6-8.5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.

RST.6-8.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

Integration of Knowledge and Ideas

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

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

RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Assessments:

Formative:
Labs
Quizzes
Projects
Presentations
Homework

Summative:
Unit test
Benchmarks
Projects
Presentations

Resources:

Textbook: Module F Geologic Processes and History

- Unit 1 - The Dynamic Earth
  - Lesson 1: Weathering, Erosion, and Deposition
  - Lesson 2: The Rock Cycle
  - Lesson 3: Earth's Plates
  - Lesson 4: Earth's Changing Surface
- Unit 2 - Earth through Time
  - Lesson 1 - The Age of Earth's Rocks
  - Lesson 2 - Earth's History

Textbook: Module G Earth and Human Activity

- Unit 1: Earth's Natural Hazards
  - Lesson 1: Natural Hazards
  - Lesson 2: Natural Hazard Predictions
- Unit 2: Resources in Earth Systems
  - Lesson 1: Natural Resources
  - Lesson 2: The Distribution of Natural Resources
- Unit 3 - Using Resources
  - Lesson 1: Human Population and Resources Use
  - Lesson 2 Resource Use and Earth's Systems
- Unit 4 - Human Impacts on Earth's Systems
  - Lesson 1: Human Impacts on the Environment

***Sample Activities*:**

- Create a timeline - personal and geologic
- Identify rocks
- Rock Cycle - using crayons
- US Population Clock: http://www.census.gov/popclock/
- Oh, Deer!
- Capturing the Wild Bean
- Population Survey and J-Curve graph
- www.NOAA.gov
- Project Learning Tree (PLT)
- Project Wet
- Project Wild
- Project Wild Aquatic
- http://www.need.org/
- http://www.eia.gov/kids/
- http://energy.gov/science-innovation/energy-sources
- https://www.tvakids.com/
- http://www.nrc.gov/reading-rm/basic-ref/students.html
- https://www.tvakids.com/electricity/hydro.htm
- https://www.tvakids.com/electricity/fossil.htm

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
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21st Century Themes	21st Century Skills
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Grade: 7th Grade	**Unit**: Weather and Climate	**Time Frame**: Marking Period 3 & 4
Essential Questions ● What makes water so important? ● How does water change state and move around on Earth? ● How does fresh water flow on Earth? ● How does an ocean wave form and move? ● How does water move in the ocean? ● What is the atmosphere? ● How does energy move through Earth's system? ● What is wind? ● What is weather and how can we describe different types of weather conditions? ● How do clouds form, and how are clouds classified? ● How do the water cycles and other global patterns affect local weather? ● How can humans protect themselves from hazardous weather? ● What tools do we use to predict weather? ● How is climate affected by energy from the sun and variations on Earth's surface? ● What are the causes and effects of climate change? ● What is energy? ● How is energy used in our daily lives?		**Unit Sequence** 1. Water Cycle 2. Surface Water and Groundwater 3. Ocean Waves 4. Tsunamis 5. Ocean Currents 6. Atmosphere - Layers 7. Transfer of Energy in the Atmosphere 8. Wind in the Atmosphere 9. Weather 10. Clouds 11. Influences of Weather - pressure, water cycle, 12. Reading a weather map 13. Severe weather - tornado, hurricane 14. Climate Change

- How do differences in obtaining, transforming, and distributing energy from various sources impact the environment?
- Can the world run out of energy?
- How are nonrenewable and renewable energy sources similar and different in terms of cost and effectiveness?
- Where are the best locations for new alternative energy sources?

Natural Phenomena:

- Tornadoes mostly happen in the mid-west.
- The beach erosion is greater in the winter.
- There is a drought this spring.
- The ocean is colder at a California beach than the Jersey shore.
- Thunderstorms happen more when it is hot and humid outside.
- Storms come in fast and violent and others are a long period of rain.
- Different hair responds differently to humidity.
- The grass is wet some morning, and it didn't rain.
- We get hail in the summer months.
- When it rains the temperature drops.
- Thunder with no clouds in the sky.
- It can rain when the sun is shining.
- Lower levels of a lake are colder.
- Dark puffy clouds appear and then it rained.
- Some days with the same temperatures seem hotter.
- Geysers produce heat energy.
- Some areas around the world alternative fuels for public transport.
- A home gets warm on the sunny side of the house.
- Sitting in a sunny area makes you feel warm.
- Some calculators, watches, and backpacks are powered by the sun.
- Iceland uses hydrogen fuel cell technology for public transportation.
- My mom yells at me when I leave the lights on when I leave a room.
- Some people have natural gas stoves while others use electric
- We visited the Hoover dam on vacation.
- Wind farms are planned off of the NJ shore.

Disciplinary Core Ideas

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.
- Global movements of water and its changes in form are propelled by sunlight and gravity.
- 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.
- Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents.
- Water's movements-both on the land and underground-cause weathering and erosion, which change the land's surface features and create underground formations.

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.
- Because these patterns are so complex, weather can only be predicted probabilistically.
- 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.

ESS3.A Natural Resources

- Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes.

ESS3.B Natural Hazards

- Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events.

ESS3.C Human Impacts on Earth Systems

- Typically as human populations and per-capita consumption of natural resources increase so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.
- Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of species. But changes to Earth's environment can have different impacts for different living things.

ESS3.D Global Climate Change

- Human activities, such as the release of greenhouse gases from burning fossil fuels are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding on human behavior and on applying that knowledge wisely in decisions and activities.

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.

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 the criteria and constraints of a problem.
- Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors.
- Models of all kinds are important for testing solutions.

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.
- 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.

Scientific Practices	Crosscutting Concepts
Asking Questions and Defining Problems	Patterns
Developing and Using Models	Cause and Effect
Planning and Carrying Out Investigations	Scale, Proportion, Quantity
Analyzing and Interpreting Data	Systems and System Models
Using Mathematics and Computational Thinking	Energy and Matter: Flows, Cycles, and Conservation
Constructing Explanations and Designing Solutions	Structure and Function
Engaging in Argument from Evidence	Stability and Change
Obtaining, Evaluating, and Communication Information	

Performance Expectations

MS-ESS2-1 Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
MS-ESS2-2: Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
MS-ESS2-3 Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.
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 results 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.
MS-ESS3-1 Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.
MS-ESS3-2 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
MS-ESS3-2: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

MS-ESS3-4: Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
MS-ESS3-5: Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
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.

Standards Correlations & Interdisciplinary Connections:

NJSL Companion Standards for English Language Arts

Key Ideas and Details

RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

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Assessments:

Formative:
Labs
Quizzes
Projects
Presentations
Homework

Summative:
Unit test
Benchmarks
Projects
Presentations

Resources:

Textbook: Module E Earth's Water & Atmosphere

- Unit 1: Circulation of Earth's Air and Water
  - Lesson 1: Circulation in Earth's Atmosphere
  - Lesson 2: Circulation in Earth's Ocean
  - Lesson 3: The Water Cycle
- Unit 2: Weather and Climate
  - Lesson 1: Influences on Weather
  - Lesson 2: Weather Prediction
  - Lesson 3: Influences on Climate

***Sample Activities*:**

- Pressure
  - Egg in a flask
  - Test tube balloon

	• Polar Bears in Phoenix • Alternative Energy Projects

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
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Career Ready Practices	
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8th Grade Science

Pacing Guide

Chemical Reactions 65 days		**Cells 65 days**
Marking Period 1	**Marking Period 2**	
Cells 65 days	**Heredity 23 days**	**Diversity of Life 22 days**
Marking Period 3	**Marking Period 4**	

Unit 1 Chemical Reactions: Periodic Table, Elements, Compounds, Chemical Reactions, Acids/Bases

Unit 2 Cells: Cell Parts, Molecules of Life, Chemical Reactions of Life

Unit 3 Heredity: Cell Division, DNA, Protein Synthesis, Mutations

Unit 4 Diversity of Life: Plant and Animal Reproduction/Sexual and Asexual Reproduction, Evolution

Integrated Accommodations

For Students with IEPs, 504s, and/or Students at Risk of Failure

Use of manipulatives and representations for simultaneous processing • Use visual and multi-sensory formats • Use of assistive technology • Use of graphic organizers and prompts • Modification of student products • Testing accommodations • Authentic assessments • Small group instruction • Adjusting the pace of lessons

Gifted & Talented Students

Inquiry-based instruction • Independent study • Higher-order thinking skills and questions • Interest-based content • Student-driven lessons • Real-world projects and scenarios

English Language Learners

Pre-teaching of vocabulary and concepts • Visual learning, including graphic organizers • Use of cognates to increase comprehension • Teacher modeling • Pairing students with beginning English language skills with students who have more advanced English language skills • Scaffolding: sentence frames, think-pair-share, cooperative learning groups, teacher read-alouds • Use of assistive technology

Grade: 8th Grade	**Unit**: Chemical Reactions	**Time Frame**: 1.5 Marking Periods

Essential Questions

- What properties define matter?
- What are physical and chemical properties of matter?
- What are physical and chemical changes of matter?
- How do pure substances and mixtures compare?
- How do particles in solids, liquids, and gases move?
- What happens when matter changes state?
- How do we know what parts make up the atom?
- How are elements arranged on the periodic table?
- How do atoms interact with each other?
- How can atoms join together?
- How are chemical reactions modeled?
- How does carbon form molecules?
- How do nuclear reactions differ from chemical reactions?
- What is a solution?
- What are the properties of acids, bases, and salts?
- What is pH a measure of?

Unit Sequence

1. Introduction to Matter
2. Physical Properties
3. Chemical Properties
4. Physical Changes
5. Chemical Changes
6. Elements
7. Compounds
8. Mixtures
9. States of Matter and Changes of Matter
10. Atoms
11. Basic Arrangement of Periodic Table
12. Atomic drawings
13. Valence electrons
14. Chemical bonding
15. Identifying chemical reactions
16. Properties of metals
17. Chemical Equations
18. Conservation of Mass
19. Energy of Reactions
20. Changing the rates of reactions
21. Solutions and solubility
22. Acids, bases, and salts
23. pH
24. Neutralization

Natural Phenomena:

- Condensation on a cold water bottle
- Steam coming off of a pot of boiling water
- Cooking dinner
- Dead car battery
- Ice cube melting in water
- Axe body spray can eventually be smelled throughout the house.
- Clarity of pool improved after adding baking soda
- My metal teaspoon gets hot in my teacup.
- Some pool chemicals get hot when dissolved in water.
- There is water on my windshield every morning but it did not rain overnight.
- Sun tanning and use of sunscreen
- Burning peat smells very different from burning wood.
- I dropped my soda and it exploded and overflowed when I opened it.
- My carrots burned when the pan ran out of water.
- My silver jewelry tarnishes faster on the dressed than in the jewelry box.
- Candle burning - wick changes color, heat and light are given off
- Bleach leaving white stains on clothes
- Sodium, an explosive metal, and Chlorine, a toxic gas combine to form table salt
- Cooking dinner
- When you add heat to raw chicken, it turns from pink to white.
- Getting a tan when in the sun
- Sugar “disappears” when added to water
- When you add honey iced tea, it sticks to the spoon and is harder to dissolve, but when you put it in hot tea, it comes right off of your spoon.
- Hydrangea may be range in color depending on the soil where it is planted
- Soda goes flat faster if left out on a hot day than if it is put in the refrigerator
- When you mix vinegar and baking soda in a model volcano, it bubbles and foams.
- Swimming pools are tested with strips of paper - why?
- A spoon, a wire and tin foil are all made out of metal but are all quite different
- Copper is used to make wires as well as pipes
- People put vinegar and baking soda in a model of a volcano to make it “erupt”

Disciplinary Core Ideas

PS3.A Definitions of Energy

- The temperature of a system is proportional to the average internal kinetic energy and potential energy per atom or molecule (whichever is the appropriate building block for the system's material) The details of that relationship depend on the type of atom or molecule and the interactions among the atoms in the material. Temperature is not a direct measure of a system's total thermal energy. The total thermal energy of a system depends jointly on the temperature, the total number of atoms in the system, and the state of the material.

PS1.A Structure and Properties of Matter:

- Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms.
- In a liquid, the molecules are constantly in contact with others; in a gas they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position, but do not change relative locations.
- Solids may be formed from molecules, or they may be extended structures with repeating subunits.
- Each pure substance has characteristic physical and chemical properties that can be used to identify it

PSI.B Chemical Reactions

- Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules and these new substances have different properties from those reactants.
- The total number of each type of atom is conserved, and thus the mass does not change.
- Some chemical reactions release energy, others store energy

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.
- Models of all kinds are important for testing solutions.

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 the characteristics may be incorporated into the new design.
- 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.

Scientific Practices

Asking Questions and Defining Problems
Developing and Using Models
Planning and Carrying Out Investigations
Analyzing and Interpreting Data
Using Mathematics and Computational Thinking
Constructing Explanations and Designing Solutions
Engaging in Argument from Evidence
Obtaining, Evaluating, and Communication Information

Crosscutting Concepts

Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures.
MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
MS-PS1-4 Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
MS-PS1-2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
MS-PS1-5 Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.
MS-PS1-6 Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.
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.

Standards Correlations & Interdisciplinary Connections:

NJSL Companion Standards for English Language Arts

Key Ideas and Details

RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Craft and Structure

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

RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Assessments:

Formative:
Labs
Quizzes
Projects
Presentations
Homework

Summative:
Unit test
Benchmarks
Projects
Presentations

Resources:

Textbook: Module J Chemistry

- Unit 1 The Structure of Matter
  - Lesson 1 - The Properties of Matter
  - Lesson 2 - Atoms and Elements
  - Lesson 3 - Molecules and Extended Structures
- Unit 2
  - Lesson 1 - States of Matter
  - Lesson 2 - Changes of State
- Unit 3
  - Lesson 1 - Chemical Reactions
  - Lesson 2 - Chemical Equations
  - Lesson 3 - Thermal Energy and Chemical Processes
- Unit 4 The Chemistry of Materials
  - Lesson 1 Natural and Synthetic Materials (optional)

Sample Activities:

- Atomic drawings
- Physical vs. chemical changes lab
- Manganese Dioxide Lab
- Liver Lab
- Indicator lab
- Acids, Base, Neutral lab
- Neutralization Lab
- pH Model Lab

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
☒ Global Awareness ☒ Environmental Literacy ☐ Health Literacy ☐ Civic Literacy ☐ Financial, Economic, Business, and Entrepreneurial Literacy	☒ Critical Thinking and Problem Solving ☒ Creativity and Innovation ☒ Collaboration, Teamwork, and Leadership ☒ Cross-cultural and Interpersonal Communication ☐ Accountability, Productivity, and Ethics

8.1 Educational Technology Standards	8.2 Technology Education, Engineering, Design & Computational Thinking - Programming
☒ 8.1.A Technology Operations and Concepts ☐ 8.1.B Creativity and Innovation ☒ 8.1.C Communication and Collaboration ☐ 8.1.D Digital Citizenship ☒ 8.1.E Research and Information Fluency ☐ 8.1.F Critical Thinking, Problem Solving & Decision Making	☒ 8.2.A The Nature of Technology: Creativity and Innovation ☒ 8.2.B Technology and Society ☐ 8.2.C Design ☐ 8.2.D Abilities for a Technological World ☐ 8.2.E Computational Thinking: Programming

Career Ready Practices	
☒ CRP1.	Act as a responsible and contributing citizen and employee
☒ CRP2.	Apply appropriate academics and technical skills
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☒ CRP4.	Communicate clearly and effectively with reason
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☐ CRP6.	Demonstrate creativity and innovation
☒ CRP7.	Employ valid and reliable research strategies
☒ CRP8.	Utilize critical thinking to make sense of problems and persevere in solving them
☐ CRP9.	Model integrity, ethical leadership, and effective management
☐ CRP10.	Plan education and career paths aligned to personal goals
☒ CRP11.	Use technology to enhance productivity
☐ CRP12.	Work productively in teams while using global cultural competence

Grade: 8th Grade	**Unit**: Cells	**Time Frame**: 1.5 Marking Period

Essential Questions

- What do all cells have in common?
- Explain how cell size helps cells survive?
- What to the various parts of cells do for the functioning of cells?
- What do cells need in order to survive and function?
- Which processes do cells use?

Unit Sequence

1. Cells
2. Molecules cells need
3. Functions with cells
4. Photosynthesis
5. Cellular respiration
6. Matter and Energy in Ecosystems

● How can energy be transferred in a cell? ● Explain how cells are organized from unicellular to multicellular organisms. ● How do plants use natural resources to produce their food? ● How do animals rely on the products of photosynthesis during the process of cellular respiration? ● How do cells get and use energy?	

Natural Phenomena:

- When I Exercise, I Sweat
- When you are hungry, your stomach growls
- After swimming in the pool for a while, your fingers are shriveled, or when you come out you get cold.
- Heart rate increases when I'm nervous
- Coffee wakes me up
- I get 'goose bumps' when I am cold or scared
- Grass is yellow underneath a potted plant/covered area of the lawn
- Grass stains on baseball pants
- Venus flytrap and other carnivorous plants
- Why do people say that breakfast is the most important meal of the day?
- I got cramps while running the mile in gym.
- You gain weight if you eat too much sugar and don't get enough exercise.
- A plant bends towards a sunny window.
- How do parts of the environment interact with each other?
- How does energy flow within an ecosystem?
- What happens if an organism is removed from a food web?

Disciplinary Core Ideas

LS1.A: Structure and Function

- All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular).
- Within cells, special structures are responsible for particular functions, and the cell membrane, forms the boundary that controls what enters and leaves the cell.
- In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions.

LS1.B Growth and Development of Organisms

- Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring.
- Animals engage in characteristic behaviors that increase the odds of reproduction.
- Plants reproduce a variety of ways, sometimes depending on animal behavior and specialized features for reproduction.
- Genetic factors as well as local conditions affect the growth of the adult plant.

LS1.D: Information Processing

- Each sense receptor responds to different inputs (electromagnetic, mechanical, and chemical) transmitting them as signals that travel along nerve cells to the brain. Signals are then processed in the brain, resulting in immediate behaviors and memories.

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.
- 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.

LS2.A Interdependent Relationships on Ecosystems

- Organisms and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors.
- 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.

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.

LS2.C Ecosystem Dynamics, Functioning, and Resilience

- 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.

LS4.B: Natural Selection

- In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed onto offspring.

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.

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.
- Cellular respiration in plants and animals involve chemical reactions with oxygen that release store stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials.

Scientific Practices	Crosscutting Concepts
Asking Questions and Defining Problems	Patterns
Developing and Using Models	Cause and Effect
Planning and Carrying Out Investigations	Scale, Proportion, Quantity
Analyzing and Interpreting Data	Systems and System Models
Using Mathematics and Computational Thinking	Energy and Matter: Flows, Cycles, and Conservation
Constructing Explanations and Designing Solutions	Structure and Function
Engaging in Argument from Evidence	Stability and Change
Obtaining, Evaluating, and Communication Information	

Performance Expectations

MS-LS4-4 Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals'' probability of surviving and reproducing in a specific environment.
MS-LS4-6 Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.
MS-LS3-2 Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
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-LS1-6 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-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
MS-LS1-1 Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
MS-LS1-2 Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.
MS-LS1-3 Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
MS-LS1-8 Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behaviors or storage as memories.
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-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
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.

Standards Correlations & Interdisciplinary Connections:

NJSL Companion Standards for English Language Arts

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Assessments:

Formative:
Labs
Quizzes
Projects
Presentations
Homework

Summative:
Unit test
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Resources:

Module C - Ecology and the Environment

- Unit 1 Matter and Energy in Living Systems
  - Lesson 1: Matter and Energy in Organisms
  - Lesson 2: Photosynthesis and Cellular Respiration
  - Lesson 3: Matter and Energy in Ecosystems

Textbook: Module B Cells and Heredity

- Unit 1: Cells
  - Lesson 1: The Characteristics of Cells
  - Lesson 2: Cell Structures and Function
- Unit 2: Organisms as Systems
  - Lesson 1: Levels of Organization in Organisms
  - Lesson 2: Plant Bodies as Systems
  - Lesson 3: Animal Bodies as Systems
  - Lesson 4: Information Processing in Animals
- Websites
  - http://www.olympic.org/sports
  - http://science.nationalgeographic.com/science/health-and-human-body/human-body/
  - http://www.innerbody.com/
  - http://kidshealth.org/en/kids/vitamin.html
  - http://news.health.com/2008/08/05/gold-medal-eating-from-olympic-athletes/
  - https://www.healthy.co.nz/content/body-system.html
  - http://www.cnn.com/2008/HEALTH/diet.fitness/08/14/olympic.diet/index.html#cnnSTCText
  - https://www.verywell.com/common-sports-injuries-a-to-z-list-3119253
  - http://www.human-body-facts.com/human-body-diseases.html
  - http://www.specialolympics.org/sports.aspx

	○ http://www.design-technology.org/sportsshoes1.htm ○ http://www.jsonline.com/sports/29417459.html ○ https://www.sciencedaily.com/releases/2008/07/080731173157.htm ○ http://www.niams.nih.gov/health_info/sports_injuries/sports_injuries_ff.asp#b ○ http://www.ncaa.org/health-and-safety/sport-science-institute/mind-body-and-sport-how-being-injured-affects-mental-health ○ http://www.dconline.org/wp-content/uploads/2016/04/Br-J-Sports-Med-2016-Nabhan-bjsports-2015-095835-1.pdf ○ https://www.nbclearn.com/science-of-the-summer-olympics ○ https://www.nbclearn.com/science-and-engineering-of-the-2014-olympic-winter-games ○ https://www.nsf.gov/news/special_reports/olympics/ ○ https://science360.gov/series/science-winter-olympics/b263b26f-6d34-4ddb-a77f-6d69507e0533 ○ https://science360.gov/series/science-summer-olympicsengineering-sports/84211b74-7ae1-4d9b-9024-5faa6300fc29 ○ http://sciencenetlinks.com/tools/science-at-the-olympics/ ○ http://btc.montana.edu/olympics/nutrition/ *Sample Activities:* ● Cell Project ● Cell Size Lab/Demo ● Observing plant growth ● Popcorn lab ● Frog dissection

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
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21st Century Themes	21st Century Skills
☒ Global Awareness ☒ Environmental Literacy ☐ Health Literacy ☐ Civic Literacy ☐ Financial, Economic, Business, and Entrepreneurial Literacy	☒ Critical Thinking and Problem Solving ☐ Creativity and Innovation ☒ Collaboration, Teamwork, and Leadership ☒ Cross-cultural and Interpersonal Communication ☐ Accountability, Productivity, and Ethics
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Career Ready Practices	
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☐ CRP8.	Utilize critical thinking to make sense of problems and persevere in solving them
☐ CRP9.	Model integrity, ethical leadership, and effective management
☐ CRP10.	Plan education and career paths aligned to personal goals
☒ CRP11.	Use technology to enhance productivity
☒ CRP12.	Work productively in teams while using global cultural competence

Grade: 8th Grade	**Unit**: Heredity	**Time Frame**: 1 Marking Period

Essential Questions

- How cells divide?
- How are reproductive cells different from other cells in our body?
- What are the benefits and shortcomings of sexual reproduction vs. asexual reproduction?
- Why are some traits more common than others?
- How is it possible that a person looks more like a grandparent than a parent or more like one parent than the other?
- How can you predict the possible outcome of traits in your offspring?
- How are patterns of inheritance studied?
- How does DNA control your heredity and traits?
- What happens to DNA in order for it to be passed to offspring?
- How does the cell use DNA to make proteins?
- If DNA changes, what are the consequences?
- How can humans use selective breeding to influence traits?
- How does biotechnology impact our world?

Unit Sequence

1. Mitosis vs. Meiosis
2. Types of reproduction
3. Genes and heredity
4. Punnett Squares and Pedigrees
5. DNA structure
6. Replication
7. Transcription and Translation
8. Mutations
9. DNA technology

Natural Phenomena:

- Often times, people with red hair also have fair skin and freckles.
- My friend's family has 2 children with brown hair, mom and dad have blonde and red hair.
- Some people have blue eyes/blonde hair
- Frizzy hair vs. not frizzy hair
- Parent bird/other animal abandons smallest/deformed "runt" offspring
- Some kids tan/others burn
- Colorblindness and hemophilia are more common in boys than in girls
- I look a lot like my brother, but nothing like my sister
- A litter of kittens all with different colors and markings
- What chance does my child have in looking like me?
- Can I clone myself?
- I saw a two headed turtle at the zoo.
- If there are seedless fruit, how do you make more of them?
- The only way to get a mule is by crossing a female horse with a male donkey.
- Mules can't make more mules.

- Hypoallergenic dogs - labradoodle, cockapoo

Disciplinary Core Ideas

LS1.B Growth and Development of Organisms

- Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring.
- Animals engage in characteristic behaviors that increase the odds of reproduction.
- Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction.
- Genetic factors as well as local conditions affect the growth of the adult plant.

LS3.A: Inheritance of Traits

- Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. Changes to genes (mutations) can result in changes to proteins, which can affect the structures and functions of the organism and thereby change the traits.
- Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited.

LS3.B: Variation of Traits

- In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other.
- In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism.

LS4.B: Natural Selection

- In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed onto offspring.

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.
- Sometimes parts of different solutions can be combined to create a solution that is better than its predecessors.
- Models of all kinds are important for testing solutions.

Scientific Practices

Asking Questions and Defining Problems
Developing and Using Models
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Using Mathematics and Computational Thinking
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Crosscutting Concepts

Patterns
Cause and Effect
Scale, Proportion, Quantity
Systems and System Models
Energy and Matter: Flows, Cycles, and Conservation
Structure and Function
Stability and Change

Performance Expectations

MS-LS4-4 Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.
MS-LS3-2 Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
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-LS4-5 Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.
MS-LS1-1 Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
MS-LS1-2 Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.
MS-LS1-3 Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

MS-LS3-1 Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.
MS-LS3-2 Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
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.
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Assessments:

Formative:
Labs
Quizzes
Projects
Presentations
Homework

Summative:
Unit test
Benchmarks
Projects
Presentations

Resources:

Textbook: Module B Cells and Heredity

- Unit 3: Reproduction, Heredity, and Growth
  - Lesson 1: Inheritance
  - Lesson 2: Asexual and Sexual Reproduction
  - Lesson 3: Plant Reproduction and Growth
  - Lesson 4: Animal Reproduction and Growth

Sample Labs/Activities:

- Flower dissection
- Mitosis song and timeline
- Punnett square activities
- Blood typing activities and Punnett square
- DNA model building

	• Create a face activity • Clone a Mouse Online Activity

Differentiation:

- The unit includes presentation of material through multiple modalities such as visual, auditory, and kinesthetic to address the unique learning styles of all students.
- Assign, assess and modify if necessary to address the specific needs of the learner.
- Students will select from authentic literature at their independent and instructional reading levels.
- The teacher will individually conference with each student to address specific needs of the reader.

21st Century Themes	21st Century Skills
☒ Global Awareness ☒ Environmental Literacy ☐ Health Literacy ☐ Civic Literacy ☐ Financial, Economic, Business, and Entrepreneurial Literacy	☒ Critical Thinking and Problem Solving ☒ Creativity and Innovation ☒ Collaboration, Teamwork, and Leadership ☒ Cross-cultural and Interpersonal Communication ☒ Accountability, Productivity, and Ethics
8.1 Educational Technology Standards	**8.2 Technology Education, Engineering, Design & Computational Thinking - Programming**
☒ 8.1.A Technology Operations and Concepts ☒ 8.1.B Creativity and Innovation ☒ 8.1.C Communication and Collaboration ☐ 8.1.D Digital Citizenship ☐ 8.1.E Research and Information Fluency ☒ 8.1.F Critical Thinking, Problem Solving & Decision Making	☒ 8.2.A The Nature of Technology: Creativity and Innovation ☒ 8.2.B Technology and Society ☒ 8.2.C Design ☒ 8.2.D Abilities for a Technological World ☐ 8.2.E Computational Thinking: Programming

Career Ready Practices	
☒ CRP1.	Act as a responsible and contributing citizen and employee
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☐ CRP10.	Plan education and career paths aligned to personal goals
☒ CRP11.	Use technology to enhance productivity
☒ CRP12.	Work productively in teams while using global cultural competence

Grade: 8th Grade	**Unit**: The Diversity of Life	**Time Frame**: .5 Marking Period
Essential Questions ● What are living things? ● What is the theory of evolution by natural selection? ● What evidence supports the theory of evolution? ● How has life on Earth changed over time? ● How are organisms classified? ● What are microorganisms? ● What are plants? ● How do plants stay alive? ● What are animals? ● How do animals behave? ● Explain the difference between prokaryotic and eukaryotic.		**Unit Sequence** 1. What are fossils? 2. Natural selection vs. evolution 3. Classification of organisms 4. Prokaryotes, viruses 5. Animals and animal behavior

Natural Phenomena:

- Embryos of vertebrates resemble each other at early stages.
- Plants are green.
- Plants look different depending on the region where they grow.
- Pollen covers cars in the spring.
- Some plants have flowers others don't.
- Maple trees change colors in the fall.
- Why did my plant wilt?
- The plant growing in the direction of the window
- Getting goosebumps when you are cold and shivering.
- Why do we have a tailbone? An appendix?
- You jump when your friend sneaks up on you.
- Why are there so many different types of birds?
- The doctor gives an antibiotic sometimes, but not others. Why?
- Some dinosaur fossils have feathers.
- You cover your mouth when you sneeze
- I get a flu vaccine each year, but I only needed to be vaccinated for chickenpox when I was little.

Disciplinary Core Ideas

LS4.A Evidence of Common Ancestry and Diversity

- The collection of fossils and their placement in chronological order is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on earth.
- Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record, enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent.
- Comparison of the embryological development of different species also reveals similarities that show relationships not evident in the fully formed anatomy.

LS4.B Natural Selection

- Natural selection leads to the predominance of certain traits in a population, and the suppression of others.

LS4.C Adaptation

- Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common.

LS1.B Growth and Development of Organisms

- Organisms reproduce, either sexually or asexually, and transfer genetic material to their offspring.
- Animals engage in characteristic behaviors that increase the odds of reproduction.
- Plants reproduce in variety of ways, sometimes depending on animal behavior and specialized features for reproduction.

- Genetic factors as well as local conditions affect the growth of the adult plants.

LS4.B Natural Selection

- In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed on to offspring.

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.

LS1.D: Information Processing

- Each sense receptor responds to different inputs (electromagnetic, mechanical, and chemical) transmitting them as signals that travel along nerve cells to the brain. Signals are then processed in the brain, resulting in immediate behaviors and memories.

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.
- Models of all kinds are important for testing solutions.

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 the characteristics may be incorporated into the new design.
- 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.

LS4.A Evidence of Common Ancestry and Diversity

- The collection of fossils and their placements in chronological order (e.g., through the location of the sedimentary layers in which they are found or through radioactive dating) is known as the fossil record. It documents the existence, diversity, extinction, and change of many life forms throughout the history of life on Earth.

Scientific Practices	Crosscutting Concepts
Asking Questions and Defining Problems	Patterns
Developing and Using Models	Cause and Effect
Planning and Carrying Out Investigations	Scale, Proportion, Quantity
Analyzing and Interpreting Data	Systems and System Models
Using Mathematics and Computational Thinking	Energy and Matter: Flows, Cycles, and Conservation
Constructing Explanations and Designing Solutions	Structure and Function
Engaging in Argument from Evidence	Stability and Change
Obtaining, Evaluating, and Communication Information	

Performance Expectations

MS-LS4-1 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.

MS-LS4-2 Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.

MS-LS4-3 Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.

MS-LS4-4 Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

MS-LS4-6 Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

MS-LS3-2 Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

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 - LS 4-5 Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

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.

Standards Correlations & Interdisciplinary Connections:

NJSL Companion Standards for English Language Arts

Key Ideas and Details

RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.

RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

Craft and Structure

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.

RST.6-8.5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.

RST.6-8.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

Integration of Knowledge and Ideas

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

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

RST.6-8.9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Assessments:

Formative:
Labs
Quizzes
Projects
Presentations
Homework

Summative:
Unit test
Benchmarks
Projects
Presentations

Resources:

Textbook: Module D The Diversity of Living Things

- Unit 1: The History of Life on Earth
  - Lesson 1: The Fossil Record
  - Lesson 2: Patterns of Change on Life of Earth
  - Lesson 3: Evidence of Common Ancestry
- Unit 2: Evolution
  - Lesson 1: Genetic Change and Traits
  - Lesson 2: Natural Selection
  - Lesson 3: Speciation and Extinction
- Unit 3: Human Influence on Inheritance
  - Lesson 1: Artificial Selection
  - Lesson 2: Biotechnology and Inheritance

Sample Labs/Activities:

- Fossil Activities
- Growing Seeds
- Milkweed bugs
- Neuroscience for Kids site: http://faculty.washington.edu/chudler/neurok.html

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