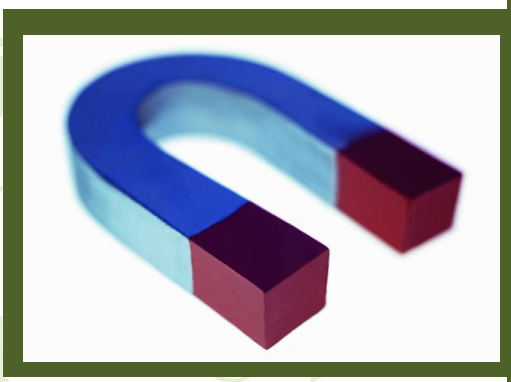
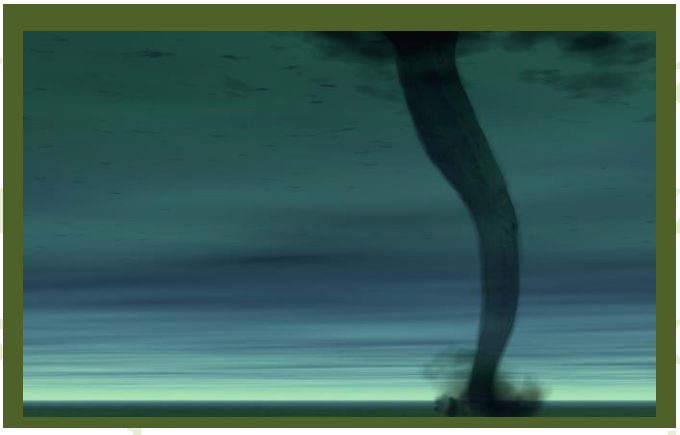
Westampton Township School District

Science
Curriculum Guide

Kindergarten – Eighth Grade

Approved by Westampton Township Board of Education: February 13, 2023





Westampton Township School District

Science
Curriculum Guide

Kindergarten – Eighth Grade

Science Curriculum Writing Team

Laurisa Duba

Cristentia Finn

Deidre Adams

Bea Kelsey

Jessica Galvis

Amy Stuck

Stacey Zubrzycki

Jennifer Murray

Westampton Board of Education

Mr. Christopher Hamilton
President

Mr. Malcolm Whitley
Vice President

Ms. Ashlee Caldwell

Mr. Allan Forsyth

Mr. Gil Ghein-Scott

Ms. Anjanae Haqq

Ms. Maureen Malecki

Dr. Vanessa Nichols

Ms. Andrea Sargent

District Administration

Mr. James DiDonato
Superintendent of Schools

Mrs. Karen Greer
School Business Administrator

Mrs. Jennifer Murray
Principal, Holly Hills Elementary School &
Director of Curriculum PK-8

Dr. Rachel Feldman
Principal, Westampton Intermediate School

Mrs. Yashanta Holloway-Taluy
Principal, Westampton Middle School

Mr. Nicholas Carpo
Vice-Principal, Westampton Middle School

Table of Contents

Introduction

District Mission Statement

The Westampton School District, in partnership with its Community, shall do whatever it takes to ensure that every child achieves or exceeds proficiency in the current New Jersey Student Learning Standards.

Be open! Be creative! Be accountable!

Vision Statement

To create a climate where the Community and District support the instructional process by incorporating an effective, comprehensive communication system that incorporates the whole child as its driving force involving parents, staff, and the Community by utilizing appropriate data to challenge the students and teachers to maximize each student's level of achievement.

Curriculum and Instruction Vision Statement

Westampton Township School District's Office of Curriculum and Instruction is committed to supporting, implementing, and supervising Preschool – 8 curricula that is rigorous, meaningful, differentiated, culturally responsive, and academically challenging to ensure that students receive high-quality instruction that promotes excellence and high expectations, prepares all students for the rigors of high school and postsecondary education and produces dynamic student achievement and lifelong learners.

Science Education Philosophy

Science education is vital to the development of all children as it plays a significant role in society. Science education should have two primary goals. It should teach children the importance of exploration and discovery through hands-on activities that will reinforce the scientific method and scientific processes. Additionally, it should utilize critical thinking and logical reasoning to help children understand the elements of the science lessons.

This curriculum was designed based on current research and practice that has shown that science education is more effective if it has depth, rather than focus on facts and concept coverage. The current focus in science is on how we know what we know and why we believe it. Science is a subject that is constantly evolving and expanding. The goal of this curriculum is to focus on specific units with great depth to give students a perspective of a science as a set of processes that involve the analysis of evidence, development of theory, and participation in the scientific practice of testing hypotheses.

Curriculum Guide

The Science Curriculum is developed to reflect the mission and vision of the Westampton Township School District and is guided by the New Jersey Student Learning Standards for Next Generation Science. Its content, which includes instructional objectives, teaching strategies, learning activities, assessment, and

resources, are tools that should be utilized throughout the school year by teachers to ensure that all students receive rigorous, standards-based instruction.

The curriculum is organized in units, designed to introduce students to scientific processes and the scientific method. Each grade level from K-4 is responsible for four to six instructional units that incorporate Life Science, Earth/Space Science, and Physical Science units. This spiraling curriculum will expose students to the branches of science with depth and focus on the scientific method as the theme that ties all units together. In addition, the ongoing focus of all lessons will be critical thinking and logical reasoning skills. Each unit will be taught utilizing hands-on, exploratory lessons that will provide an authentic exposure to the world of science. Grades 5-8 expand on the learning K-4 and cover units in Life Science, Earth Science, and Physical Science as well. There are six instructional units in each grade level 5-8.

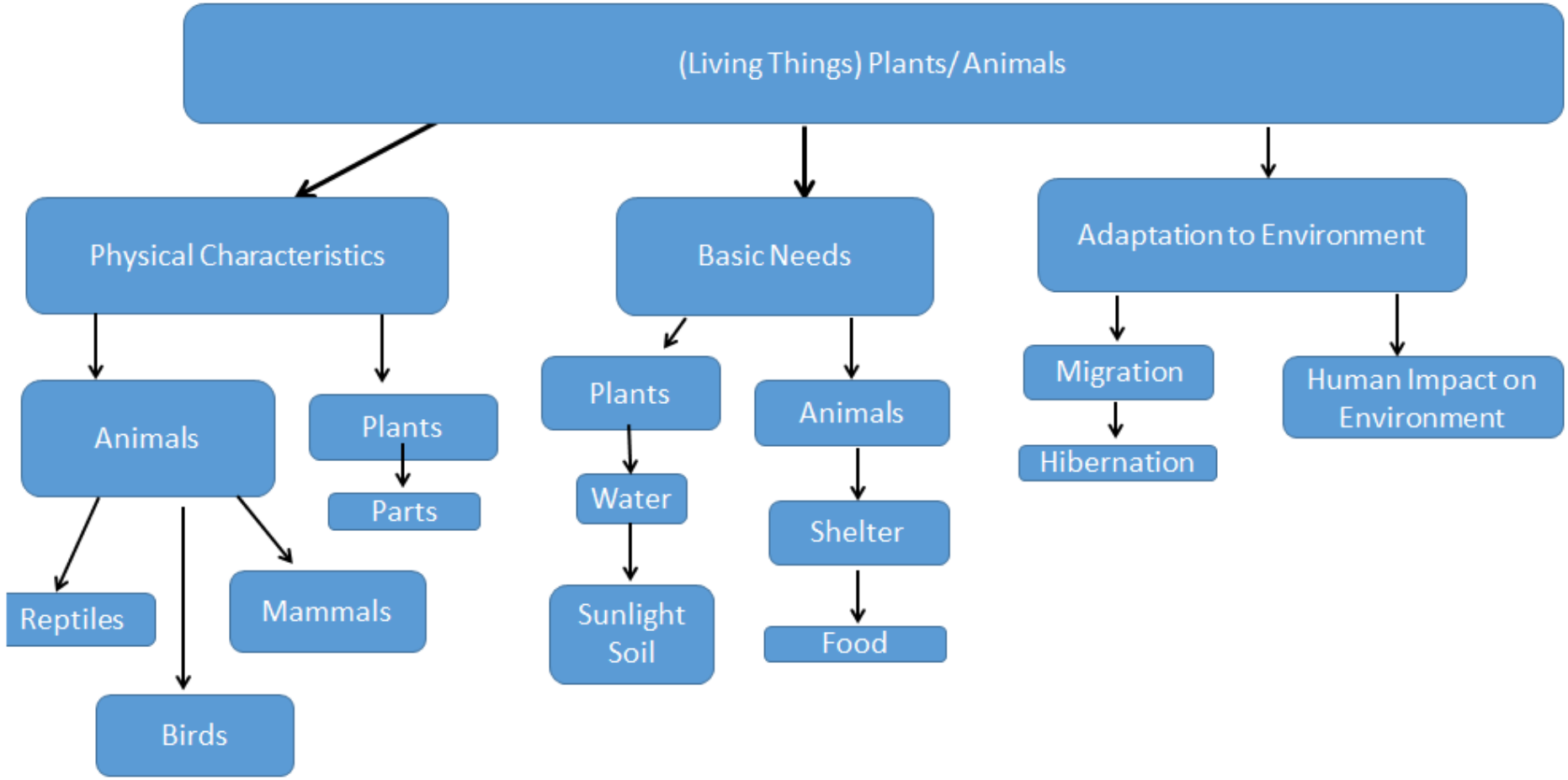
This guide is ongoing and will continue to evolve as research changes and classroom practice determines new ways to teach students and increase student achievement. This document allows for ongoing dialogue and contributions by teachers and administrators to ensure that this guide provides the best education possible for all students.

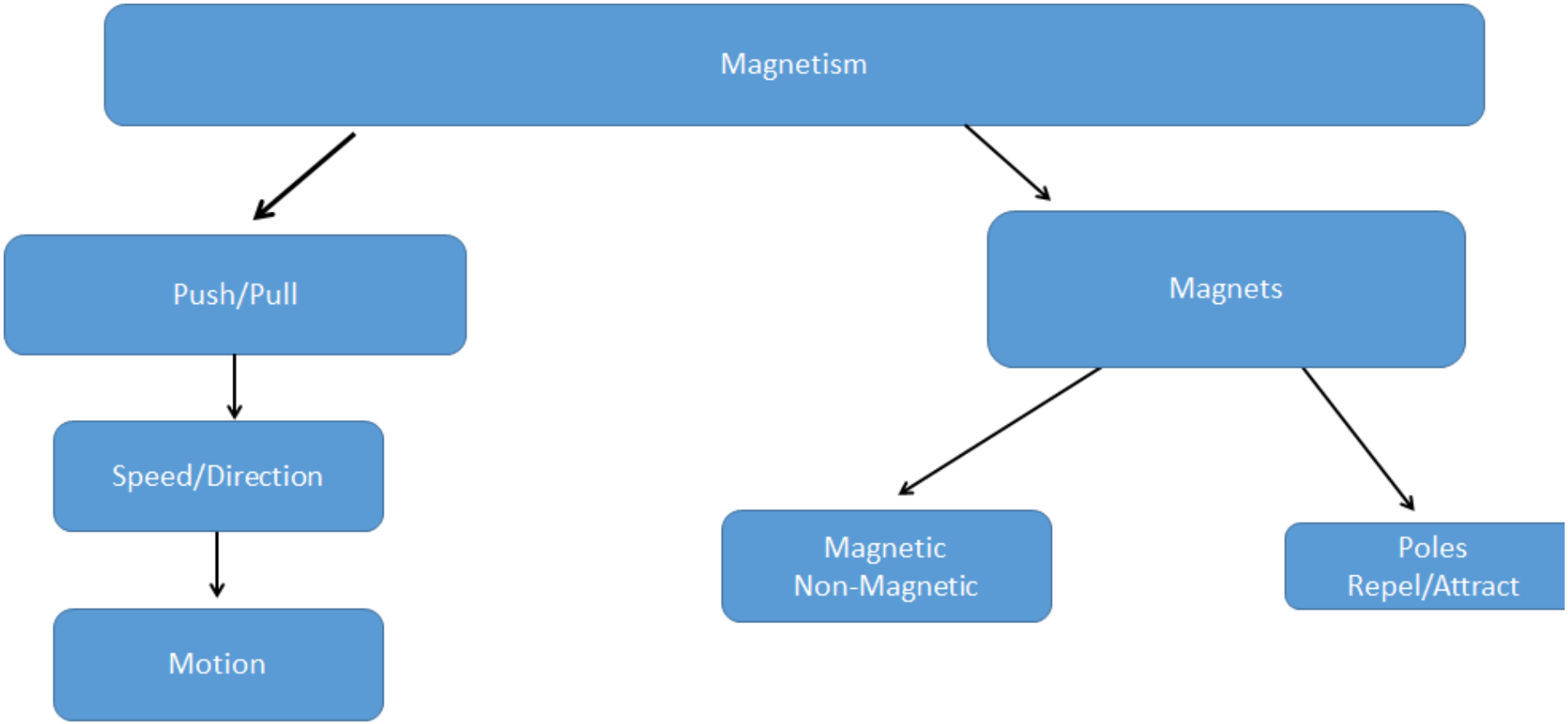
Organization of Units - Kindergarten through Eighth Grade

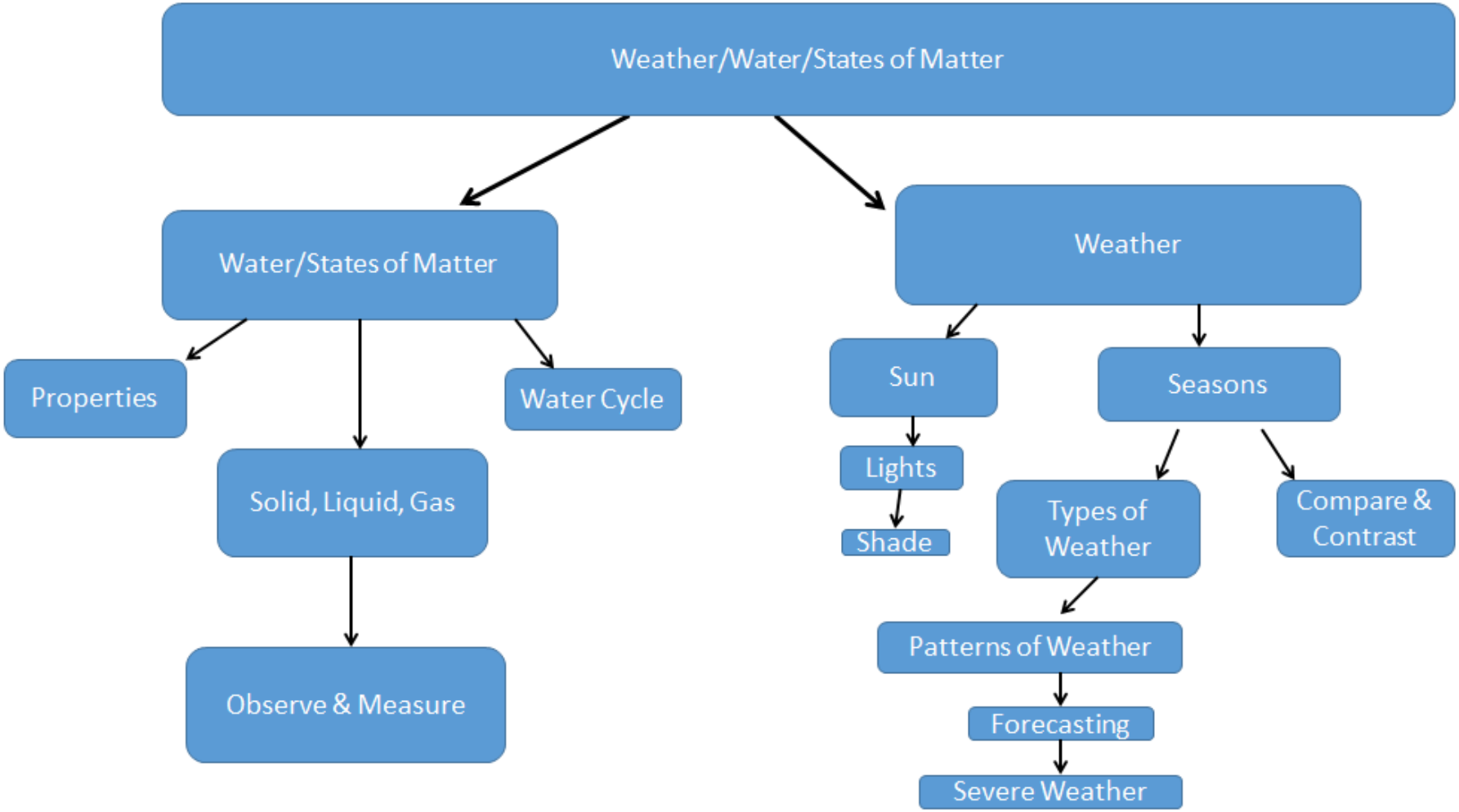
	Life	**Earth & Space**	**Physical**
Kindergarten	Plants & Animals (and Human Impact) Life Cycle of a Butterfly	Weather/ Water	Magnetism Forces of Motion
1st Grade	Life Cycle – Chicken Seed to Plant	Solar System	Matter (Explored through Five Senses)
2nd Grade	Ocean Life Earth History	Water Cycle / Weather	States of Matter
3rd Grade	Food Webs Life Cycle - Frog	Weather and Climate	Magnetism Forces of Motion
4th Grade	Micro Worlds/Microscopes Ecology	Rocks, Minerals, and Landforms	Sound & Light (Energy)

	Life Science	**Earth Science**	**Physical Science**
5th Grade	Matter and Energy in Organisms and Ecosystems	Earth Systems Space Systems	Physical Matter and It's Interactions
6th Grade	Life Forms	Astronomy Earth History/Rocks/Fossils Weather and Climate	Waves
7th Grade	Photosynthesis and Respiration Genetics The Human Body/Cells Diversity in Ecosystems	Erosion	Energy Flow
8th Grade	Life Systems	Astronomy	Structure and Properties of Matter Interactions of Matter Forces and Motion Electric and Magnetic Forces Potential and Kinetic Energy Thermal Energy

Science Curriculum


(Living Things) Plants/ Animals
Physical Characteristics
Basic Needs
Adaptation to Environment
Animals
Plants
Parts
Reptiles
Mammals
Birds
Plants
Water
Sunlight
Soil
Animals
Shelter
Food
Migration
Hibernation
Human Impact on Environment


Magnetism
Push/Pull
Speed/Direction
Motion
Magnets
Magnetic
Non-Magnetic
Poles
Repel/Attract


Weather/Water/States of Matter
Water/States of Matter
Weather
Properties
Water Cycle
Solid, Liquid, Gas
Observe & Measure
Sun
Seasons
Lights
Shade
Types of Weather
Compare & Contrast
Patterns of Weather
Forecasting
Severe Weather

Theme/Unit: Human Impact on Plants and Animals	**Suggested Sequence: One Marking Period**

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

Science and Engineering Practices:
Analyzing and Interpreting Data
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.
Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-ESS2-1)
Engaging in Argument from Evidence
Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).
Construct an argument with evidence to support a claim. (K-ESS2-2)

Connections to Nature of Science

Science Knowledge is Based on Empirical Evidence

Scientists look for patterns and order when making observations about the world. (K-ESS2-1)

Disciplinary Core Ideas:	**Crosscutting Concepts:**
ESS2.D: Weather and Climate Weather is the 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. (K-ESS2-1) **ESS2.E: Bio geology** Plants and animals can change their environment. (K ESS2-2) **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. (secondary to K-ESS2-2)	**Patterns** Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (K-ESS2-1) **Systems and System Models** Systems in the natural and designed world have parts that work together. (K-ESS2-2)

Knowledge, Skills, and Instructional Objectives:
SWBAT:
- Use observations to describe patterns of what plants and animals need to survive
- Analyze data by collecting, recording, and sharing observations
- Use a model to show the relationship between the needs of different plants or animals and the places they live
- Use patterns as evidence to support claims

- Construct an argument supported by evidence for how plants and animals change the environment to survive

Instructional Materials/Resources:
- Science text
- Unit kit
- Trade books

Suggested Vocabulary:
Living things, nonliving things, shelter desert, forest, pond, ocean, environment

Technology:
8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge.
- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:
- Create a chart of living and nonliving things around the classroom/school
- Make a list of what plants need to survive, what animals need to survive, compare/contrast
- List the attributes of the 4 main types of habitat (desert, forest, pond, ocean) and list the type of animal that lives in each

Extension Strategies/Activities:
- Jigsaw groupings –students turn and teach
- Class posters or chart, models, illustrations, diagrams, dioramas
- Related experiments (home or school)
- Oral presentations
- Provide a variety of trade books related to the unit
- Create and play review games
- Role playing

Modification Strategies/Activities:

Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready & Cross-curricular Connections:
CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP3. Attend to personal health and financial well-being.

CRP4. Communicate clearly and effectively and 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.

- Read related nonfiction books K.RI.10
- Write response to open-ended questions K.W.2
- Write informational research reports K.W.8
- Develop questioning techniques K.SL.3
- Make an oral presentation K.SL.4-6

Suggested Assessments:

Performance Task:

- Participation in Investigation Labs
- Completion of experiment recording sheet

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Life Cycle of a Butterfly	**Suggested Sequence: One Marking Period**

NJSLS:
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.

Science and Engineering Practices:
Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.
Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1)
Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in K– 2 builds on prior experiences and uses observations and texts to communicate new information.
Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. (1-LS1-2)

Connections to Nature of Science
Scientific Knowledge is Based on Empirical Evidence
Scientists look for patterns and order when making observations about the world. (1-LS1-2)

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. (1-LS1-1)
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. (1-LS1-2)
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. (1-LS1-1)
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. (1- LS3-1)
LS3.B: Variation of Traits

Crosscutting Concepts:
Patterns
Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2)
Structure and Function
The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1)
---------- **Connections to Engineering, Technology, and Applications of Science**

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

Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (1-LS1-1)

Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1)	

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Identify the various stages of the butterfly life cycle

Instructional Materials/Resources:

- Science text
- Unit kit
- Trade books

Suggested Vocabulary:
• Pupa • Cocoon • Larva • Caterpillar, • Egg • Chick • Hatch

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

- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Observe life cycle of butterfly
- Sequence life cycles
- Compare/contrast life cycles of different organisms

Extension Strategies/Activities:

- Jigsaw groupings –students turn and teach
- Class posters or chart, models, illustrations, diagrams, dioramas
- Related experiments (home or school)
- Oral presentations
- Provide a variety of trade books related to the unit
- Create and play review games
- Role playing

Modification Strategies/Activities:

Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:
CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and 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.
CRP11. Use technology to enhance productivity.

Cross-curricular Connections:

- Read related nonfiction books K.RI.10
- Write response to open-ended questions K.W.2
- Write informational research reports K.W.8
- Develop questioning techniques K.SL.3
- Make an oral presentation K.SL.4-6

Suggested Assessments:

Performance Task:

- Participation in Investigation Labs
- Completion of experiment recording sheet

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Weather & Water	**Suggested Sequence: One Marking Period**

NJSLS:

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.
K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time.
K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

Science and Engineering Practices:

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.
Make observations (firsthand or from media) to collect data that can be used to make comparisons. (K-PS3-1)

Constructing Explanations and Designing

Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.
Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem. (K-PS3- 2)

Analyzing and Interpreting Data
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.
Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-ESS2-1)
Engaging in Argument from Evidence Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).
Construct an argument with evidence to support a claim. (K-ESS2-2)

Connections to Nature of Science
Scientific Investigations Use a Variety of Methods

Scientists use different ways to study the world. (K-PS3-1)
Scientists look for patterns and order when making observations about the world. (K-ESS2-1)

Disciplinary Core Ideas:	**Crosscutting Concepts:**
PS3.B: Conservation of Energy and Energy Transfer Sunlight warms Earth's surface. (K-PS3-1), (K-PS3-2) **ESS2.D: Weather and Climate** Weather is the 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. (K-ESS2-1) **ESS2.E: Bio geology** Plants and animals can change their environment. (K ESS2-2) **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. (secondary to K-ESS2-2)	**Cause and Effect** Events have causes that generate observable patterns. (K-PS3-1), (K-PS3-2) **Patterns** Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (K-ESS2-1) **Systems and System Models** Systems in the natural and designed world have parts that work together. (K-ESS2-2)

Knowledge, Skills, and Instructional Objectives:
SWBAT:
- Use observations to describe different kinds of weather patterns
- Explore observable weather patterns
- Use patterns as evidence to describe weather conditions
- Ask questions to find out about different kinds of weather
- Explore technologies meteorologists use to predict weather and sever weather conditions

Instructional Materials/Resources:	**Suggested Vocabulary:**
• Science text	Weather pattern, season, temperature, severe weather, weather forecast

• Unit kit • Trade books	**Technology:** 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. • Related websites • Web quests • Publishing programs • Images and videos • Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- **Identify the 4 main weather conditions (snowy, rainy, windy, sunny)**
- **Chart how weather changes during the week/month**
- **List the 4 seasons and the type of weather typical to each**
- **Use tools such as a thermometer, windsock to measure the weather on a typical day**
- **List the attributes of the major types of severe weather (thunderstorms, blizzards, hurricanes, tornadoes)**
- **Watch a weather forecast and identify the things it tells**
- **Describe how a weather forecast can be used to determine the weather and prepare for it**

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas • Related experiments (home or school) • Oral presentations • Provide a variety of trade books related to the unit • Create and play review games • Role playing	Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.
CRP11. Use technology to enhance productivity.

Cross-curricular Connections:

- Read related nonfiction books K.RI.10
- Write response to open-ended questions K.W.2
- Write informational research reports K.W.8
- Develop questioning techniques K.SL.3
- Make an oral presentation K.SL.4-6

Suggested Assessments:

Performance Task:

- Participation in Investigation Labs
- Completion of experiment recording sheet
- Weekly/monthly weather record sheet

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Magnetism & Forces of Motion	**Suggested Sequence: One Marking Period**

NJSLS:
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.

Science and Engineering Practices:

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.
With guidance, plan and conduct an investigation in collaboration with peers. (K-PS2-1)
Analyzing and Interpreting Data Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.
Analyze data from tests of an object or tool to determine if it works as intended. (K-PS2-2)

Connections to Nature of Science Scientific Investigations Use a Variety of Methods

Scientists use different ways to study the world. (K-PS2-1)

Disciplinary Core Ideas:

PS2.A: Forces and Motion
Pushes and pulls can have different strengths and directions. (KPS2-1), (K-PS2-2)
Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (K-PS2-1), (K-PS2-2)

PS2.B: Types of Interactions
When objects touch or collide, they push on one another and can change motion. (K-PS2-1)

PS3.C: Relationship Between Energy and Forces
A bigger push or pull makes things speed up or slow down more quickly. (secondary to K-PS2-1)

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. (secondary to KPS2-2)

Crosscutting Concepts:

Cause and Effect
Simple tests can be designed to gather evidence to support or refute student ideas about causes. (K-PS2- 1),(K-PS2-2)

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- gain an understanding of natural laws as they apply to motion, forces, and energy transformations.
- investigate properties of items to determine what is magnetic and what is not.
- identify the poles of a magnet.

- recognize that a magnet can attract things and have different strengths.
- Plan and conduct an investigation about the speed of objects
- Gather evidence to support or refute ideas about what causes motion
- Analyze data from tests to determine if a tool works as intended
- Explore pushes and pulls of different strengths and their effect on objects

Instructional Materials/Resources:

- Science text
- Unit kit
- Trade books

Suggested Vocabulary:
Motion, speed, directions, force, attract

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

- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- **Use various objects to demonstrate the difference between push/pull & fast/slow**
- **Use balls/blocks to show how objects move in different directions**
- **Use various objects/blocks to show how objects can move fast/slow**
- **Use magnets to test if an object is metal (attracts) or nonmetal (repels)**

Extension Strategies/Activities:

- Jigsaw groupings –students turn and teach
- Class posters or chart, models, illustrations, diagrams, dioramas
- Related experiments (home or school)
- Oral presentations
- Provide a variety of trade books related to the unit
- Create and play review games
- Role playing

Modification Strategies/Activities:

Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:
CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.
CRP11. Use technology to enhance productivity.

Cross-curricular Connections:

- Read related nonfiction books K.RI.10
- Write response to open-ended questions K.W.2
- Write informational research reports K.W.8
- Develop questioning techniques K.SL.3
- Make an oral presentation K.SL.4-6

Suggested Assessments:

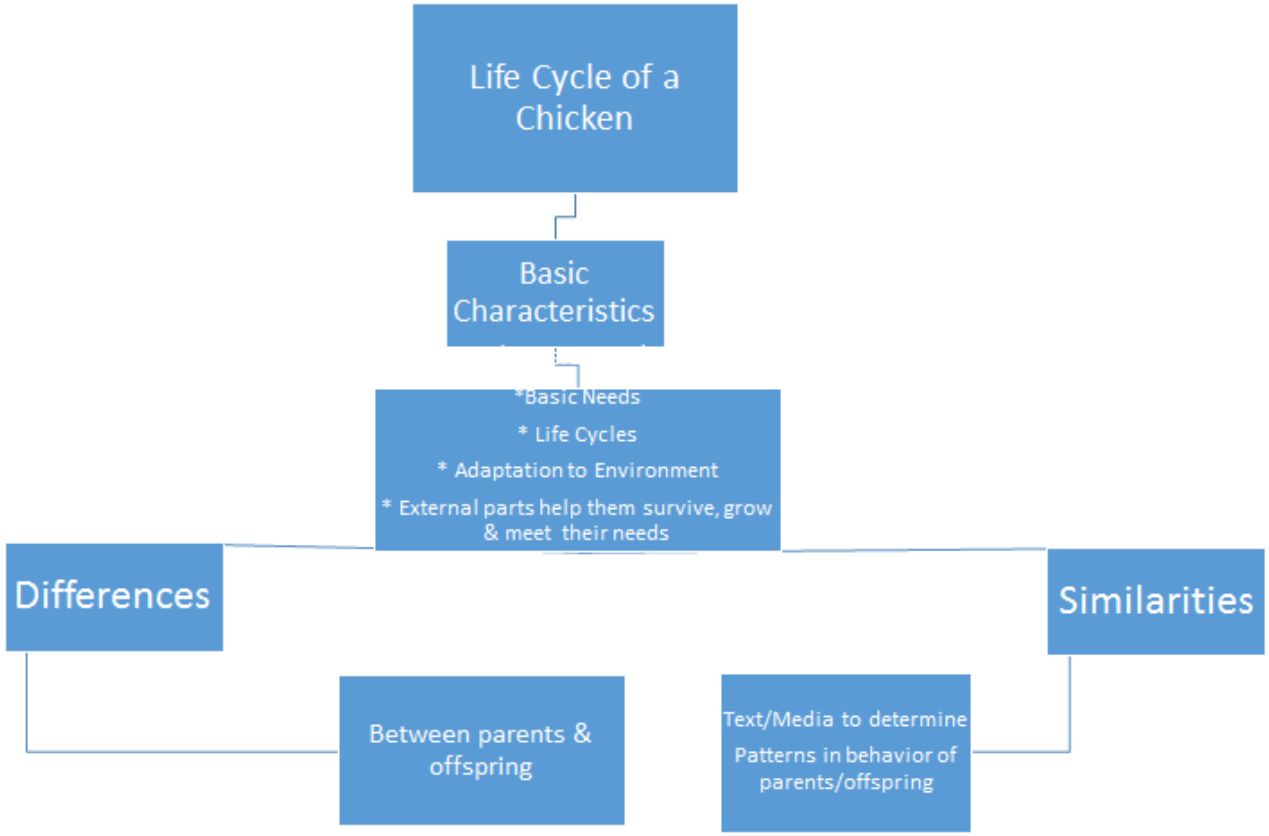
Performance Task:

- Participation in Investigation Labs
- Completion of experiment recording sheet
- Weekly/monthly weather record sheet

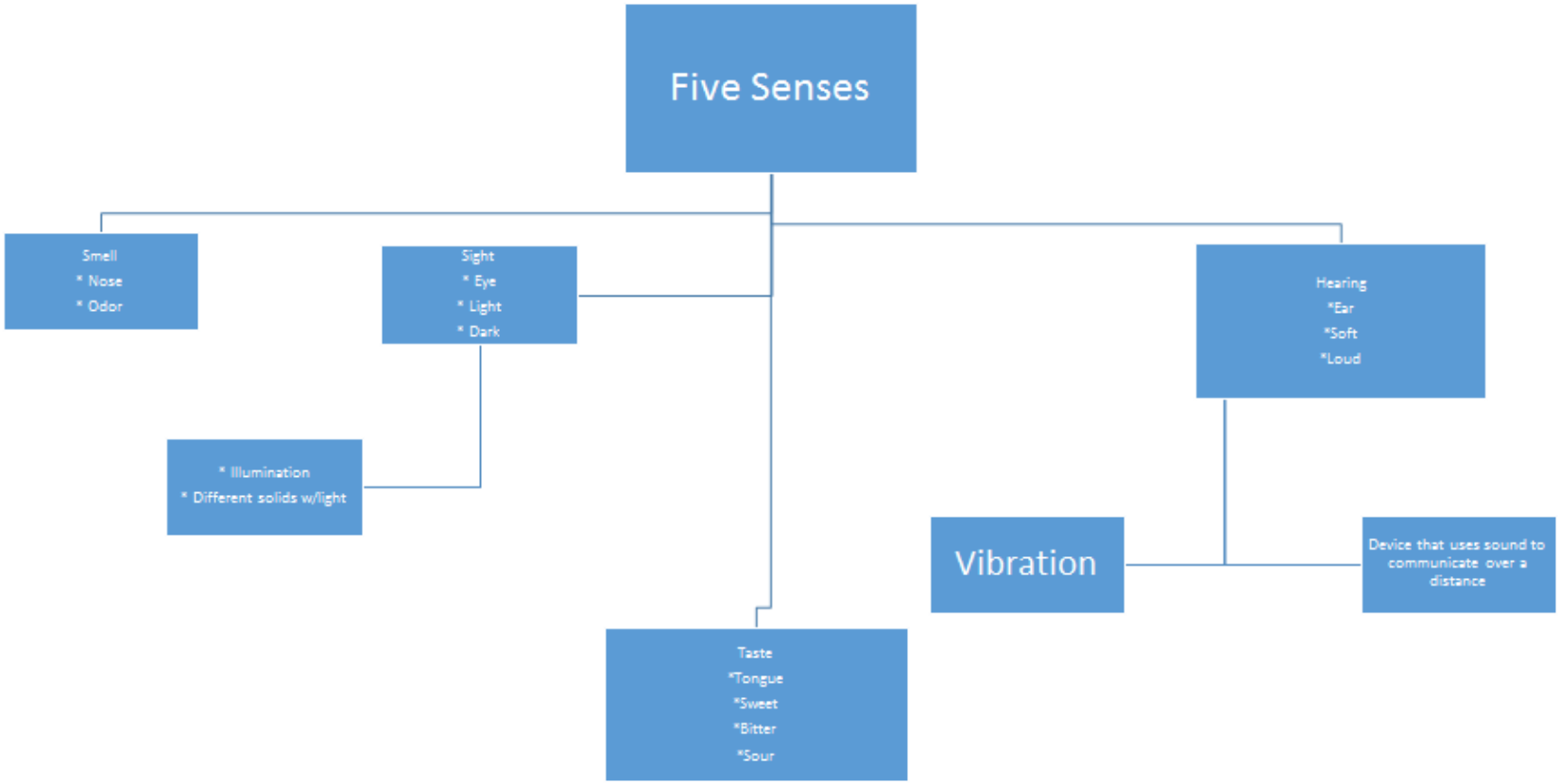
Other Assessment Evidence:

- Text or teacher prepared assessment

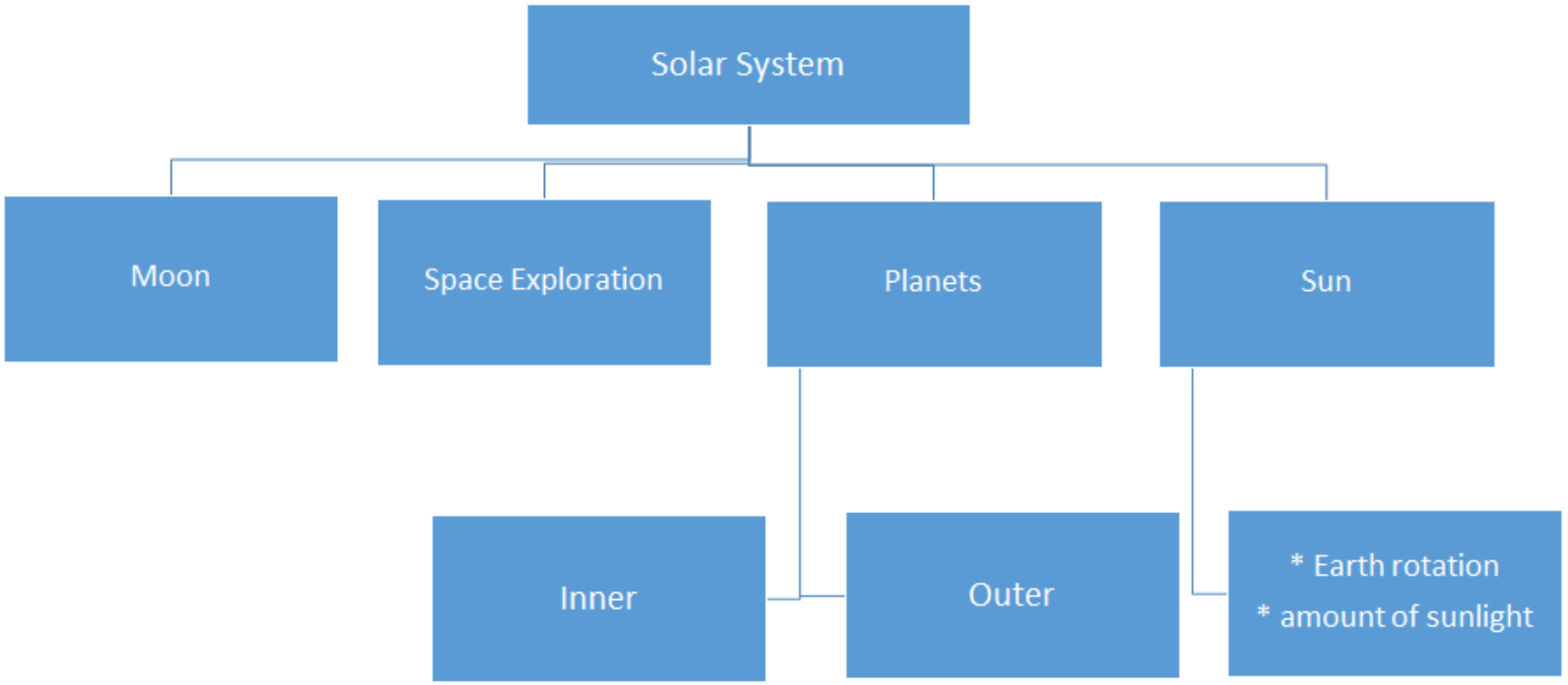
Life Cycle- Chicken



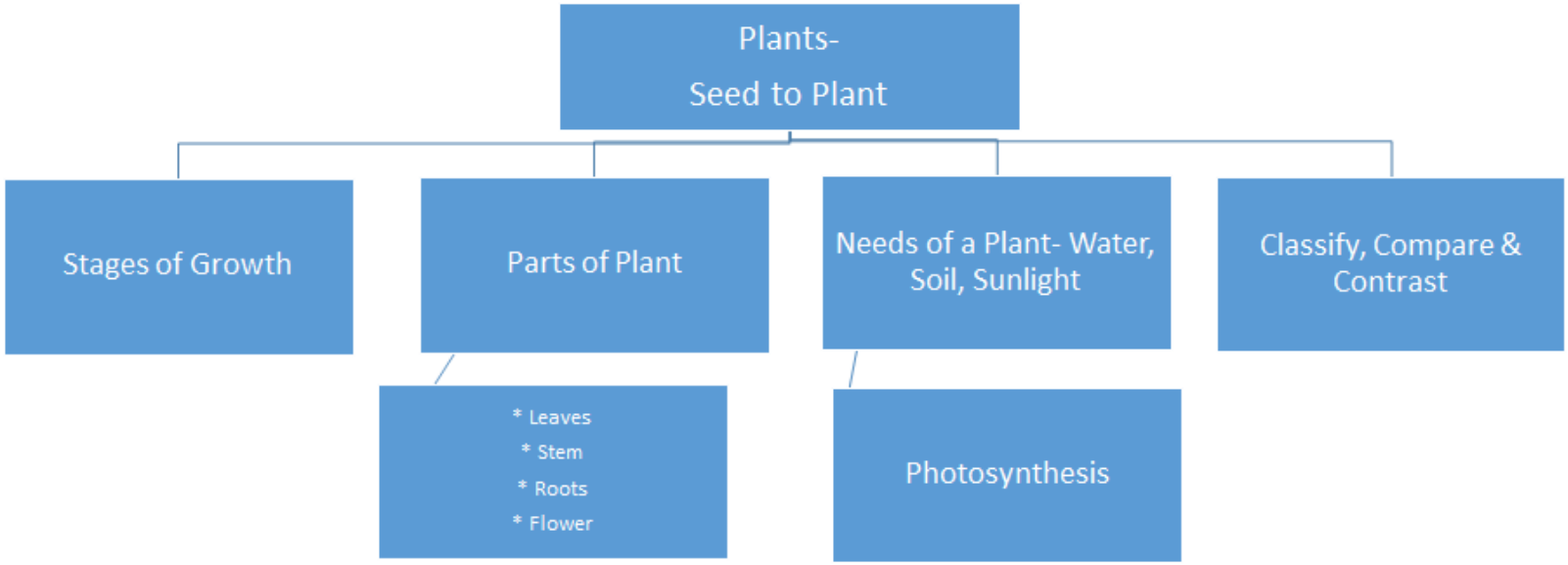
Five Senses


Five Senses
Smell
* Nose
* Odor
Sight
* Eye
* Light
* Dark
* Illumination
* Different solids w/light
Hearing
*Ear
*Soft
*Loud
Vibration
Device that uses sound to communicate over a distance
Taste
*Tongue
*Sweet
*Bitter
*Sour

Solar System



Plants - Seed to Plant



Theme/Unit: Seed to Plant	**Suggested Sequence: One Marking Period**

NJSLS:
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.
2.1.2.PP.1 Define reproduction (via life cycle of plants)

Science and Engineering Practices:
Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. χ Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-LS3-1)
χ Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1)
Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in K– 2 builds on prior experiences and uses observations and texts to communicate new information.
χ Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. (1-LS1-2)
Connections to Nature of Science
Scientific Knowledge is Based on Empirical Evidence
χ Scientists look for patterns and order when making observations about the world. (1-LS1-2)

Disciplinary Core Ideas:
LS1.A: Structure and Function
χ 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. (1-LS1-1)
LS1.B: Growth and Development of Organisms
χ 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. (1-LS1-2)
LS1.D: Information Processing
χ Animals have body parts that capture and convey different kinds of information needed for growth and

Crosscutting Concepts:
Patterns
χ Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2), (1-LS3- 1)
Structure and Function
χ The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1)

Connections to Engineering, Technology, and Applications of Science Influence of Engineering, Technology, and Science on Society and the Natural World
χ Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (1-LS1-1)

survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1)

LS3.A: Inheritance of Traits

χ Young animals are very much, but not exactly, like their parents. Plants also are very much, but not exactly, like their parents. (1- LS3-1)

LS3.B: Variation of Traits

χ Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1)

Knowledge, Skills, and Instructional Objectives:

SWBAT:

- Describe how parts of a plant help it to survive and grow
- Explain how parts of an animal help it to survive and grow
- Relate the shape and stability of structures to their functions
- Use evidence to describe how plants and animals process and respond to information
- Describe how human made products are designed by applying knowledge of the natural world
- Use observations to design a solution to a human problem by mimicking how plants use their parts to survive
- Identify the life cycle of a plant

Instructional Materials/Resources:

- Science text
- Unit kit
- Trade books

Suggested Vocabulary: mimic, gills,, lungs adaptation, environment

Technology:

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

- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Identify the parts of a plant
- Tell how the shape of a plant helps it to survive in its environment

- Identify different body parts on various animals and tell how those body parts allow the animal to survive
- List was animals can hide from danger based on their characteristics and environment
- Compare how an animal uses it body and characteristics to survive with how a human adapts to survive
- List various parts of an animal that help it meet its basic needs (find food, eat, drink, breathe)
- Tell plants and animals more or adapt to survive their changing environment

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Construct a house that provides protection and the things an animal would need to survive in a variety of conditions/environments • Oral presentations • Provide a variety of trade books related to the unit	Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.
CRP11. Use technology to enhance productivity.

Cross-curricular Connections:

- ELA/Literacy – RI.1.1 Ask and answer questions about key details in a text. (1-LS1-2), (1-LS3-1) RI.1.2 Identify the main topic and retell key details of a text. (1-LS1-2) RI.1.10 With prompting and support, read informational texts appropriately complex for grade. (1-LS1-2) W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-LS1- 1), (1-LS3-1) W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-LS3-1)
- Mathematics – MP.2 Reason abstractly and quantitatively. (1-LS3-1) MP5 Use appropriate tools strategically. (1-LS3-1) 1.NBT.B.3 Compare two two-digit numbers based on the meanings of the tens and one digits, recording the results of comparisons with the symbols $>$, $=$, and $<$. (1-LS1-2) 1.NBT.C.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning uses. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. (1- LS1-2) 1.NBT.C.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. (1-LS1-2) 1.NBT.C.6 Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain

the reasoning used. (1-LS1-2) 1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-LS3-1)
Suggested Assessments: Performance Task: • Participation in Investigation Labs • Completion of experiment recording sheet • Text or teacher prepared assessment Other Assessment Evidence: • Text or teacher prepared assessment

Theme/Unit: Life Cycle of a Chicken	**Suggested Sequence: One Marking Period**

NJSLS:
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.
2.1.2.PP.1 Define reproduction (via life cycle of animals)

Science and Engineering Practices:
Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. χ Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-LS3-1)
χ Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1)
Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in K– 2 builds on prior experiences and uses observations and texts to communicate new information.
χ Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. (1-LS1-2)
Connections to Nature of Science
Scientific Knowledge is Based on Empirical Evidence
χ Scientists look for patterns and order when making observations about the world. (1-LS1-2)

Disciplinary Core Ideas:
LS1.A: Structure and Function
χ 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. (1-LS1-1)
LS1.B: Growth and Development of Organisms
χ 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. (1-LS1-2)
LS1.D: Information Processing
χ Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with

Disciplinary Core Ideas:
LS1.A: Structure and Function
χ 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. (1-LS1-1)
LS1.B: Growth and Development of Organisms
χ 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. (1-LS1-2)
LS1.D: Information Processing
χ 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. (1-LS1-1) **LS3.A: Inheritance of Traits** χ Young animals are very much, but not exactly, like their parents. Plants also are very much, but not exactly, like their parents. (1- LS3-1) **LS3.B: Variation of Traits** χ Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1)	behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1) **LS3.A: Inheritance of Traits** χ Young animals are very much, but not exactly, like their parents. Plants also are very much, but not exactly, like their parents. (1- LS3-1) **LS3.B: Variation of Traits** χ Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1)

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Compare young plants with parent plants
- Observe patterns to explain how plants of the same kind are alike and different
- Compare young animals with parent animals
- Observe patterns to explain how animals of the same kind are alike and different
- Describe how plants and animals respond to their environments to meet their needs
- Describe how behavior patterns of parents and offspring help offspring survive

Instructional Materials/Resources:

- Science text
- Unit kit
- Trade books

Suggested Vocabulary:
Parent offspring, trait, behavior, egg, hatch, incubate, chick

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

- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Observe life cycle of chicken
- Sequence life cycles
- Compare/contrast life cycles of different organisms
- Match parent animals with their offspring

Extension Strategies/Activities:	**Modification Strategies/Activities:**

• Class Book –illustrate the life cycle • Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas • Related experiments (home or school) • Oral presentations • Provide a variety of trade books related to the unit	Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.
CRP11. Use technology to enhance productivity.

Cross-curricular Connections:

- ELA/Literacy – RI.1.1 Ask and answer questions about key details in a text. (1-LS1-2), (1-LS3-1) RI.1.2 Identify the main topic and retell key details of a text. (1-LS1-2) RI.1.10 With prompting and support, read informational texts appropriately complex for grade. (1-LS1-2) W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-LS1- 1), (1-LS3-1) W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-LS3-1)
- Mathematics – MP.2 Reason abstractly and quantitatively. (1-LS3-1) MP5 Use appropriate tools strategically. (1-LS3-1) 1.NBT.B.3 Compare two two-digit numbers based on the meanings of the tens and one digits, recording the results of comparisons with the symbols $>$, $=$, and $<$. (1-LS1-2) 1.NBT.C.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning uses. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. (1- LS1-2) 1.NBT.C.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. (1-LS1-2) 1.NBT.C.6 Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. (1-LS1-2) 1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-LS3-1)

Suggested Assessments:

Performance Task:

- Participation in Investigation Labs

• Completion of experiment recording sheet Other Assessment Evidence: • Text or teacher prepared assessment

Theme/Unit: Five Senses/Matter	**Suggested Sequence: One Marking Period**
NJSLS: **1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.** **1-PS4-2. Make observations to construct an evidence-based account that objects can be seen only when illuminated.** **1-PS4-3. Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.** **1-PS4-4. Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.**	
Science and Engineering Practices: **Planning and Carrying Out Investigations** Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. χ Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question. (1-PS4-1), (1-PS4-3) **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. χ Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena (1-PS4- 2) χ Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) **Connections to Nature of Science** **Scientific Investigations Use a Variety of Methods** χ Science investigations begin with a question. (1-PS4-1) χ Scientists use different ways to study the world. (1-PS4-1)	
Disciplinary Core Ideas: **PS4.A: Wave Properties** ♣Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1) **PS4.B: Electromagnetic Radiation** ♣Objects can be seen if light is available to illuminate them or if they give off their own light. (1-PS4-2) ♣Some materials allow light to pass through them, others allow only some light through and others block	**Crosscutting Concepts:** **Cause and Effect** χ Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1), (1-PS4-2), (1-PS4-3) **Connections to Engineering, Technology, and Applications of Science**

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. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (1- PS4-3) **PS4.C: Information Technologies and Instrumentation** ♣People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)	**Influence of Engineering, Technology, and Science, on Society and the Natural World** χ People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4)

Knowledge, Skills, and Instructional Objectives:

SWBAT:

- Identify which senses are used to recognize different stimuli
- Explain how the five senses help us learn.
- Explore the relationship between sound and vibration
- Compare the volume and pitch of different sounds
- Investigate how sound makes materials move
- Identify ways people communicate using sound
- Explore how technology is used to help people communicate with sound over distances
- Provide evidence based on observations of the relationship between the amount of light and how an object is seen
- Explain, using evidence based on observations, why objects that give off their own light can be seen in the dark
- Explain and demonstrate how different materials can allow different amounts of light to pass through
- Explain how shadows are made
- Observe that light shines in a straight line until it hits an object
- Explore how reflection can be used to redirect light
- Explore how technology is used to send and receive information using light

Instructional Materials/Resources:	**Suggested Vocabulary:**
● Science text ● Unit kit	Sound, vibrate, volume, pitch, communicate, light, shadow, reflect

• Trade books	**Technology:** 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. • Related websites • Web quests • Publishing programs • Images and videos • Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Use various objects to create sounds of different pitch
- List various ways people and animals communicate using sound
- Compare/contrast the difference between light and darkness
- Use various objects to show how light can change (brighter, darker)
- Test various objects to determine if they block light or let light in
- Use various light sources to create different shadows on objects

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Class Book • Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas • Related experiments (home or school) • Oral presentations	Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.
CRP11. Use technology to enhance productivity.

Cross-curricular Connections:

- ELA/Literacy – W.1.2 Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure. (1-PS4-2) W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-PS4- 1), (1-PS4-2), (1-PS4-3), (1-PS4-4) W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-PS4-1), (1-PS4-2), (1- PS4-3) SL.1.1 Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. (1-PS4-1), (1-PS4-2), (1- PS4-3)
- Mathematics – MP5 Use appropriate tools strategically. (1-PS4-4) 1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object. (1-PS4-4) 1.MD.A.2 Express the length of an object as a whole number of length units, by layering multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. (1-PS4-4)

Suggested Assessments:

Performance Task:

- Participation in Investigation Labs
- Completion of experiment recording sheet

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Solar System	**Suggested Sequence: One Marking Period**

NJSLS:
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.

Science and Engineering Practices:

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

χ Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1-ESS1-2)

Analyzing and Interpreting Data

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

χ Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1- ESS1-1)

Disciplinary Core Ideas:	**Crosscutting Concepts:**
ESS1.A: The Universe and its Stars χ Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1) **ESS1.B: Earth and the Solar System** χ Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)	**Patterns** χ Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-ESS1-1), (1-ESS1-2) **Connections to Nature of Science** **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** χ Science assumes natural events happen today as they happened in the past. (1-ESS1-1) χ Many events are repeated. (1-ESS1-1)

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Identify and describe objects in the sky
- Use evidence to describe predictable patterns of the sun, moon, and stars
- Observe and model patterns of the moon's phases
- Use observations to describe characteristics of each season
- Predict patterns of change that take place from season to season
- Use observations to compare the amount of daylight from season to season
- Explore how seasons affect people and animals

Instructional Materials/Resources:	**Suggested Vocabulary:**
• Science text	Star, sun, moon, phases, season

• Unit kit • Trade books	**Technology:** 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. • Related websites • Web quests • Publishing programs • Images and videos • Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Compare/contrast day and night sky
- Identify and draw the phases of the moon
- Create a chart to show characteristics and how the moon and sun change with the 4 seasons

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Class Book • Computer project – web quest, write a report using word processing software. • Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas • Related experiments (home or school) • Oral presentations	Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.
CRP11. Use technology to enhance productivity.

Cross-curricular Connections:

- ELA/Literacy – W.1.7 Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1- ESS1-1), (1-ESS1-2) W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-ESS1-1), (1-ESS1-2)
- Mathematics – MP.2 Reason abstractly and quantitatively. (1-ESS1-2) MP4 Model with mathematics. (1-ESS1-2) MP5 Use appropriate tools strategically. (1-ESS1-2) 1. OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations to represent the problem. (1-ESS1-2) 1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. (1-ESS1-2)

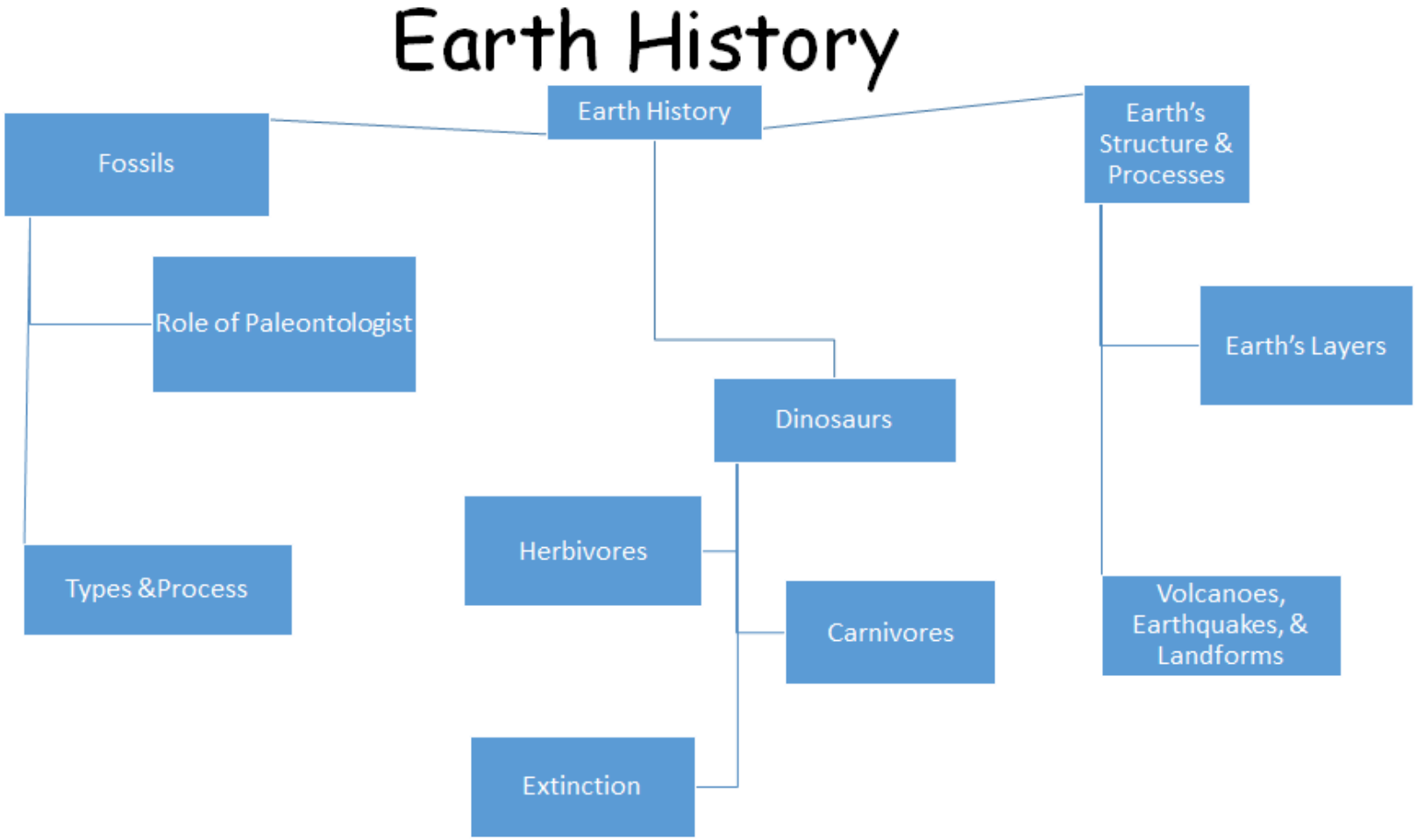
Suggested Assessments:

Performance Task:

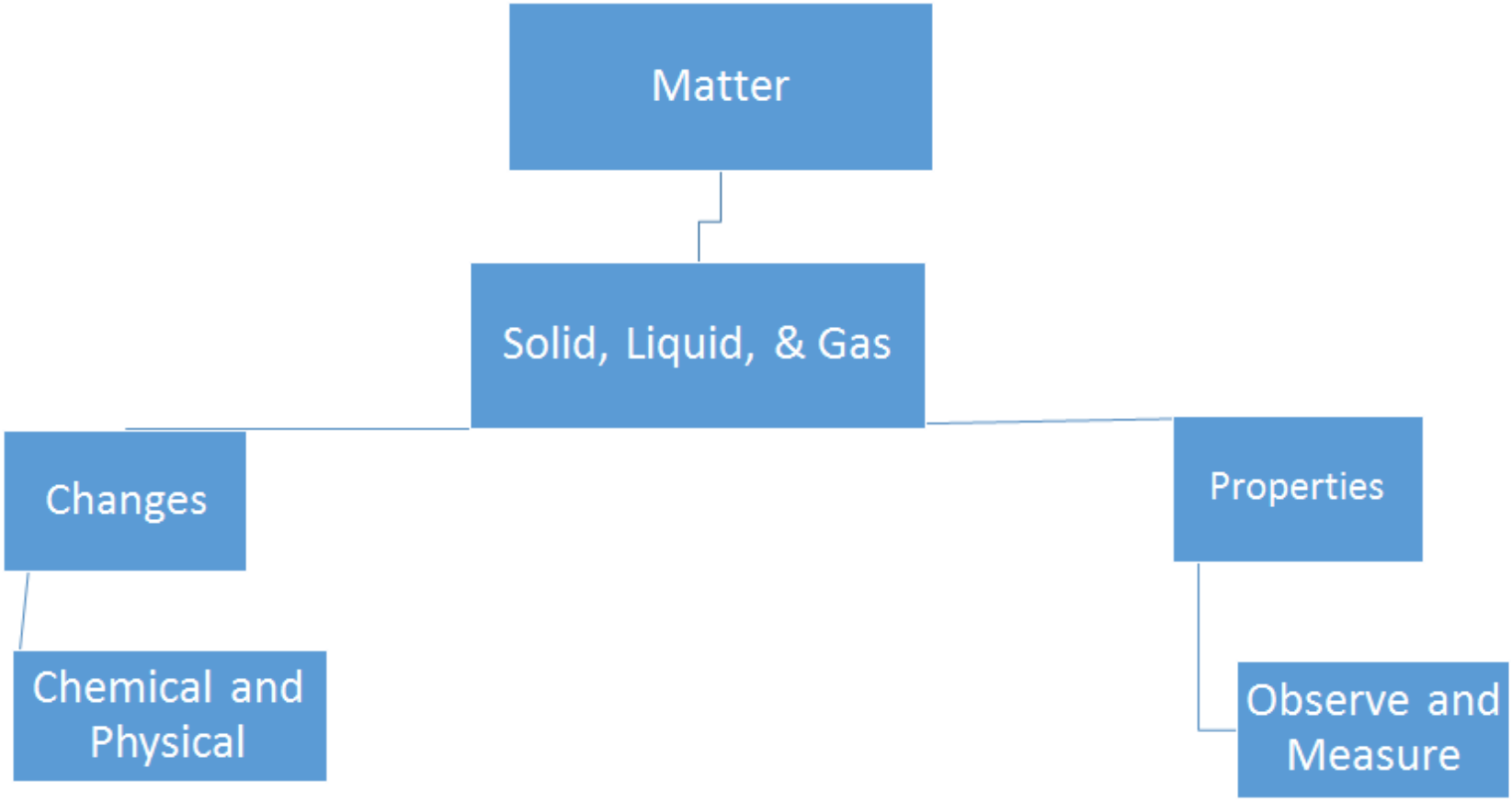
- Seasons/moon chart
- Participation in Investigation Labs
- Completion of experiment recording sheet

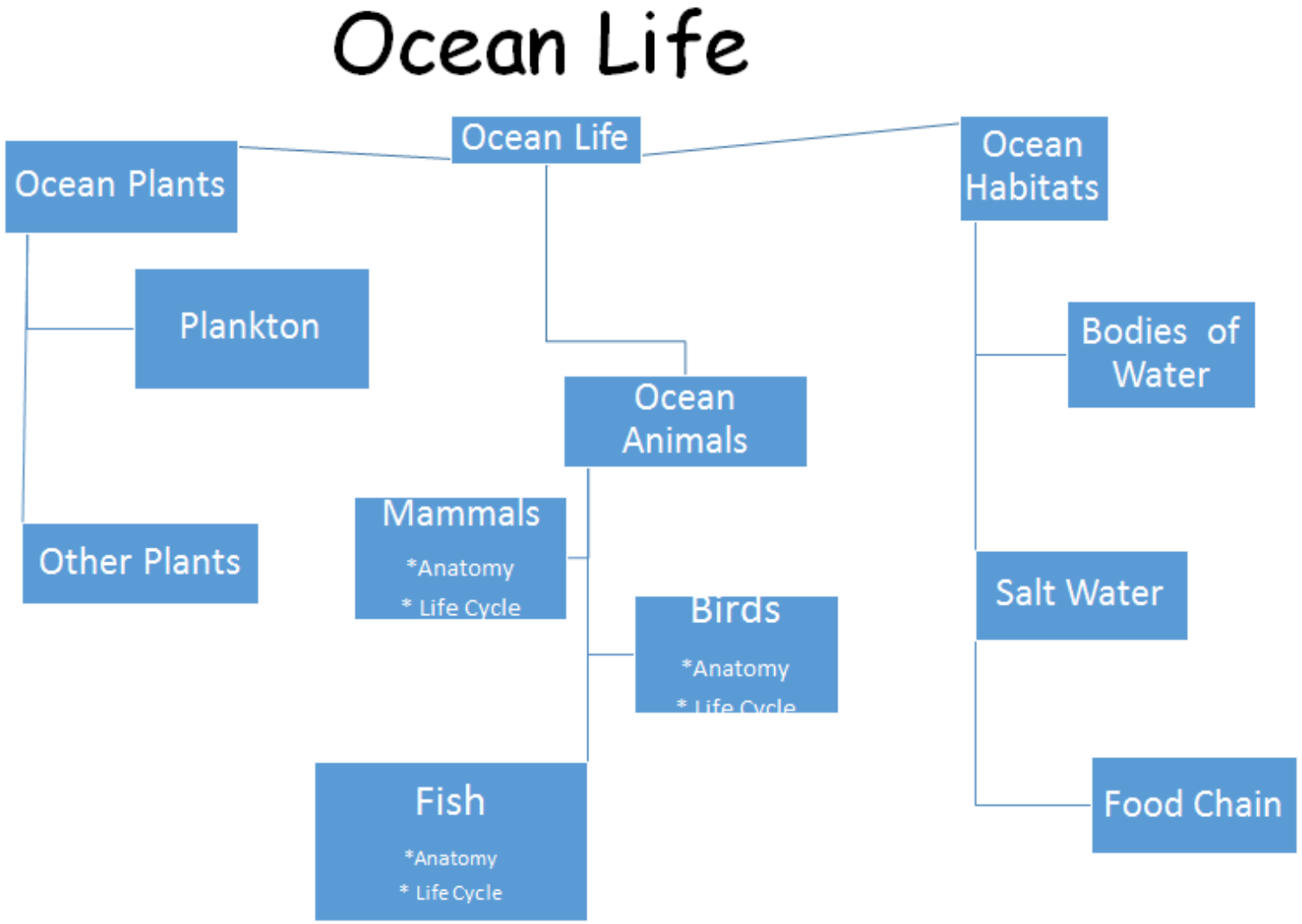
Other Assessment Evidence:

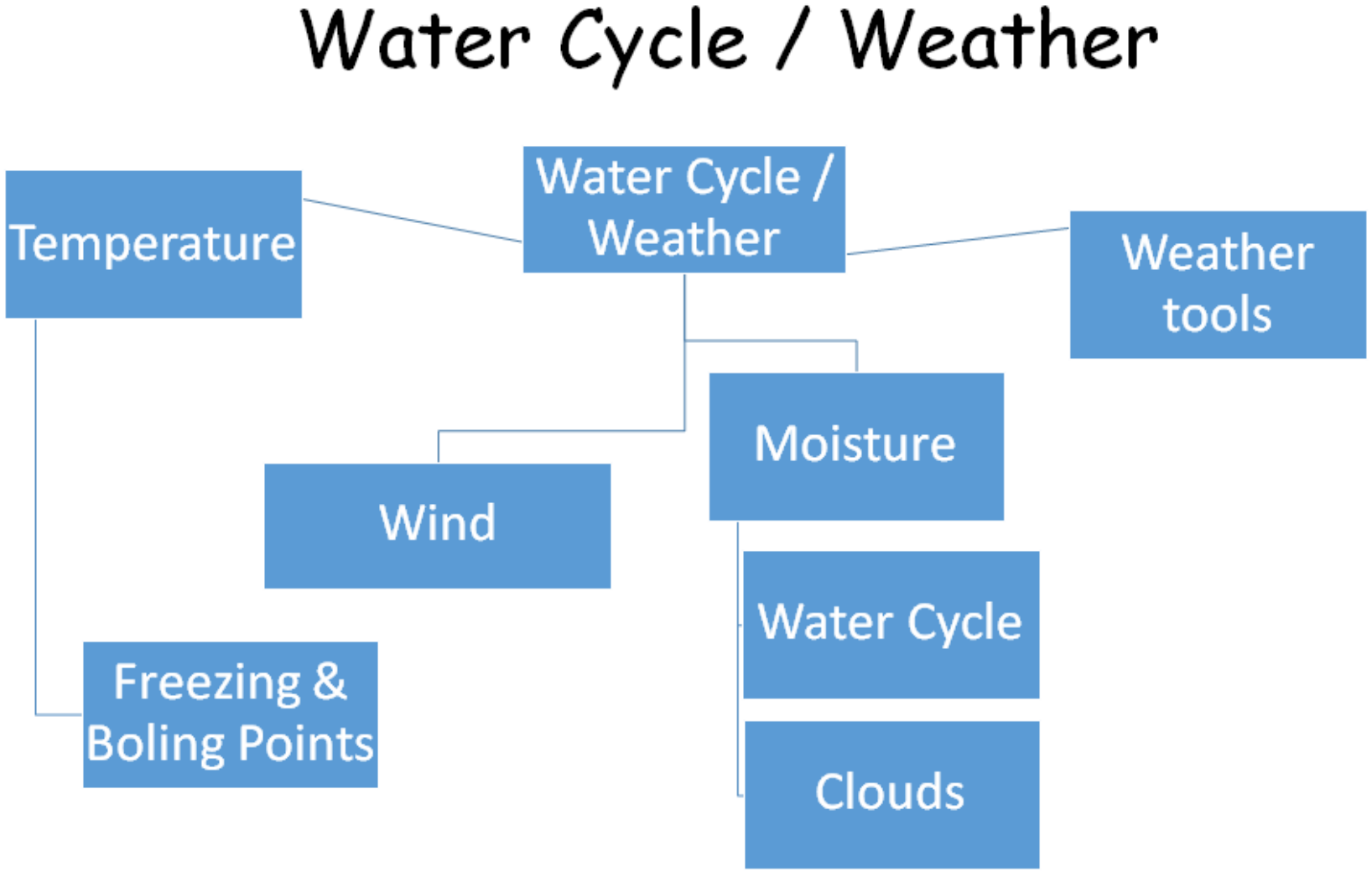
- Text or teacher prepared assessment


Earth History
Earth History
Fossils
Role of Paleontologist
Types &Process
Dinosaurs
Herbivores
Carnivores
Extinction
Earth's Structure & Processes
Earth's Layers
Volcanoes, Earthquakes, & Landforms

Matter


Matter
Solid, Liquid, & Gas
Changes
Chemical and Physical
Properties
Observe and Measure


Ocean Life
Ocean Life
Ocean Plants
Plankton
Other Plants
Ocean Animals
Mammals
*Anatomy
* Life Cycle
Birds
*Anatomy
Fish
*Anatomy
* Life Cycle
Ocean Habitats
Bodies of Water
Salt Water
Food Chain


Water Cycle / Weather
Water Cycle / Weather
Temperature
Weather tools
Moisture
Wind
Water Cycle
Freezing & Boling Points
Clouds

<table>
<tr><th>Theme/Unit: Ocean Life</th><th>Suggested Sequence: One Marking Period</th></tr>
<tr><td colspan="2">NJSLS:
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.</td></tr>
<tr><td colspan="2">Science and Engineering Practices:
Developing and Using Models
Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.
● Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2)
Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.
● Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1)</td></tr>
<tr><td>Disciplinary Core Ideas:
LS2.A: Interdependent Relationships in Ecosystems
● Plants depend on water and light to grow. (2-LS2-1)
● Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)
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. (secondary to 2-LS2-2)</td><td>Crosscutting Concepts:
Cause and Effect
● Events have causes that generate observable patterns. (2-LS2-1)
Structure and Function
● The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2)</td></tr>
<tr><td colspan="2">Knowledge, Skills, and Instructional Objectives:
SWBAT:
● compare plants and animals for likes and differences.
● identify characteristics for classifying plants and animals.
● analyze and describe the life cycles of different animal groups.
● describe characteristics of ocean habitats, and how they meet the needs of plants and animals.
● compare and contrast saltwater and freshwater.
● name and locate the world’s oceans.
● distinguish between living and nonliving things.
● describe and give examples of ocean food chains</td></tr>
</table>

Instructional Materials/Resources:

- Science text
- Unit kit
- Trade books: Meet the Octopus by Sylvia M. James

The Coral Reef by Christine Economies

Suggested Vocabulary: Living, nonliving, mammal, reptile, amphibian, insect, life cycle, habitat, ocean, river, environment, food chain

Technology:

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

- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Shared reading of Harcourt textbook Chapters A 1-3
- Listen to book on tape – Meet the Octopus – select important facts.
- Shared reading of The Coral Reef and complete graphic organizer.
- Sorting sea shells based on their attributes.
- Visit to Jenkinson's Aquarium.
- Home Performance Assessment – Make a Model (diorama, poster) of an ocean habitat

Extension Strategies/Activities:

- Class Book – predict & illustrate ocean creature's description based upon his name.
- Computer project – web quest facts for chosen sea animals, write a report using word processing software.
- Layers of the ocean in a jar – experiment
- Jigsaw groupings –students turn and teach
- Class posters or chart, models, illustrations, diagrams, dioramas
- Related experiments (home or school)
- Oral presentations
- Provide a variety of trade books related to the unit

Modification Strategies/Activities:

Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.

CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.
CRP11. Use technology to enhance productivity.

Cross-curricular Connections:

- ELA/Literacy – W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-LS2-1), (2-LS4-1) W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-LS2-1), (2-LS4-1) SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (2-LS2-2)
- Mathematics – MP.2 Reason abstractly and quantitatively. (2-LS2-1), (2-LS4-1) MP4 Model with mathematics. (2-LS2-1), (2-LS2-2), (2-LS4-1) MP5 Use appropriate tools strategically. (2-LS2-1) 2.MD.D.10 Draw a picture graph and a bar graph

Suggested Assessments: Performance Task:

- Participation in Investigation Labs
- Completion of experiment recording sheet
- Label oceans on world map
- Depict levels of the ocean through poster or flip book Other Assessment Evidence:
- Text or teacher prepared assessment

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Earth History	**Suggested Sequence: One Marking Period**

NJSLS:
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.

Science and Engineering Practices:
Developing and Using Models
Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a model to represent patterns in the natural world. (2-ESS2-2)

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Make observations from several sources to construct an evidence-based account for natural phenomena (2-ESS1-1)
- Compare multiple solutions to a problem. (2-ESS2-1**)**

Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.

- Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3)

Disciplinary Core Ideas:
ESS2.A: Earth Materials and Systems

- Wind and water can change the shape of the land. (2- ESS2-1)

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. (2-ESS2- 2)

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. (2-ESS2-3)

ETS1.C: Optimizing the Design Solution

Crosscutting Concepts:
Patterns

- Patterns in the natural world can be observed. (2-ESS2-2), (2-ESS2-3)

Stability and Change

- Things may change slowly or rapidly. (2- ESS2-1)

---------- Connections to Engineering, Technology, and Applications of Science

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

- Developing and using technology has impacts on the natural world. (2-ESS2-1) ---------- Connections to Nature of Science

• Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (secondary to 2-ESS2-1)	**Science Addresses Questions About the Natural and Material World** • Scientists study the natural and material world. (2-ESS2-1)

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- determine how some kinds of fossils are made.
- describe what fossils are and where they are found.
- demonstrate how scientists collect and reconstruct fossils.
- explain what scientists learn from fossils.
- describe what scientists have learned about dinosaurs.
- sketch the layers of the earth.

Instructional Materials/Resources: • Science text • Unit kit • Trade books	**Suggested Vocabulary:** Volcano, earthquake, fossil, reconstruct, paleontologist, dinosaur, extinct **Technology:** 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. • Related websites • Web quests • Publishing programs • Images and videos • Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- • Use dinosaur models to observe and compare size, shape, and appearance.
- Read Harcourt textbook chapter: Earth Long Ago.
- Examine and discuss the Discovery Works display chart.
- Make fossil imprints using clay or plaster of Paris.
- Make a model of earth's layers using clay.
- Model the work of a paleontologist by separating chocolate chips from a cookie.
- Worksheet – reconstruct the skeleton of a dinosaur.

Extension Strategies/Activities: • Class Book – predict & illustrate dinosaur creature's description based upon his name.	**Modification Strategies/Activities:** Books on tape, visual clues, study guide, modified expectations, modified assessments, modified

• Computer project – web quest facts for chosen dinosaur, write a report using word processing software. • Layers of the earth in a jar– experiment • Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas • Related experiments (home or school) • Oral presentations • Provide a variety of trade books related to the unit	homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.
CRP11. Use technology to enhance productivity.

Cross-curricular Connections:

- ELA/Literacy – RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-ESS1-1) RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-ESS1-1), (2-ESS2-1) RI.2.9 Compare and contrast the most important points presented by two texts on the same topic. (2-ESS2-1) W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (2-ESS1-1), (2-ESS2-3) W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-ESS1-1) W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-ESS1-1), (2-ESS2-3) SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media. (2-ESS1-1) SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (2-ESS2-2)
- Mathematics – MP.2 Reason abstractly and quantitatively. (2-ESS2-1), (2-ESS2-1), (2-ESS2-2) MP4 Model with mathematics. (2-ESS1-1), (2-ESS2-1), (2-ESS2-2) MP5 Use appropriate tools strategically. (2-ESS2-1) 2.NBT.A Understand place value. (2-ESS1-1) 2.NBT.A.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. (2-ESS2-2) 2.MD.B.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem. (2-ESS2-1)

Suggested Assessments:

Performance Task:

- Dinosaur diorama or poster

- Participation in Investigation Labs
- Completion of experiment recording sheet

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Water Cycle/Weather	**Suggested Sequence: One Marking Period**

NJSLS:
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.

Science and Engineering Practices:
Developing and Using Models
Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a model to represent patterns in the natural world. (2-ESS2-2)

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Make observations from several sources to construct an evidence-based account for natural phenomena (2-ESS1-1)
- Compare multiple solutions to a problem. (2-ESS2-1**)**

Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.

- Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3)

Disciplinary Core Ideas:
ESS2.A: Earth Materials and Systems

- Wind and water can change the shape of the land. (2- ESS2-1)

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. (2-ESS2- 2)

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. (2-ESS2-3)

ETS1.C: Optimizing the Design Solution

Crosscutting Concepts:
Patterns

- Patterns in the natural world can be observed. (2-ESS2-2), (2-ESS2-3)

Stability and Change

- Things may change slowly or rapidly. (2- ESS2-1)

---------- Connections to Engineering, Technology, and Applications of Science

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

- Developing and using technology has impacts on the natural world. (2-ESS2-1) ---------- Connections to Nature of Science

• Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (secondary to 2-ESS2-1)	**Science Addresses Questions About the Natural and Material World** • Scientists study the natural and material world. (2-ESS2-1)

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- identify ways the weather can change from day to day.
- recognize how the weather changes from season to season.
- explain how water gets into the air.
- describe the water cycle.
- predict the weather using different kinds of clouds as indicators of weather changes.
- identify tools used to measure weather conditions.

Instructional Materials/Resources: • Science text • Unit kit • Trade books • The Cloud Book Weather Words	**Suggested Vocabulary:** Weather, water cycle, evaporate, water vapor, thermometer, temperature, stratus, cirrus, cumulus **Technology:** 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. • Related websites • Web quests • Publishing programs • Images and videos • Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Read Harcourt textbook chapter: Earth's Weather.
- Observe and record the week's weather.
- Make a rain gauge and measure/record the rainfall for the month.
- Act out the water cycle.
- Make a cloud picture to illustrate the 3 types of clouds.

Extension Strategies/Activities: • Class Book – predict & illustrate weather description based upon his name.	**Modification Strategies/Activities:** Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for

• Computer project – web quest facts for chosen weather event, write a report using word processing software. • Weather in a jar – experiment • Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas • Related experiments (home or school) • Oral presentations	spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.
CRP11. Use technology to enhance productivity.

Cross-curricular Connections:

• ELA/Literacy – RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-ESS1-1) RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-ESS1-1), (2-ESS2-1) RI.2.9 Compare and contrast the most important points presented by two texts on the same topic. (2-ESS2-1) W.2.6 With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (2-ESS1-1), (2-ESS2-3) W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-ESS1-1) W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-ESS1-1), (2-ESS2-3) SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media. (2-ESS1-1) SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (2-ESS2-2)

• Mathematics – MP.2 Reason abstractly and quantitatively. (2-ESS2-1), (2-ESS2-1), (2-ESS2-2) MP4 Model with mathematics. (2-ESS1-1), (2-ESS2-1), (2-ESS2-2) MP5 Use appropriate tools strategically. (2-ESS2-1) 2.NBT.A Understand place value. (2-ESS1-1) 2.NBT.A.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. (2-ESS2-2) 2.MD.B.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem. (2-ESS2-1)

Suggested Assessments:

Performance Task:

• Daily Weather Recording Sheet
• Participation in Investigation Labs

- Completion of experiment recording sheet

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: States of Matter	**Suggested Sequence: One Marking Period**

NJSLS:
2PS1-1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
2PS1-2 Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.
2PS1-3 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.
2PS1-4 Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.

Science and Engineering Practices:
Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-PS1-1)

Analyzing and Interpreting Data
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Analyze data from tests of an object or tool to determine if it works as intended. (2-PS1-2)

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3)

Engaging in Argument from Evidence
Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).

- Construct an argument with evidence to support a claim. (2- PS1-4)

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. (2-PS1-1)
- Different properties are suited to different purposes. (2- PS1-2), (2-PS1-3)
- A great variety of objects can be built up from a small set of pieces. (2-PS1-3) **PS1.B: Chemical Reactions**

Crosscutting Concepts:
Patterns

- Patterns in the natural and human designed world can be observed. (2-PS1-1)

Cause and Effect

- Events have causes that generate observable patterns. (2-PS1-4)
- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2-PS1-2)

Energy and Matter

• Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)	• Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (2-PS1-3) --- **Connections to Engineering, Technology, and Applications of Science** **Influence of Engineering, Technology, and Science on Society and the Natural World** • Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (2-PS1-2)

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Describe and classify materials by their observable properties
- Select and use materials based on these properties
- Use evidence to describe how heating and cooling cause changes to matter
- Use evidence to describe reversible and irreversible changes to matter
- Explore how an object can be taken apart and its pieces used to make another object

Instructional Materials/Resources: • Science text • Unit kit • Trade books	**Suggested Vocabulary:** Matter, property, solid, liquid, melt, freeze, reversible, irreversible **Technology:** 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. • Related websites • Web quests • Publishing programs • Images and videos • Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Introduce the 5 properties of matter to describe an object
- Create a chart of the 5 properties of matter and use it compare/contrast a variety of objects
- Use the properties of matter to describe the difference between a liquid and a solid
- Use a candle flame and ice to show how temperature can affect the states of matter
- Use magna tiles, blocks, Legos, etc. to show how objects can be put together and then taken apart to form new objects

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Class Book • Computer project – web quest, write a report using word processing software. • Weather in a jar – experiment • Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas • Related experiments (home or school) • Oral presentations	Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.
CRP11. Use technology to enhance productivity.

Cross-curricular Connections:

- ELA/Literacy – RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. (2-PS1-4) RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-PS1-4) RI.2.8 Describe how reasons support specific points the author makes in a text. (2-PS1-2), (2-PS1-4) W.2.1 Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, use linking words (e.g., because, and, also) to connect opinion and reasons, and provide a concluding statement or section. (2-PS1-4) W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-PS1-1), (2-PS1- 2), (2-PS1-3) W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-PS1-1), (2-PS1-2), (2-PS1-3)
- Mathematics – MP.2 Reason abstractly and quantitatively. (2-PS1-2) MP4 Model with mathematics. (2-PS1-1), (2-PS1-2) MP5 Use appropriate tools strategically. (2-PS1-2) 2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. (2-PS1-1),(2-PS1-2)

Suggested Assessments:

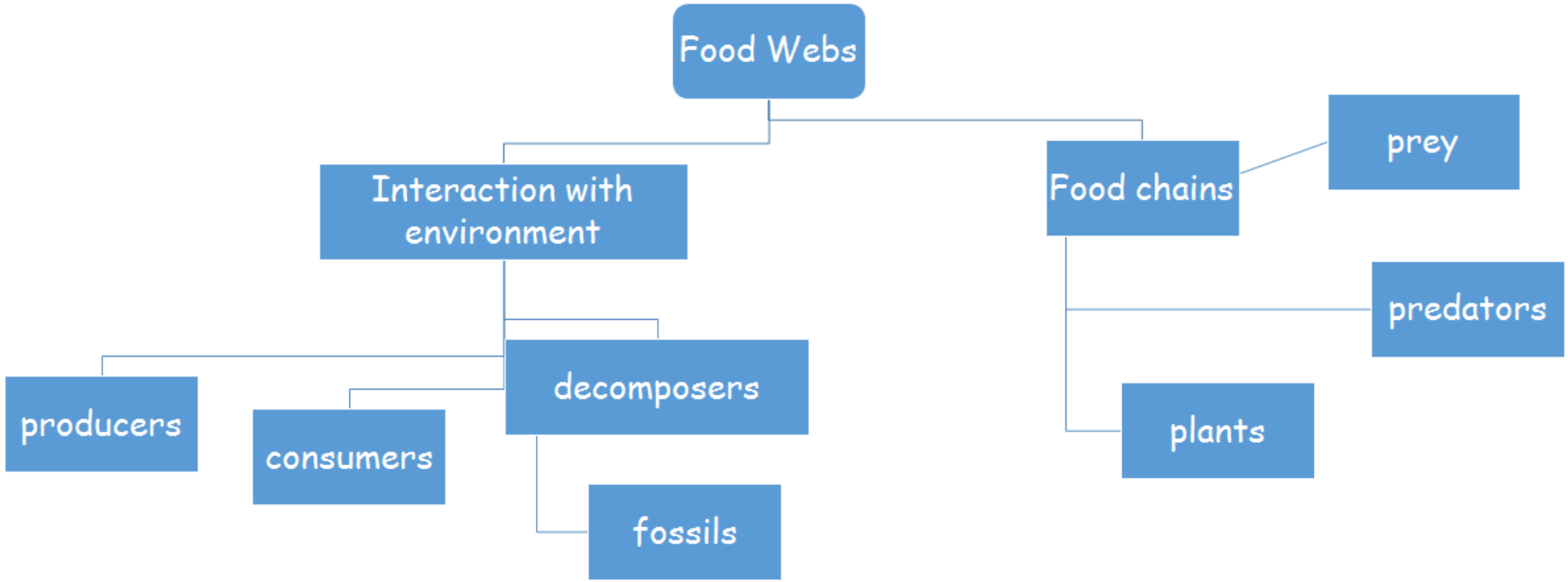
Performance Task:

- Matter properties chart
- Participation in Investigation Labs
- Completion of experiment recording sheet

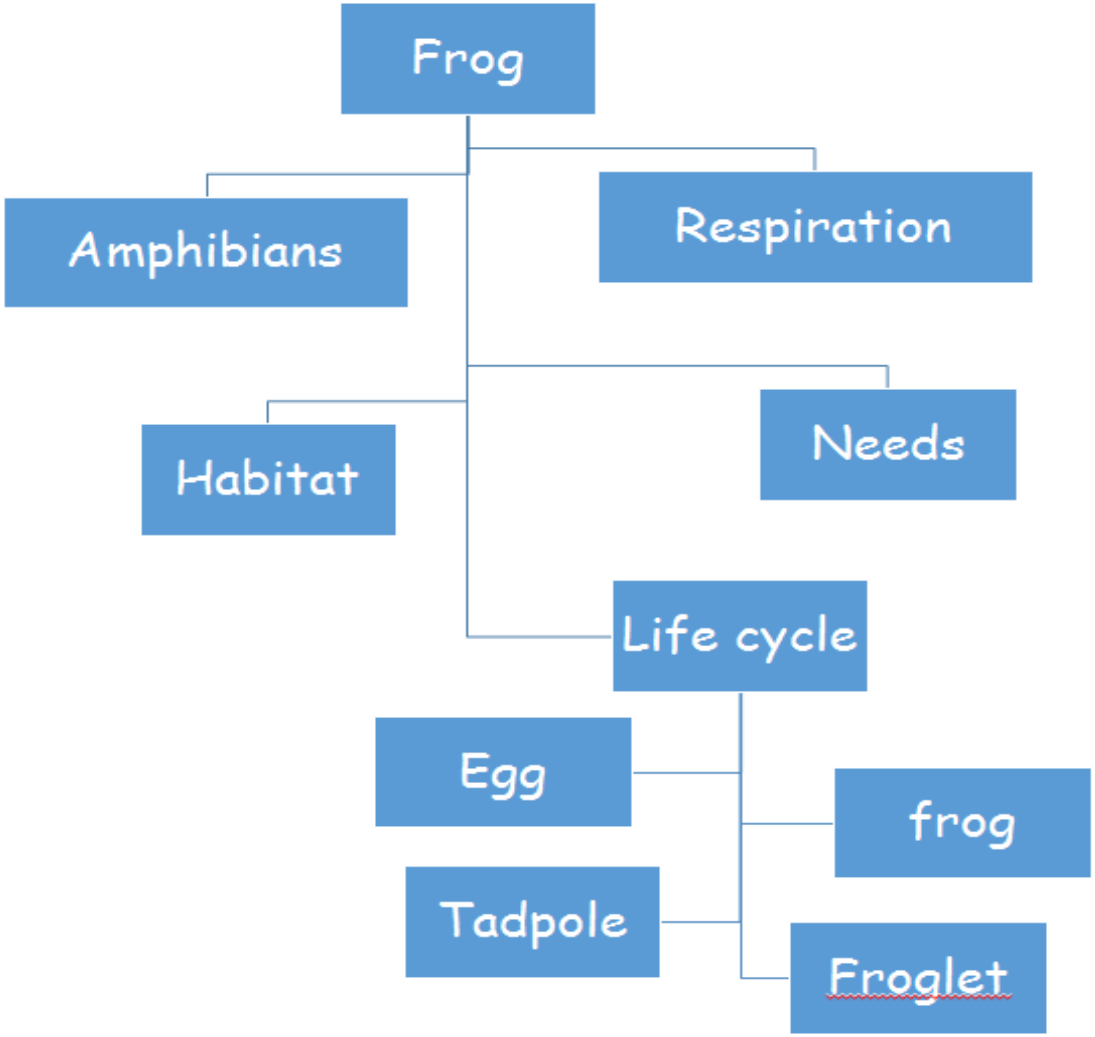
Other Assessment Evidence:

- Text or teacher prepared assessment

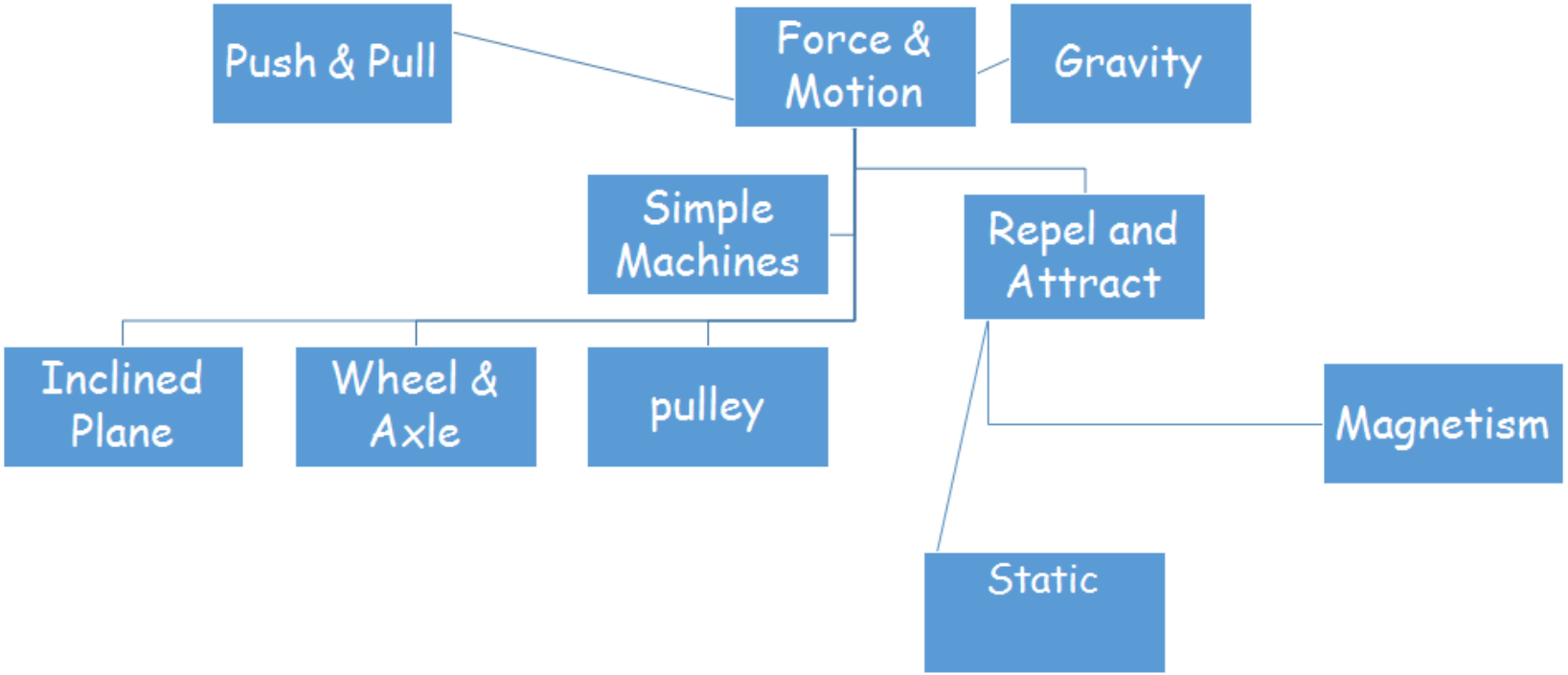
Food Webs


Food Webs
Interaction with environment
Food chains
prey
predators
plants
decomposers
producers
consumers
fossils

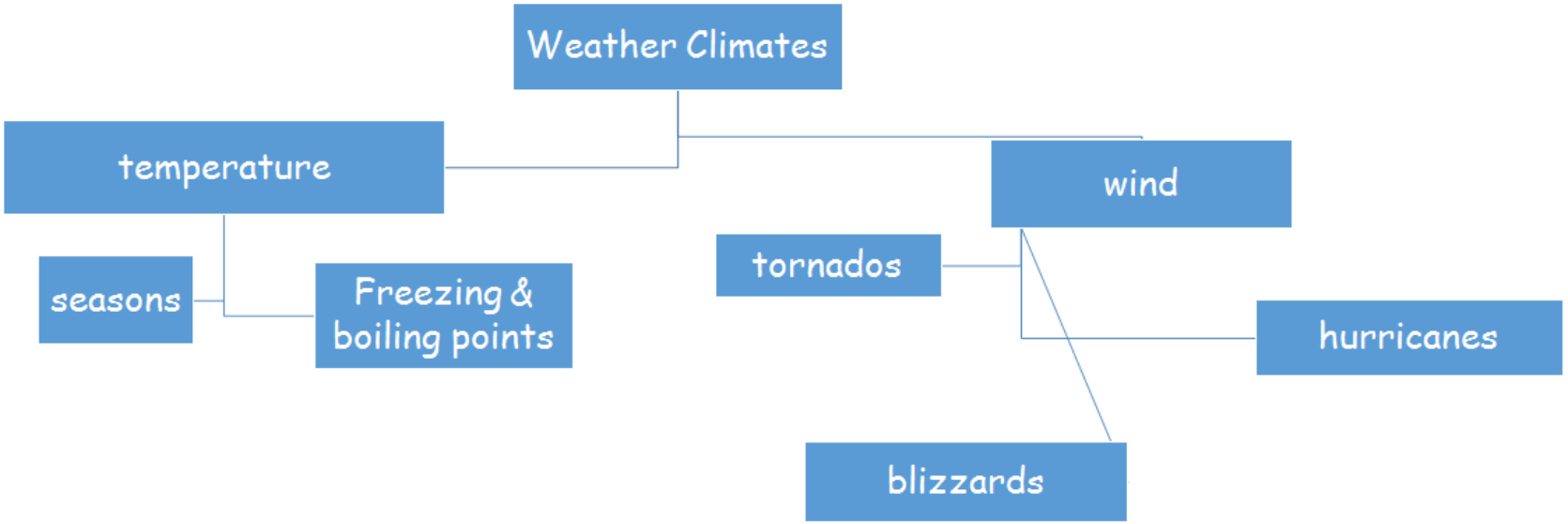
Life Cycle of a Frog



Force & Motion



Weather Climates



Theme/Unit: Food Webs	**Suggested Sequence: One Marking Period**

NJSLS:
3-LS2-1. Construct an argument that some animals form groups that help members survive.
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-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all
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.

Science and Engineering Practices:
Analyzing and Interpreting Data
Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.
χ Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS4-1)
Engaging in Argument from Evidence
Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed worlds.
χ Construct an argument with evidence, data, and/or a model. (3-LS2-1)
χ Construct an argument with evidence. (3-LS4-3)
χ Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-LS4-4)

Disciplinary Core Ideas:
LS2.C: Ecosystem Dynamics, Functioning, and Resilience
χ 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 into the transformed environment, and some die. (secondary to 3-LS4-4)
LS2.D: Social Interactions and Group Behavior
χ 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. (Note: Moved from K–2) (3-LS2-1)
LS4.A: Evidence of Common Ancestry and Diversity
χ Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (Note: Moved from K–2) (3-LS4-1)

Crosscutting Concepts:
Cause and Effect
χ Cause and effect relationships are routinely identified and used to explain change. (3-LS2- 1), (3-LS4-3)
Scale, Proportion, and Quantity
χ Observable phenomena exist from very short to very long time periods. (3-LS4-1)
Systems and System Models
χ A system can be described in terms of its components and their interactions. (3-LS4-4)

Connections to Engineering, Technology, and Applications of Science
Interdependence of Science, Engineering, and Technology
χ Knowledge of relevant scientific concepts and research findings is important in engineering. (3-LS4-4)

Connections to Nature of Science

χ Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1) **LS4.C: Adaptation** χ For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3) **LS4.D: Biodiversity and Humans** χ Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)	**Scientific Knowledge Assumes an Order and Consistency in Natural Systems** χ Science assumes consistent patterns in natural systems. (3-LS4-1)

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Explain and describe that the energy most living things get from food originated with the sun.
- Identify that all living things get energy from food.
- Recall characteristics of living things that help them get food.
- Recognize that more than one food chain exists in a community
- Explore inheritance and variation of traits in organisms
- Discover how different organisms adapt to their environment
- Identify the cause and effect of how organisms change when environments change
- Discover what fossils can tell us about animals that lived long ago
- Explore fossils

Instructional Materials/Resources: • Science text • Unit kit • Trade books	**Suggested Vocabulary:** food chain, food web, adaptation, camouflage, environment, habitat, mimicry, population, Interact, producer, consumer, decomposer, food chain, energy pyramid, predator, prey, fossil, extinct

	Technology: 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. • Related websites • Web quests • Publishing programs • Images and videos • Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Create a food chain & web to show how animals interact and energy is transferred
- Identify different traits animal have and tell how those traits allow them to interact with their environment
- List various ways animals can adapt to their environment
- List the things an animal needs to survive
- Tell what happens when an environment changes and what the animals and plants must do to survive
- List the ways a fossil can form
- Tell how fossils can identify where an animal lived and what they ate

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Class Book • Computer project – web quest facts • Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas • Related experiments (home or school) • Oral presentations • Provide a variety of trade books related to the unit	Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.
CRP11. Use technology to enhance productivity.

Cross-curricular Connections:

- ELA/Literacy – RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS2-1), (3-LS4-1), (3-LS4-3), (3-LS4-4) RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS4-1), (3-LS4-3), (3LS4-4) RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS2-1), (3-LS4-1), (3-LS4-3), (3-LS4-4) W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS2-1), (3-LS4-1), (3-LS4-3), (3-LS4-4) W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS4-1), (3-LS4-3), (3-LS4-4) W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-LS4-1) SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3-LS4- 3), (3-LS4-4)
- Mathematics – MP.2 Reason abstractly and quantitatively. (3-LS4-1), (3-LS4-3), (3-LS4-4) MP4 Model with mathematics. (3-LS2-1), (3-LS4-1), (3-LS4-3), (3-LS4-4) MP5 Use appropriate tools strategically. (3-LS4-1) 3.NBT Number and Operations in Base Ten (3-LS2-1) 3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. (3-LS4-3) 3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. (3-LS4-1)

Suggested Assessments: Performance Task:

- Participation in Investigation Labs
- Completion of experiment recording sheet
- Food chain/food web
- Text or teacher prepared assessment

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Life Cycle of a Frog	**Suggested Sequence: One Marking Period**

NJSLS:
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-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-LS4-2. 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.
2.1.2.PP.1 Define reproduction (via life cycle of animals)

Science and Engineering Practices:
Developing and Using Models
Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.
χ Develop models to describe phenomena. (3-LS1-1)
Analyzing and Interpreting Data
Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.
χ Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1)
Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.
χ Use evidence (e.g., observations, patterns) to support an explanation. (3-LS3-2)
χ Use evidence (e.g., observations, patterns) to construct an explanation. (3-LS4-2)

Connections to Nature of Science
Scientific Knowledge is Based on Empirical Evidence
χ Science findings are based on recognizing patterns. (3-LS1-1)

Disciplinary Core Ideas:	**Crosscutting Concepts:**
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. (3-LS1-1) **LS3.A: Inheritance of Traits** ♣Many characteristics of organisms are inherited from their parents. (3-LS3-1) ♣Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3- LS3-2)	**Patterns** χ Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1) χ Patterns of change can be used to make predictions. (3-LS1-1) **Cause and Effect** χ Cause and effect relationships are routinely identified and used to explain change. (3-LS3-2),(3-LS4-2)

LS3.B: Variation of Traits ♣Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1) ♣The environment also affects the traits that an organism develops. (3-LS3-2) **LS4.B: Natural Selection** ♣Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)	

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- observe and identify characteristics among amphibians, fish, and reptiles that allow each to survive.
- analyze how adaptive characteristics help individuals within a species survive.

Instructional Materials/Resources:

- Science text
- Unit kit
- Trade books

Suggested Vocabulary:
amphibian, gills, fish, scales, reptile, metamorphosis, oxygen

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

- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Track the life cycle of the frog from tadpole to frog
- Tell how different adaptations allow the frog to survive

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Layers of the earth in a jar– experiment • Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas	Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for

• Related experiments (home or school) • Oral presentations • Provide a variety of trade books related to the unit	spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.
CRP11. Use technology to enhance productivity.

Cross-curricular Connections:

- ELA/Literacy – RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS3-1), (3-LS3-2), (3-LS4-2) RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS3-1), (3-LS3-2), (3-LS4-2) RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS3-1), (3-LS3-2), (3-LS4-2) RI.3.7 Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). (3-LS1-1) W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS3-1), (3-LS3-2), (3-LS4-2) SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3- LS3-1), (3-LS3-2), (3-LS4-2) SL.3.5 Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details. (3-LS1-1)
- Mathematics – MP.2 Reason abstractly and quantitatively. (3-LS3-1), (3-LS3-2), (3-LS4-2) MP4 Model with mathematics. (3-LS1-1), (3-LS3-1), (3-LS3-2), (3-LS4-2) 3.NBT Number and Operations in Base Ten (3-LS1-1) 3.NF Number and Operations—Fractions (3-LS1-1) 3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. (3-LS4-2) 3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. (3-LS3-1),(3-LS3-2)

Suggested Assessments:

Performance Task:

- Frog life cycle book
- Participation in Investigation Labs
- Completion of experiment recording sheet

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Weather and Climates	**Suggested Sequence: One Marking Period**

NJSLS:
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.
3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

Science and Engineering Practices:

Analyzing and Interpreting Data

Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.

χ Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. (3-ESS2-1)

Engaging in Argument from Evidence

Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

χ Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-ESS3-1)

Obtaining, Evaluating, and Communicating Information

Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.

χ Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2)

Disciplinary Core Ideas:

ESS2.D: Weather and Climate

χ 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. (3-ESS2-1)

χ Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2)

ESS3.B: Natural Hazards

χ A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1) (Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.)

Crosscutting Concepts:

Patterns

χ Patterns of change can be used to make predictions. (3-ESS2-1), (3-ESS2-2)

Cause and Effect

χ Cause and effect relationships are routinely identified, tested, and used to explain change. (3-ESS3-1)

Connections to Engineering, Technology, and Applications of Science

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

χ Engineers improve existing technologies or develop new ones to increase their benefits (e.g., better artificial limbs), decrease known risks (e.g., seatbelts in cars), and meet societal demands (e.g., cell phones). (3-ESS3-1)

	Connections to Nature of Science **Science is a Human Endeavor** χ Science affects everyday life. (3-ESS3-1)

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Explore how weather is predicted and measured
- Learn about the difference between weather and climate
- Identify the impact of severe weather on society and nature

Instructional Materials/Resources:	**Suggested Vocabulary:**
• Science text • Unit kit • Trade books • Thermometer • Wind vane • Rain gauge	Weather, atmosphere, climate, hazard, precipitation, rain gauge, thermometer, weather , wind vane **Technology:** 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. • Related websites • Web quests • Publishing programs • Images and videos • Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- List the different instruments used to measure different types of weather and identify the use for each
- Name the four seasons and the typical weather associated with each
- Label the regions of the US/world and identify the climate and weather associated with each
- Use various instrument to predict the weather for a specific date and time
- Identify the 4 main types of severe weather (tornado, blizzard, hurricane, thunderstorm) and the characteristics of each
- List ways to prepare for sever weather

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Class Book – predict & illustrate weather description based upon his name. • Computer project – web quest facts for chosen weather event, write a report using word processing software. • Weather in a jar – experiment	Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses,

• Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas • Related experiments (home or school) • Oral presentations	reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections:

- ELA/Literacy – RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-ESS2-2) RI.3.9 Compare and contrast the most important points and key details presented in two texts on the same topic. (3-ESS2-2) W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-ESS3-1) W.3.7 Conduct short research projects that build knowledge about a topic. (3-ESS3-1) W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3- ESS2-2)
- Mathematics – MP.2 Reason abstractly and quantitatively. (3-ESS2-1), (3-ESS2-2), (3-ESS3-1) MP4 Model with mathematics. (3-ESS2-1), (3-ESS2-2), (3-ESS3-1) MP5 Use appropriate tools strategically. (3-ESS2-1) 3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (3-ESS2-1) 3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in bar graphs. (3-ESS2-1)

Suggested Assessments:

Performance Task:

- Daily Weather Recording Sheet
- Participation in Investigation Labs
- Completion of experiment recording sheet

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Forces/Motion/Magnets	**Suggested Sequence: One Marking Period**

NJSLS:
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.

Science and Engineering Practices:
Asking Questions and Defining Problems
Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.
χ Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3)
χ Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)
Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.
χ Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-PS2-1)
χ Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (3-PS2-2)

Connections to Nature of Science
Science Knowledge is Based on Empirical Evidence
χ Science findings are based on recognizing patterns. (3-PS2-2) Scientific Investigations Use a Variety of Methods
χ Science investigations use a variety of methods, tools, and techniques. (3-PS2-1)

Disciplinary Core Ideas:
PS2.A: Forces and Motion
χ 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. (Boundary: Qualitative and conceptual, but not quantitative addition of forces is used at this level.) (3-PS2-1)
χ 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

Crosscutting Concepts:
Patterns
χ Patterns of change can be used to make predictions. (3-PS2-2)
Cause and Effect
χ Cause and effect relationships are routinely identified. (3-PS2-1)
χ Cause and effect relationships are routinely identified, tested, and used to explain change. (3-PS2-3)

Connections to Engineering, Technology, and Applications of Science

can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.) (3-PS2-2) **PS2.B: Types of Interactions** χ Objects in contact exert forces on each other. (3-PS2-1) χ 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. (3-PS2-3), (3-PS2-4)	**Interdependence of Science, Engineering, and Technology** χ Scientific discoveries about the natural world can often lead to new and improved technologies, which are developed through the engineering design process. (3-PS2-4)

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Explore how forces work
- Discover the different types of forces
- Learn about forces that act from a distance
- Explore types of forces and motion
- Learn about the relationship between force and motion
- Identify patterns in motion

Instructional Materials/Resources: • Science text • Unit kit • Trade books • magnets	**Suggested Vocabulary:** Balanced forces, electricity, force, gravity, magnet, net force, static electricity, unbalanced force, motion, position, speed **Technology:** 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. • Related websites • Web quests • Publishing programs • Images and videos • Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Use various objects to move and define force using the examples of push/pull on an object
- Allow students to use balloons to determine friction and how an object can stick to something and how gravity pushes down on an object
- Test various objects using magnets to determine whether the objects attract or repel
- Using filings, show how magnets create a field of attraction
- Using ramps/blocks/etc. show how objects can speed up/slow down and change direction

Extension Strategies/Activities:

- Class Book
- Computer project – web quest, write a report using word processing software.
- Jigsaw groupings –students turn and teach
- Class posters or chart, models, illustrations, diagrams, dioramas
- Related experiments (home or school)
- Oral presentations

Modification Strategies/Activities:

Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections:

- ELA/Literacy – RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-PS2-1), (3-PS2-3) RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-PS2-3) RI.3.8 Describe the logical connection between particular sentences and paragraphs in a text (e.g., comparison, cause/effect, first/second/third in a sequence). (3-PS2-3) W.3.7 Conduct short research projects that build knowledge about a topic. (3-PS2-1), (3-PS2-2) W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-PS2- 1), (3-PS2-2) SL.3.3 Ask and answer questions about information from a speaker, offering appropriate elaboration and detail. (3-PS2-3)
- Mathematics – MP.2 Reason abstractly and quantitatively. (3-PS2-1) MP5 Use appropriate tools strategically. (3-PS2-1) 3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (3-PS2-1)

Suggested Assessments:

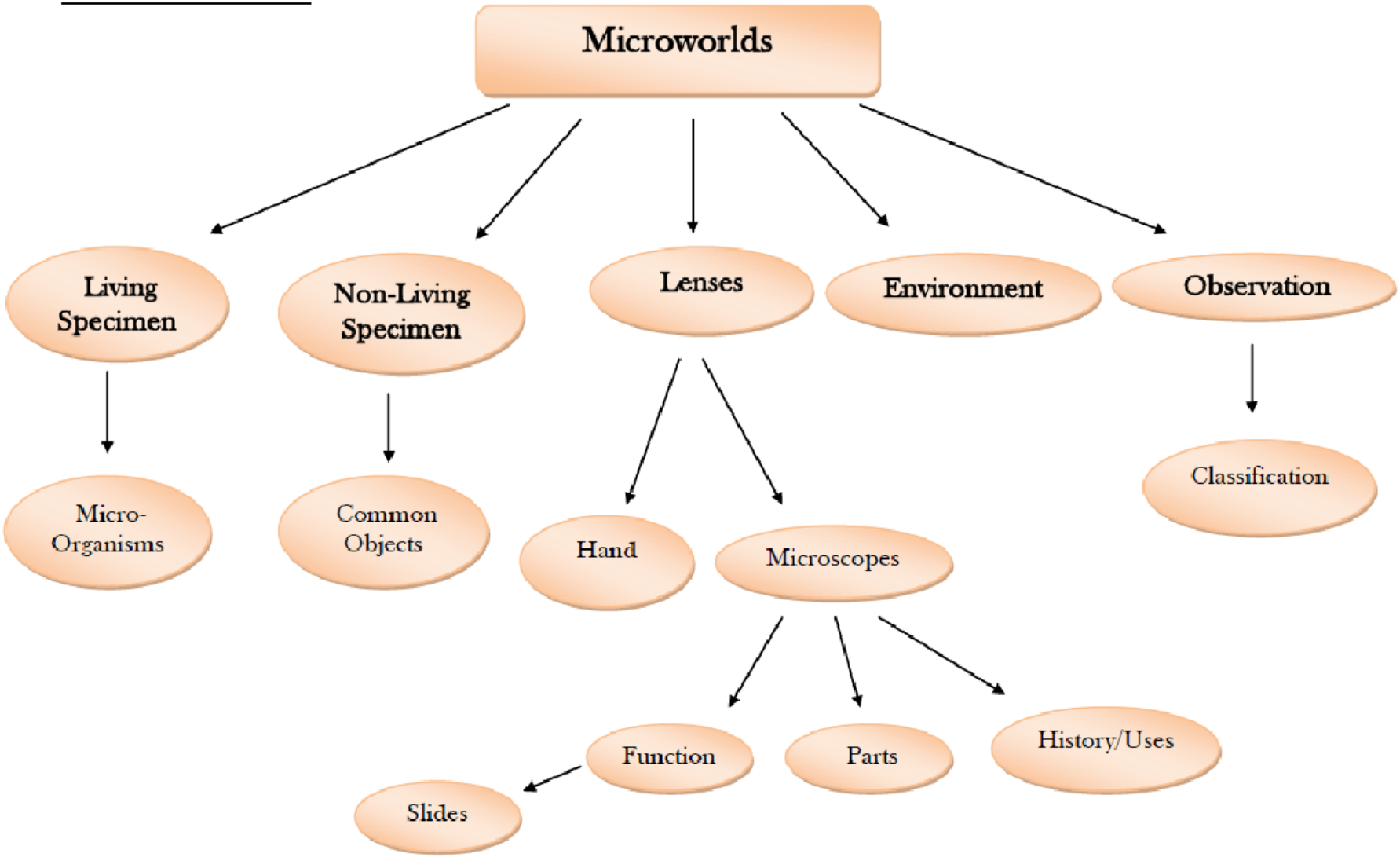
Performance Task:

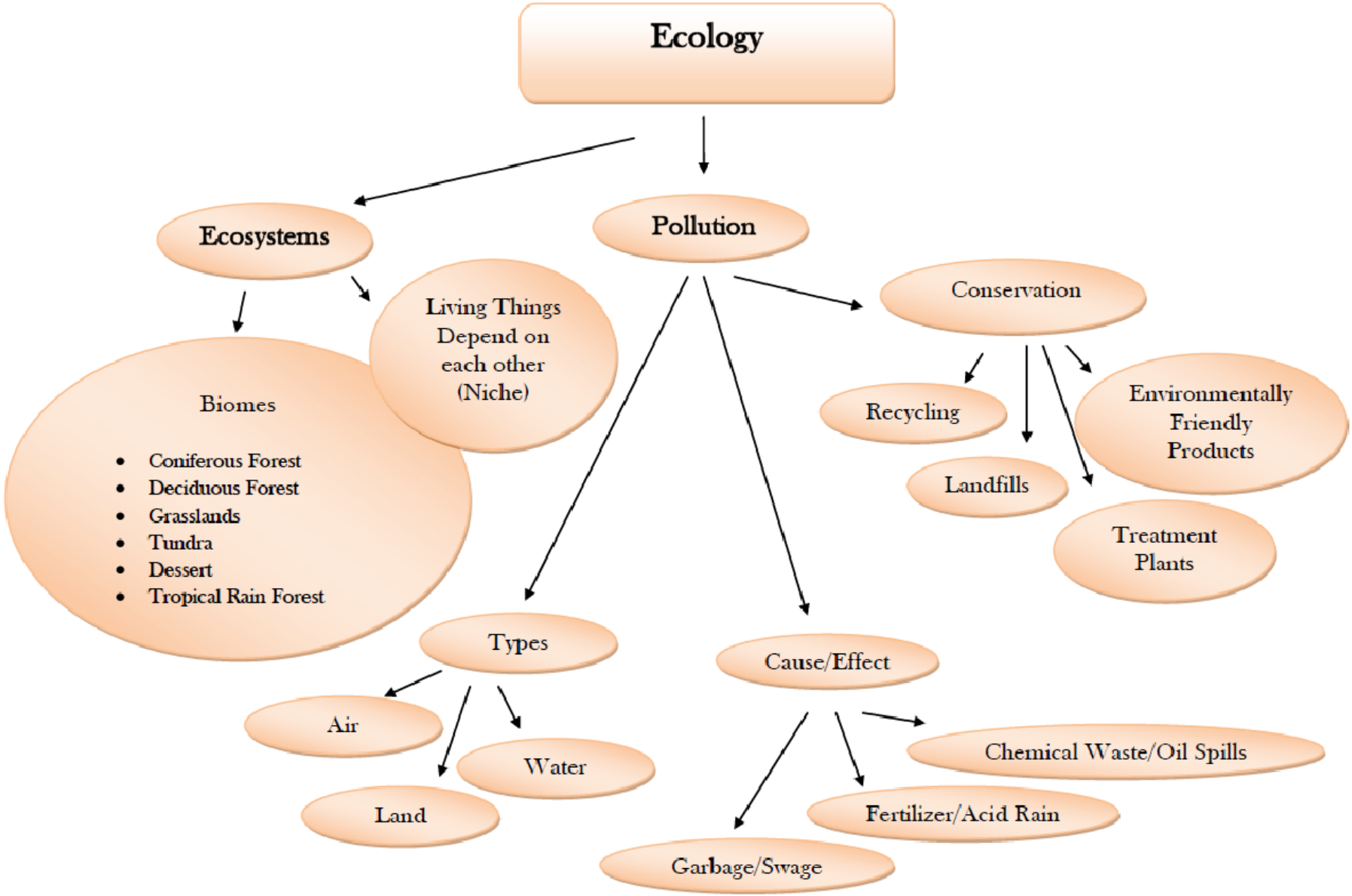
- Matter properties chart
- Types of motion graph
- Participation in Investigation Labs
- Completion of experiment recording sheet

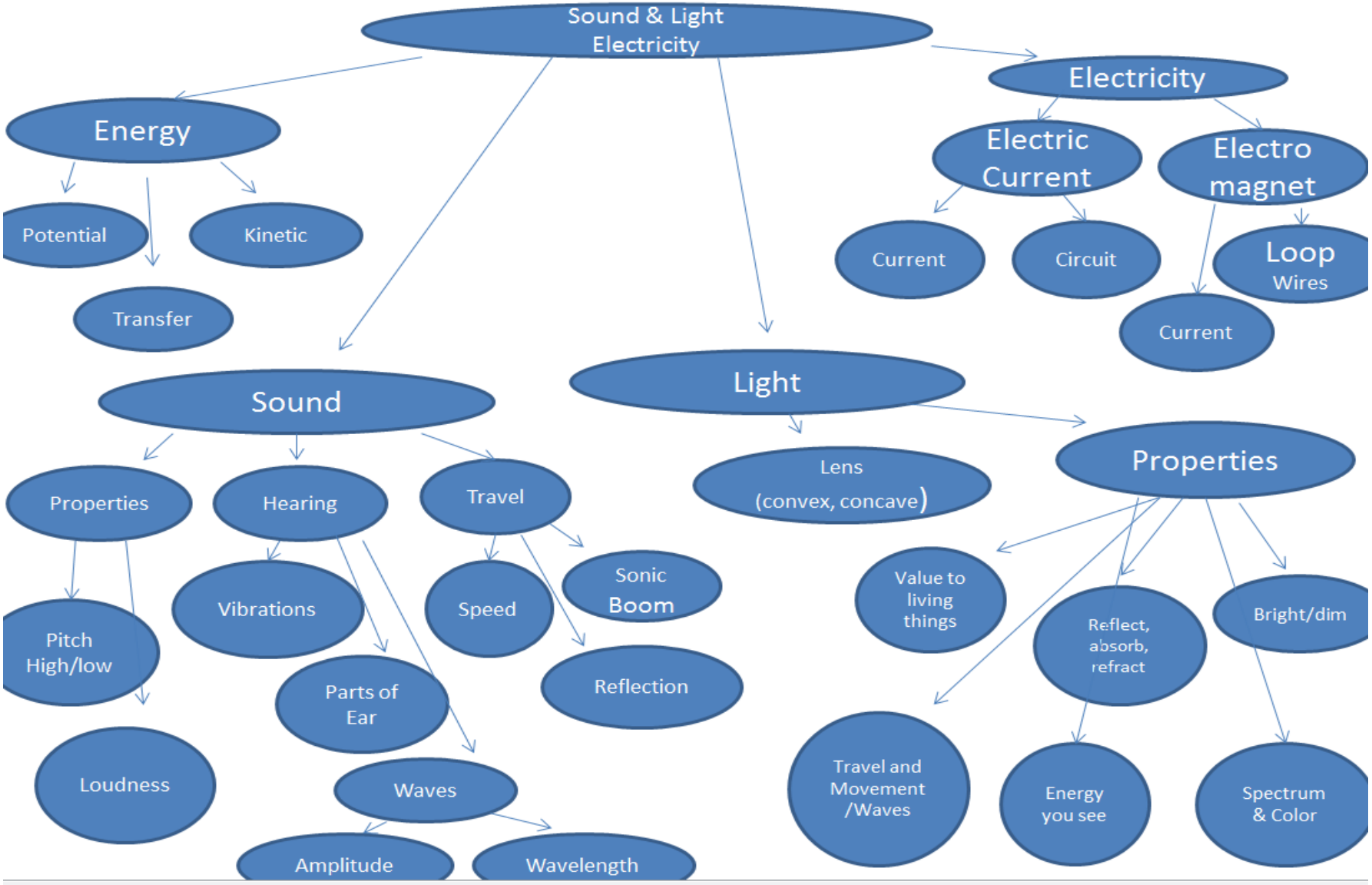
Other Assessment Evidence:

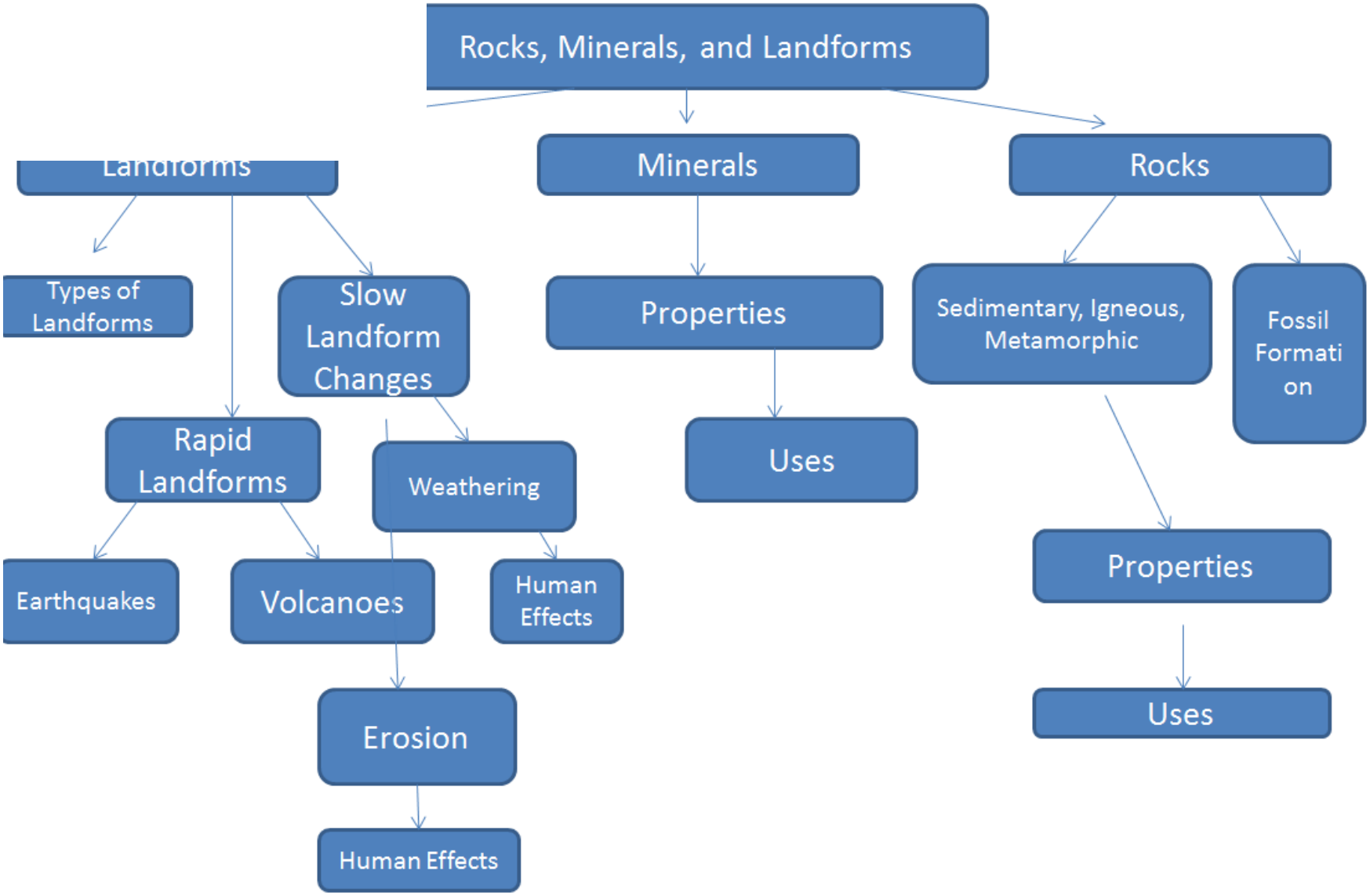
- Text or teacher prepared assessment

Fourth Grade




Ecology
Ecosystems
Pollution
Living Things Depend on each other (Niche)
Biomes
Coniferous Forest
Deciduous Forest
Grasslands
Tundra
Dessert
Tropical Rain Forest
Conservation
Recycling
Landfills
Environmentally Friendly Products
Treatment Plants
Types
Air
Water
Land
Cause/Effect
Chemical Waste/Oil Spills
Fertilizer/Acid Rain
Garbage/Swage


Sound & Light
Electricity
Energy
Potential
Kinetic
Transfer
Electricity
Electric Current
Electro magnet
Current
Circuit
Loop
Wires
Current
Sound
Properties
Hearing
Travel
Pitch
High/low
Vibrations
Speed
Sonic
Boom
Loudness
Parts of
Ear
Reflection
Waves
Amplitude
Wavelength
Light
Lens
(convex, concave)
Properties
Value to
living
things
Reflect,
absorb,
refract
Bright/dim
Travel and
Movement
/Waves
Energy
you see
Spectrum
& Color


Rocks, Minerals, and Landforms
Landforms
Minerals
Rocks
Types of Landforms
Slow Landform Changes
Properties
Sedimentary, Igneous, Metamorphic
Fossil Formation
Rapid Landforms
Weathering
Uses
Earthquakes
Volcanoes
Human Effects
Properties
Erosion
Uses
Human Effects

Theme/Unit: Micro worlds	**Suggested Sequence: One Marking Period**
NJSLS: **4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.** **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.**	
Science and Engineering Practices: **Developing and Using Models** Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. χ Develop a model to describe phenomena. (4-PS4-2) χ Use a model to test interactions concerning the functioning of a natural system. (4-LS1-2) **Engaging in Argument from Evidence** Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). χ Construct an argument with evidence, data, and/or a model. (4-LS1-1)	
Disciplinary Core Ideas: **PS4.B: Electromagnetic Radiation** χ An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2) **LS1.A: Structure and Function** χ Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1) **LS1.D: Information Processing** χ 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. (4-LS1-2)	**Crosscutting Concepts:** **Cause and Effect** χ Cause and effect relationships are routinely identified. (4-PS4-2) **Systems and System Models** χ A system can be described in terms of its components and their interactions. (4- LS1-1), (LS1-2)
Knowledge, Skills, and Instructional Objectives: **SWBAT:** • Describe the difference between a living and nonliving specimen. • Describe the similarities and differences between micro-organisms. • Identify and use the various parts of hand lenses. • Identify and correctly use the parts of a microscope. • Make and observe slides.	

- Identify micro-worlds within the environment.
- Describe the impact of micro-worlds on the environment.
- • Observe and classify micro-worlds.

Instructional Materials/Resources:
- Science text
- Unit kit
- Trade books

Suggested Vocabulary:
Microscope, lens, cell, slide, classification, specimen,
microorganism, magnify, transparent, convex, focus,
field of view, wet-mount slide, well slide

Technology:
8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge.
- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:
- Identify parts of a lens and microscope.
- Use a microscope and lens correctly.
- Create slides of living and non-living specimens.
- Classify different types of micro-worlds.

Extension Strategies/Activities:
- Class Book
- Computer project – web quest facts
- Jigsaw groupings –students turn and teach
- Class posters or chart, models, illustrations, diagrams, dioramas
- Related experiments (home or school)
- Oral presentations
- Provide a variety of trade books related to the unit

Modification Strategies/Activities:

Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:
CRP1. Act as a responsible and contributing citizen and employee.

CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections:

- ELA/Literacy – W.4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (4-LS1-1) SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-PS4-2), (4-LS1-2)
- Mathematics – MP4 Model with mathematics. (4-PS4-2) 4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. (4-PS4-2) 4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line symmetric figures and draw lines of symmetry. (4-LS1-1)

Suggested Assessments: Performance Task:

- Participation in Investigation Labs
- Completion of experiment recording sheet
- Text or teacher prepared assessment

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Ecology	**Suggested Sequence: One Marking Period**

NJSLS:
4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
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.

Science and Engineering Practices:
Developing and Using Models
Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.
χ Develop a model to describe phenomena. (4-PS4-2)
χ Use a model to test interactions concerning the functioning of a natural system. (4-LS1-2)
Engaging in Argument from Evidence
Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).
χ Construct an argument with evidence, data, and/or a model. (4-LS1-1)

Disciplinary Core Ideas:	**Crosscutting Concepts:**
PS4.B: Electromagnetic Radiation χ An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2) **LS1.A: Structure and Function** χ Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1) **LS1.D: Information Processing** χ 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. (4-LS1-2)	**Cause and Effect** χ Cause and effect relationships are routinely identified. (4-PS4-2) **Systems and System Models** χ A system can be described in terms of its components and their interactions. (4- LS1-1), (LS1-2)

Knowledge, Skills, and Instructional Objectives:
SWBAT:
- Describe what makes up a system.
- Identify ways that a system gains stability.
- Describe the basic parts of an ecosystem.
- Explain how the living things in ecosystems are organized.
- Give examples of habitats and niches in ecosystems.
- Explain how plants and animals interact and change their environments.
- Explain how tropical rain forests and coral reefs are alike.
- Describe the resources of rain forests and coral reefs and explain why they're important.

- • Evaluate the impact of research and technology on scientific thought, society, and the environment

Instructional Materials/Resources:

- Science text
- Unit kit
- Trade books

Suggested Vocabulary:
System, stability, ecosystem, population, community,
habitat, niche, producer, consumer, decomposer, climate, diversity, salinity

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

- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Create a model of an animal habitat
- Label the internal structures of an animal
- Label the external structures of an animal
- Tell how the 5 senses help an animal to survive
- Label the internal structures of a plant
- Label the external structures of a plant
- Tell how adaptations help a plant to survive

Extension Strategies/Activities:

- Layers of the earth in a jar– experiment
- Jigsaw groupings –students turn and teach
- Class posters or chart, models, illustrations, diagrams, dioramas
- Related experiments (home or school)
- Oral presentations
- Provide a variety of trade books related to the unit

Modification Strategies/Activities:

Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:
CRP1. Act as a responsible and contributing citizen and employee.

CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections:

- ELA/Literacy – W.4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (4-LS1-1) SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-PS4-2), (4-LS1-2)
- Mathematics – MP4 Model with mathematics. (4-PS4-2) 4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. (4-PS4-2) 4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line symmetric figures and draw lines of symmetry. (4-LS1-1)

Suggested Assessments:

Performance Task:

- Participation in Investigation Labs
- Completion of experiment recording sheet

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Rocks, Minerals & Landforms	**Suggested Sequence: One Marking Period**

NJSLS:
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.

Science and Engineering Practices:
Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.
χ Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (4-ESS2-1)
Analyzing and Interpreting Data
Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.
χ Analyze and interpret data to make sense of phenomena using logical reasoning. (4-ESS2-2)
Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 3– 5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.
χ Identify the evidence that supports particular points in an explanation. (4-ESS1-1)
χ Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (4-ESS3-2)

Disciplinary Core Ideas:
ESS1.C: The History of Planet Earth
χ Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1)
ESS2.A: Earth Materials and Systems
χ 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. (4-ESS2-1)
ESS2.B: Plate Tectonics and Large-Scale System Interactions

Crosscutting Concepts:
Patterns
χ Patterns can be used as evidence to support an explanation. (4-ESS1-1), (4- ESS2-2)
Cause and Effect
χ Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS2-1), (4-ESS3-2)

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

χ 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. (4-ESS2-2) **ESS2.E: Bio geology** χ Living things affect the physical characteristics of their regions. (4- ESS2-1) **ESS3.B: Natural Hazards** χ A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2) (Note: This Disciplinary Core Idea can also be found in 3.WC.) **ETS1.B: Designing Solutions to Engineering Problems** χ Testing a solution involves investigating how well it performs under a range of likely conditions. (secondary to 4-ESS3-2)	χ Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands. (4-ESS3-2) **Connections to Nature of Science** **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** χ Science assumes consistent patterns in natural systems. (4-ESS1-1)

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Describe what minerals and rocks are.
- List examples of the uses of minerals and rocks.
- Identify the solid and liquid portions of Earth's structure.
- Name the three types of rocks and how they form.
- Write the way people use rocks.
- Restate the sequence of events in the rock cycle that can change one type of rock into another.
- Describe how fossils form.
- Recognize where most fossils are found.
- Compare how fossils show that life has changed.
- Identify some of the forces that change Earth's surface.
- Explain the ways different landforms look and change.
- Demonstrate how earthquakes, volcanoes, and floods change the surface of Earth.

Instructional Materials/Resources:	**Suggested Vocabulary:**
• Science text • Unit kit • Trade books • Labeled rocks and minerals • magnifying glasses • hammer	Mineral, rock, crust, mantle, core, igneous rock, sedimentary rock, metamorphic rock, rock cycle, fossil, landform, mountain, valley, canyon, plain, plateau, barrier island, weathering, erosion, glacier, earthquake, volcano, flood

• goggles • model of volcano	**Technology:** 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. • Related websites • Web quests • Publishing programs • Images and videos • Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- A hard mineral scratches a softer mineral.
- Use a magnifying glass to observe and classify rocks.
- Use clay and shells to be models of fossils.
- Use a model to find out how the surface of Earth can fold
- Interpret data to learn how sand wears away rock.
- Make a model to see how a volcano can change the land around it.

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Class Book • Computer project – web quest facts • Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas • Related experiments (home or school) • Oral presentations	Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections:

- ELA/Literacy – RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-ESS3-2) RI.4.7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. (4-ESS2-2) RI.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-ESS3-2) W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-ESS1-1), (4-ESS2-1) W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-ESS1-1), (4-ESS2-1) W.4.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-ESS1-1)
- Mathematics – MP.2 Reason abstractly and quantitatively. (4-ESS1-1), (4-ESS2-1), (4-ESS3-2) MP.4 Model with mathematics. (4-ESS1-1), (4-ESS2-1), (4-ESS3-2) MP.5 Use appropriate tools strategically. (4-ESS2-1) 4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb., oz.; l, ml; hr., min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. (4-ESS1-1), (4-ESS2-1) 4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. (4-ESS2-1), (4-ESS2-2) 4. OA.A.1 Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. (4-ESS3-2)

Suggested Assessments:

Performance Task:

- Participation in Investigation Labs
- Completion of experiment recording sheet

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Sound/Light/Electricity	Suggested Sequence: One Marking Period

NJSLS:
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
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-PS4-3. Generate and compare multiple solutions that use patterns to transfer information

Science and Engineering Practices:
Asking Questions and Defining Problems
Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.
χ Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. (4-PS3-3)
Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K– 2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.
χ Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2)
Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.
χ Use evidence (e.g., measurements, observations, patterns) to construct an explanation. (4-PS3-1) χ Apply scientific ideas to solve design problems. (4- PS3-4)
χ Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (4-PS4-3)
Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluate the merit and accuracy of ideas and methods.
χ Obtain and combine information from books and other reliable media to explain phenomena. (4-ESS3-1)

Developing and Using Models
Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.
χ Develop a model using an analogy, example, or abstract representation to describe a scientific principle. (4-PS4- 1)

Connections to Nature of Science
Scientific Knowledge is Based on Empirical Evidence
χ Science findings are based on recognizing patterns. (4- PS4-1)

Disciplinary Core Ideas:
PS3.A: Definitions of Energy
χ The faster a given object is moving; the more energy it possesses. (4- PS3-1)
χ Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2), (4-PS3-3)
PS3.B: Conservation of Energy and Energy Transfer
χ 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. (4-PS3-2), (4-PS3-3)
χ Light also transfers energy from place to place. (4-PS3-2)
χ 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. (4-PS3-2), (4- PS3-4)
PS3.C: Relationship Between Energy and Forces
χ When objects collide, the contact forces transfer energy so as to change the objects' motions. (4-PS3-3)
PS3.D: Energy in Chemical Processes and Everyday Life χ The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)
ESS3.A: Natural Resources
χ 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. (4-ESS3-1)
ETS1.A: Defining Engineering Problems
χ Possible solutions to a problem are limited by available materials and resources (constraints). The

Crosscutting Concepts:
Cause and Effect
χ Cause and effect relationships are routinely identified and used to explain change. (4-ESS3-1)
Energy and Matter
χ Energy can be transferred in various ways and between objects. (4-PS3-1), (4- PS3-2), (4-PS3-3), (4-PS3-4)

Connections to Engineering, Technology, and Applications of Science
Interdependence of Science, Engineering, and Technology
χ Knowledge of relevant scientific concepts and research findings is important in engineering. (4-ESS3-1)
Influence of Engineering, Technology, and Science on Society and the Natural World
χ Over time, people's needs and wants change, as do their demands for new and improved technologies. (4-ESS3-1)
χ Engineers improve existing technologies or develop new ones. (4-PS3-4)

Connections to Nature of Science
Science is a Human Endeavor
χ Most scientists and engineers work in teams. (4-PS3-4)
χ Science affects everyday life. (4-PS3-4)

Patterns
χ Similarities and differences in patterns can be used to sort and classify natural phenomena. (4-PS4-1)
χ Similarities and differences in patterns can be used to sort and classify designed products. (4- PS4-3)

Connections to Engineering, Technology, and Applications of Science

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. (secondary to 4-PS3-4) **PS4.A: Wave Properties** χ 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 a beach. (Note: This grade band endpoint was moved from K–2). (4-PS4-1) χ Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1) **PS4.C: Information Technologies and Instrumentation** χ 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. (4-PS4-3) **ETS1.C: Optimizing The Design Solution** χ Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (secondary to 4-PS4-3)	**Interdependence of Science, Engineering, and Technology** χ Knowledge of relevant scientific concepts and research findings is important in engineering. (4-PS4-3)

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Define static electricity.
- Recognize that electrically charged objects attract or repel each other as can be seen from the effects of static electricity
- Explain what causes an electric field.
- Design and build a simple series circuit using components such as wires, batteries, and bulbs.
- Compare data about physical properties of matter, including conduction.
- Recognize that electric energy can be converted to other forms of energy, such as heat, light, and motion.
- Collect and analyze data about how sounds are made.
- Recognize that sound energy can be carried from one place to another by waves.
- Observe how sounds differ.
- Compare and contrast loudness and pitch.
- Recognize that sound travels at different speeds.

- Describe how an echo forms.
- Explain what causes a sonic boom.
- Evaluate the impact of research and technology on scientific thought, society, and the environment.

Instructional Materials/Resources:
- Science text
- Unit kit

Suggested Vocabulary:
Charge, static electricity, electric field, electric current, circuit, electric cell, conductor, insulator, resistor, series circuit, parallel circuit, Sound, compression, sound wave, loudness, pitch, speed of sound, echo, sonic boom

Technology:
8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge.
- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:
- Plan and conduct a simple investigation to find out how materials need to be arranged to make a bulb light.
- Create sound by using different materials and record results.
- Listen to a variety of sounds and discuss loudness and pitch.
- Use a table to find the range of various animals' sound waves.
- Compare sound waves and ripples in water

Extension Strategies/Activities:
- Class Book
- Computer project – web quest, write a report using word processing software.
- Jigsaw groupings –students turn and teach
- Class posters or chart, models, illustrations, diagrams, dioramas
- Related experiments (home or school)
- Oral presentations

Modification Strategies/Activities:

Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections:

- ELA/Literacy – RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-PS3-1) RI.4.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text. (4-PS3-1) RI.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-PS3-1) W.4.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (4-PS3-1) W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-2), (4-PS3-3), (4-PS3-4), (4-ESS3-1) W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-PS3-1), (4-PS3-2), (4-PS3-3), (4-PS3-4), (4-ESS3-1) W.4.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-PS3-1), (4-ESS3-1) RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-PS4-3) RI.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-PS4-3) SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-PS4-1)
- Mathematics – MP.2 Reason abstractly and quantitatively. (4-ESS3-1) MP4 Model with mathematics. (4-ESS3-1) 4. OA.A.1 Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. (4-ESS3-1) 4. OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (4-PS3-4) MP4 Model with mathematics. (4-PS4-1) 4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. (4-PS4-1)

Suggested Assessments:

Performance Task:

- Construct & wire house
- Participation in Investigation Labs
- Completion of experiment recording sheet

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: "*Structure and Properties of Matter*" 5th - Physical Science: Matter and Its Interactions	**Suggested Sequence:** 1st in sequence

NJSLS:
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.

Science and Engineering Practices:

Asking Questions and Defining Problems

Ask questions about what would happen if a variable is changed

Analyzing and Interpreting Data

Compare and contrast data collected by different groups to discuss similarities and differences in their findings

Using Mathematics and Computational Thinking

Describe, measure, estimate and/or graph quantities such as area, volume, weight, and time to address scientific and engineering questions and problems.

Obtaining, Evaluating, and Communicating Information

Communicate scientific and/or technical information orally and/or in written formats, including various forms of media and may include tables, diagrams, and charts

Disciplinary Core Ideas:

- 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. (5-PS1-1)
- The amount of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2)
- Measurement of a variety of properties can be used to identify materials. (5-PS1-3)
- When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4)
- No matter what reaction or change in properties occurs, the total weight of the substance does not change. (5-PS1-2)

Crosscutting Concepts:

- Matter is conserved because atoms are conserved in physical and chemical processes
- Matter is made of particles
- Matter flows and cycles can be tracked in terms of the weight of the substance before and after a process occurs
- Patterns can be used to identify cause and effect relationships
- Graphs, charts, and images can be used to identify patterns in data

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Identify the structure of an atom: protons, neutrons, and electrons.
- Classify the states of matter and evidence of different states.
- Provide examples of physical and chemical changes.
- Determine the structure of an element.
- Determine the structure of a molecule.
- Provide examples of mixtures.
- Recognize that some matter has a melting point and a freezing point.
- Define the properties of a substance.
- Use methods for testing the properties of substances.
- Make a model to demonstrate changes in matter.
- Observe, measure, record and/or graph physical changes in matter being investigated.
- Design an investigation for testing the properties of matter.

Instructional Materials/Resources:

- Harcourt Science Text Unit E – Chapter 1 Lessons 1,2,3
- Workbooks
- Investigate Activities
- Online Activities (www.betterlesson.com)
- Brain pop videos
- Bill Nye video

Suggested Vocabulary:

matter	liquid	physical properties
mass	gas	
weight	evaporation	solution
volume	condensation	solvent
density	reactivity	solute
solubility	combustibility	suspension
solid	solution	saturation

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

- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Create visual models of particles in each state of matter based on the particle theory (www.betterlesson.com)
- Investigate water molecules by completing five investigative tasks (www.betterlesson.com)
- Collect evidence to prove salt is really in the water (www.betterlesson.com)
- Complete a written assessment, as well as a choice board project to demonstrate their understanding of the standards related to matter (www.betterlesson.com)

- Complete Investigate Activities at the beginning of each lesson
- Completion of teacher created worksheet and/or notes
- Completion of textbook companion worksheets
- Completion of teacher created Interactive Lessons via ActivBoard
- Completion teacher created lab activities
- Completion of supplemental activities created from outside resources

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas • Related experiments (home or school) • Oral presentations • Provide a variety of websites/internet activities related to the unit • Create and play review games	• Reword and clarify instructions as needed • Visual clues/ highlight important information • Provide a copy of notes & study guide through class website • Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings • Modified homework and assignments • Heterogeneous groupings • Advance notice for tests • Modified assessments

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections/Standards:
SWABT:

- Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently RI.5.7
- Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic W.5.7
- Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. W.5.8
- Draw evidence from literary or informational texts to support analysis, reflection, and research W.5.9

- Reason abstractly and quantitatively MP.2
- Model with mathematics MP4
- Use appropriate tools strategically MP.5
- Convert among different-sized standard measurement units within a given measurement system 5.MD.A.1
- Recognize volume as an attribute of solid figures and understand concepts of volume measurement 5.MD.C.3

Suggested Assessments:
Performance Task:
- Complete Investigate Activities at the beginning of each lesson
- Participation in Lab Activities
- Complete Workbook pages relating to topic

Other Assessment Evidence:
- Text or teacher prepared assessment

Theme/Unit: "*Matter and Energy in Organisms and Ecosystems*" 5th Life Science/Physical Science: Ecosystems: Interactions, Energy, and Dynamics	**Suggested Sequence:** 2nd in sequence

NJSLS:
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.
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.

Science and Engineering Practices:
Asking Questions and Defining Problems
Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships
Developing and Using Models
Use a model to test cause and effect relationships or interactions concerning the functioning of a natural or designed system
Planning and Carrying Out Investigations
Make predictions about what would happen if a variable changes
Constructing Explanations and Designing Solutions
Construct an explanation of observed relationships

Disciplinary Core Ideas*:*	**Crosscutting Concepts***:*
• The energy released from food was once energy from the sun that was captured by plants in the chemical process that forms plant matter • 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	• Matter is conserved because atoms are conserved in physical and chemical processes • Matter is made of particles • Matter flows and cycles can be tracked in terms of the weight of the substance before and after a process occurs • Energy can be transferred in various ways and between objects

• 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. Decomposition eventually restores some materials back to the soil. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life	• Patterns can be used to identify cause and effect relationships • Graphs, charts, and images can be used to identify patterns in data • A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot • Some systems appear stable, but over long periods of time will eventually change

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Make a visual model of living and nonliving things in a community.
- Define each animal's role and describe interactions.
- Make a model of a food web that represents the transfer of energy (plants, herbivores, carnivores, omnivores, and decomposers).
- Infer the effects of extinction.
- Use a cause and effect graphic organizer, compare the effect of removing a producer from the food web with the effect of removing a consumer from the food web.
- Explain the key traits and interactions of consumers, scavengers, producers, and decomposers.
- Create a model comparing photosynthesis with cellular respiration.

Instructional Materials/Resources:

- Harcourt Science Text Unit B – Chapter 2 Lessons 1, 2, 3
- Workbooks
- Investigate Activities
- Owl Pellets
- Online Activities (www.betterlesson.com)
- Brain pop videos
- Bill Nye videos

Suggested Vocabulary:

population	individual	instinct
community	food chain	learned
ecosystem	decomposer	behavior
habitat	food web	exotic
niche	energy pyramid	extinct
producer	competition	endangered
consumer	symbiosis	threatened

Technology:

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

- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Complete Investigate Activities at the beginning of each lesson
- Support an argument that plants get the energy they need to live and grow from either the sun, air, water, or soil by collecting evidence through multiple experiments (www.betterlesson.com)
- Create an ecosystem model out of two large plastic bottles (www.betterlesson.com)
- Using owl pellets, identify the roles of organisms as they interact and depend on one another through food chains and food webs in an ecosystem
- Completion of teacher created worksheet and/or notes
- Completion of textbook companion worksheets
- Completion of teacher created Interactive Lessons via ActivBoard
- Completion teacher created lab activities
- Completion of supplemental activities created from outside resources

Modification Strategies/Activities:

- Reword and clarify instructions as needed
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings
- Visual clues/ highlight important information
- Provide a copy of notes & study guide through class website
- Modified homework and assignments
- Heterogeneous groupings
- Advance notice for tests
- Modified assessments

Extension Strategies/Activities:

- Jigsaw groupings- students turn and teach
- Class posters or chart, models, illustrations, diagrams, dioramas
- Related experiments (home or school)
- Oral presentations
- Provide a variety of websites/internet activities related to the unit
- Create and play review games

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections/Standards:

- Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text RI.5.1
- Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question or to solve a problem efficiently RI.5.7
- Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably RI.5.9
- Write opinion pieces on topics or texts, supporting a point of view with reasons and information W.5.1
- Include multimedia components and visual displays in presentations when appropriate to enhance the development of main ideas or themes SL.5.5
- Reason abstractly and quantitatively MP.2
- Use appropriate tools strategically MP.5
- Convert among different-sized standard measurement units within a given measurement system, and use these conversions in solving multi-step, real world problems 5.MD.A.1

Suggested Assessments:
Performance Task:
- Complete Investigate Activities at the beginning of each lesson
- Participation in Lab Activities
- Complete Workbook pages relating to topic

Other Assessment Evidence:
- Text or teacher prepared assessment

Theme/Unit: "*Earth's System*" 5th Earth Science: Earth's System and Human Activity	**Suggested Sequence:** 3rd in sequence

NJSLS:

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 the ways individual communities use science ideas to protect the Earth's resources and environment.

Science and Engineering Practices:

Asking Questions and Defining Problems

Use prior knowledge to describe problems that can be solved

Using Mathematics and Computational Thinking

Describe, measure, estimate, and/or graph quantities such as area, volume, weight, and time to address scientific and engineering questions and problems

Engaging in Argument from Evidence

Use data to evaluate claims about cause and effect

Disciplinary Core Ideas:	**Crosscutting Concepts:**
• Earth's major systems are the geosphere, the hydrosphere, the atmosphere, and the biosphere. These systems interact in multiple ways to affect Earth's surface materials and 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. • Living things affect the physical characteristics of their regions.	• A system is a group of related parts that make up a whole and carry out functions its individual parts cannot • Some systems appear stable, but over long periods of time will eventually change • Cause and effect relationships are routinely identified, tested, and used to explain change

Knowledge, Skills, and Instructional Objectives:

SWBAT:

- Identify each of the Earth's systems.
- Describe the cycles that occur within each Earth's systems.
- Develop and use models to investigate how Earth's systems interact.
- Observe how water moves through the environment on Earth.
- Describe the distribution of water on Earth.
- Explore the effect of the oceans on landforms, climates, and ecosystems.
- Investigate how materials are reused in nature.
- Investigate how human activity can affect the water cycle.

Instructional Materials/Resources:

- Harcourt Science Text Unit B – Chapter 1 Lessons 1, 2
- Workbooks
- Investigate Activities
- Online Activities (www.betterlesson.com)
- Brain pop videos
- Bill Nye videos
- Teacher created worksheets

Suggested Vocabulary:

atmosphere	condensation	transpiration
biosphere	evaporation	
geosphere	precipitation	
hydrosphere	system	
coastline	water cycle	

Technology:

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

- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Create a recycling fashion show "trashion show"
- Research (in groups) one of the Earth's systems and then become the experts in that area to teach their peers (www.betterlesson.com)
- Explore the distribution of water on Earth and create a circle graph to further analyze the Earth's water (www.betterlesson.com)
- Completion of teacher created worksheet and/or notes
- Completion of textbook companion worksheets
- Completion of teacher created Interactive Lessons via ActivBoard
- Completion teacher created lab activities
- Completion of supplemental activities created from outside resources

Extension Strategies/Activities:

- Jigsaw groupings –students turn and teach
- Class posters or chart, models, illustrations, diagrams, dioramas
- Related experiments (home or school)
- Oral presentations
- Provide a variety of websites/internet activities related to the unit
- Create and play review games

Modification Strategies/Activities:

- Reword and clarify instructions as needed
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).

	• Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings • Visual clues/ highlight important information • Provide a copy of notes & study guide through class website • Provide/Listen to text on tape • Modified homework and assignments • Heterogeneous groupings • Advance notice for tests • Modified assessments

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections/Standards:

SWABT:

- Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text RI.5.1
- Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question or to solve a problem efficiently RI.5.7
- Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably RI.5.9
- Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. W.5.8
- Draw evidence from literary or informational texts to support analysis, reflection, and research W.5.9
- Include multimedia components and visual displays in presentations when appropriate to enhance the development of main ideas or themes SL.5.5
- Reason abstractly and quantitatively MP.2
- Model with mathematics MP4
- Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate value of points in the context of the situation 5.G.A.2

Suggested Assessments:

Performance Task:

- Complete Investigate Activities at the beginning of each lesson
- Participation in Lab Activities
- Complete Workbook pages relating to topic

Other Assessment Evidence:

• Text or teacher prepared assessment

Theme/Unit: "*Space Systems: Stars and the Solar System*" 5th Physical Science/Earth and Space Science: Earth's Place in the Universe	**Suggested Sequence:** 4th in sequence
NJSLS: 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 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. 3-5-ETS1-1. Define a simple design problem reflecting a need or a 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 the 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.	
Science and Engineering Practices: **Asking Questions and Defining Problems** Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. **Developing and Using Models** Collaboratively develop and/or revise a model based on evidence that shows the relationships among variables for frequent and regular occurring events. Use a model to test a cause and effect relationship or interaction concerning the functioning of a natural or designed system. **Planning and Carrying Out Investigations** Test two different models of the same proposed, object, tool, or process to determine which better meets criteria for success. **Constructing Explanations and Designing Solutions** Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. Engaging in Argument from Evidence Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem.	
Disciplinary Core Ideas: • Possible solutions to a problem are limited by available materials and resources. The success of a designed solution is determined by considering the desired features of a solution. • Different solutions need to be tested to determine which one of them best solves the problem, given the criteria and the constraints.	**Crosscutting Concepts*:*** • Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to the very long time periods. • Change is measured in differences over time and may occur at different rates.

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Demonstrate magnitude by using models with various brightness and distances.
- Analyze images of stars in various forms.
- Make a timeline of the history of star-gazing and the tools/technology used.
- Make models using any objects to demonstrate comprehension of rotation and revolution.
- Observe, draw, and track shadows over time, and record data regarding changes in length and directions.
- Explain how shadows can be used to tell the time of day.
- Identify the cause of the sun's apparent motion in the sky.
- Conduct investigations of gravity's effect on various objects.
- Make a claim about how quickly or slowly an object moves and provide evidence and supportive reasoning for your claim.

Instructional Materials/Resources:

- Harcourt Science Text Unit D – Chapter 1 Lesson 1
- Harcourt Science Text Unit F- Chapter 1 Lesson 1
- Workbooks
- Investigate Activities
- Online Activities (www.betterlesson.com)
- Brain pop videos
- Bill Nye videos

Suggested Vocabulary:

revolution	axis	hemisphere
orbit	eclipse	gravitation
rotate	gravity	force

Technology:

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

- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Differentiate between various types of forces through different stations (www.betterlesson.com)
- Use the engineering method to design a paper roller coaster (www.betterlesson.com)
- Create a model illustrating the movement of the Earth and Moon in relation to the Sun (www.betterlesson.com)
- Explore how their shadows change throughout the day and graph the length of their shadows using a bar graph and draw conclusions (www.betterlesson.com)
- Completion of teacher created worksheet and/or notes
- Completion of textbook companion worksheets
- Completion of teacher created Interactive Lessons via ActivBoard
- Completion teacher created lab activities
- Completion of supplemental activities created from outside resources

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas • Related experiments (home or school) • Oral presentations • Provide a variety of websites/internet activities related to the unit • Create and play review games	• Reword and clarify instructions as needed • Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings • Visual clues/ highlight important information • Provide a copy of notes & study guide through class website • Modified homework and assignments • Heterogeneous groupings • Advance notice for tests • Modified assessments

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections/Standards:

SWABT:

- Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text RI.5.1
- Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question or to solve a problem efficiently RI.5.7
- Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s). RI.5.8
- Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably RI.5.9
- Write opinion pieces on topics or texts, supporting a point of view with reasons and information. W.5.1
- Include multimedia components and visual displays in presentations when appropriate to enhance the development of main ideas or themes SL.5.5
- Reason abstractly and quantitatively MP.2

- Model with mathematics MP4
- Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate value of points in the context of the situation 5.G.A.2

Suggested Assessments:
Performance Task:
- Complete Investigate Activities at the beginning of each lesson
- Participation in Lab Activities
- Complete Workbook pages relating to topic

Other Assessment Evidence:
- Text or teacher prepared assessment

Theme/Unit: Astronomy	**Suggested Sequence: One Marking Period**
NJSLS: **MS-ESS1-1. Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.** **MS-ESS1-2. Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system** **MS-ESS1-3. Analyze and interpret data to determine scale properties of objects in the solar system.:**	
Science and Engineering Practices: **Developing and Using Models** Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems. χ Develop and use a model to describe phenomena. (MS-ESS1-1), (MS-ESS1-2) **Analyzing and Interpreting Data** Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. χ Analyze and interpret data to determine similarities and differences in findings. (MS ESS1-3)	
Disciplinary Core Ideas: **ESS1.A: The Universe and Its Stars** χ Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. (MS-ESS1-1) χ Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. (MS-ESS1-2) **ESS1.B: Earth and the Solar System** χ The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. (MS-ESS1- 2), (MS-ESS1-3) χ This model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. (MS-ESS1- 1) χ The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. (MS-ESS1-2)	**Crosscutting Concepts:** **Patterns** χ Patterns can be used to identify cause and effect relationships. (MS-ESS1-1) Scale, Proportion, and Quantity χ Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS1- 3) Systems and System Models χ Models can be used to represent systems and their interactions. (MS-ESS1-2) **Connections to Engineering, Technology, and Applications of Science** **Interdependence of Science, Engineering, and Technology** χ Engineering advances have led to important discoveries in virtually every field of science and scientific discoveries have led to the development of entire industries and engineered systems. (MS ESS1-3) **Connections to Nature of Science** **Scientific Knowledge Assumes an Order and Consistency in Natural Systems**

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

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Describe where the earth is in the universe
- Describe how the movement of the earth affects the seasons
- Identify the difference between equinox and solstice
- Describe the relationship between the earth and the sun
- Identify the phases of the moon
- Describe what happens between a solar and lunar eclipse
- Identify the major parts of the galaxy including the milky way
- Describe how earth's gravity keeps people and objects on the ground (Sir Isaacs Newton's Law)

Instructional Materials/Resources:

- Science text
- Unit kit
- Trade books

Suggested Vocabulary:
Universe, equinox, solstice, phases of moon, lunar, eclipse, solar, galaxy, milky way, gravity, Newton's Law

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

- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Create a poster showing the major parts of the universe and their locations (including the earth, sun, moon, milky way)
- Use a calendar to show where the earth is in relationship to the sun for each season Identify the difference between equinox and solstice
- Track the phases of the moon using a calendar
- Drop various objects from differing heights to illustrate Sir Isaacs Newton's Law

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Class Book • Computer project – web quest facts • Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas • Related experiments (home or school) • Oral presentations • Provide a variety of trade books related to the unit	Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections:

- **ELA/Literacy** – RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS1-3) 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). (MS-ESS1-3) SL.8.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. (MS-ESS1-1), (MS-ESS1-2)
- **Mathematics** – MP.2 Reason abstractly and quantitatively. (MS-ESS1-3) MP4 Model with mathematics. (MS-ESS1-1), (MS-ESS1-2) 6. RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (MS-ESS1-1), (MS-ESS1-2). (MS-ESS1-3) 7. RP.A.2 Recognize and represent proportional relationships between quantities. (MS-ESS1-1), (MS-ESS1-2). (MS-ESS1-3) 6. EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-ESS1-2) 7. EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (MS-ESS1-2)

Suggested Assessments: Performance Task:

- Participation in Investigation Labs
- Completion of experiment recording sheet
- Text or teacher prepared assessment

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Waves	**Suggested Sequence: One Marking Period**

NJSLS:
MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.
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

Science and Engineering Practices:
Developing and Using Models
Modeling in 6–8 builds on K–5 and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.
χ Develop and use a model to describe phenomena. (MS-PS4-2)
Using Mathematics and Computational Thinking
Mathematical and computational thinking at the 6–8 level builds on K–5 and progresses to identifying patterns in large data sets and using mathematical concepts to support explanations and arguments.
χ Use mathematical representations to describe and/or support scientific conclusions and design solutions. (MS-PS4-1)
Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in 6-8 builds on K-5 and progresses to evaluating the merit and validity of ideas and methods.
χ Integrate qualitative scientific and technical information in written text with that contained in media and visual displays to clarify claims and findings. (MS-PS4-3)

Connections to Nature of Science
Scientific Knowledge is Based on Empirical Evidence
χ Science knowledge is based upon logical and conceptual connections between evidence and explanations. (MS-PS4-1)

Disciplinary Core Ideas:
PS4.A: Wave Properties
χ A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. (MS-PS4-1)
χ A sound wave needs a medium through which it is transmitted. (MS-PS4-2)
PS4.B: Electromagnetic Radiation
χ 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. (MS-PS4-2)
χ The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends. (MS-PS4-2)

Crosscutting Concepts:
Patterns
χ Graphs and charts can be used to identify patterns in data. (MS-PS4- 1)
Structure and Function
χ Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. (MS-PS4-2)
χ Structures can be designed to serve particular functions. (MS-PS4-3)

Connections to Engineering, Technology, and Applications of Science

χ A wave model of light is useful for explaining brightness, color, and the frequency-dependent bending of light at a surface between media. (MS-PS4-2) χ However, because light can travel through space, it cannot be a matter wave, like sound or water waves. (MS-PS4-2) **PS4.C: Information Technologies and Instrumentation** χ Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information. (MS-PS4-3)	**Influence of Science, Engineering, and Technology on Society and the Natural World** χ Technologies extend the measurement, exploration, modeling, and computational capacity of scientific investigations. (MS-PS4-3) **Connections to Nature of Science** **Science is a Human Endeavor** χ Advances in technology influence the progress of science and science has influenced advances in technology. (MS-PS4-3)

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Describe a repeating pattern of a wave with a specific wavelength, frequency, and amplitude.
- Predict how a wave will change
- Observe wave reflection and make waves with different wavelengths, frequencies, and amplitudes
- Determine the energy in waves and relationship to ocean waves
- Engage in a soundproofing engineering challenge.
- Describe the electromagnetic spectrum beyond the visible range.
- Identify various color filters to make inferences about the relationship between wavelengths of light and the color of objects
- Determine that when light bends so much that there is no refracted beam, there is total internal reflection.
- Consider the difference between analog and digital waves and create their own digitized waves.

Instructional Materials/Resources:	**Suggested Vocabulary:**
• Science text • Unit kit • Trade books	Wave, wavelength, frequency, amplitude, Light & Reflection, Absorption, Transmission, Color, Ray Diagrams, Tsunamis

	Technology: 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. ● Related websites ● Web quests ● Publishing programs ● Images and videos ● Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- learn the key parts of a wave and measure and diagram a wave.
- watch a video about ocean waves as an introduction to wave energy
- After defining energy, they conduct several mini-experiments with springs to determine the relationships between wave amplitude, frequency, wavelength, and energy.
- test absorption of sound by different materials in different configurations and make measurements with a decibel meter.
- use spectroscopes and spectrometers to analyze spectra from various light sources and to observe that filters absorb light of specific wavelengths
- color filters to make inferences about the relationship between wavelengths of light and the color of objects. They use this understanding to create a color camouflage drawing.
- use lasers to determine that light can bend at the interface between two different media.

Extension Strategies/Activities:	**Modification Strategies/Activities:**
● Layers of a wave– experiment ● Jigsaw groupings –students turn and teach ● Class posters or chart, models, illustrations, diagrams, dioramas ● Related experiments (home or school) ● Oral presentations ● Provide a variety of trade books related to the unit	Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections:

- ELA/Literacy – RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-PS4-3) 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. (MS-PS4-3) 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. (MS-PS4-3) WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. (MS-PS4-3) SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-PS4-1), (MS-PS4-2)
- Mathematics – MP.2 Reason abstractly and quantitatively. (MS-PS4-1) MP.4 Model with mathematics. (MS-PS4-1) 6. RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (MS-PS4-1) 6. RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems. (MS-PS4-1) 7. RP.A.2 Recognize and represent proportional relationships between quantities. (MS-PS4-1) 8.F.A.3 Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. (MS-PS4-1)

Suggested Assessments:

Performance Task:

- Participation in Investigation Labs
- Completion of experiment recording sheet

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Earth History/Rocks/Fossils	**Suggested Sequence: One Marking Period**

NJSLS:
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-ESS2-2. 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-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

Science and Engineering Practices:
Analyzing and Interpreting Data
Analyzing data in 6–8 builds on K–5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.
χ Analyze and interpret data to provide evidence for phenomena. (MS-ESS2-3)
Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.
χ Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS ESS1-4), (MS-ESS2-2)

Connections to Nature of Science
Scientific Knowledge is Open to Revision in Light of New Evidence
χ Science findings are frequently revised and/or reinterpreted based on new evidence. (MS-ESS2-3)

Disciplinary Core Ideas:
ESS1.C: The History of Planet Earth
χ 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. (MS-ESS1- 4)
χ Tectonic processes continually generate new ocean sea floor at ridges and destroy old seafloor at trenches. (HS. ESS1.C GBE) (secondary to MS-ESS2-3)
ESS2.A: Earth's Materials and Systems
χ The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. (MS-ESS2-2)

Crosscutting Concepts:
Patterns
χ Patterns in rates of change and other numerical relationships can provide information about natural systems. (MS-ESS2-3)
Scale Proportion and Quantity
χ Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS1-4),(MS-ESS2-2)

ESS2.B: Plate Tectonics and Large-Scale System Interactions χ Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart. (MS-ESS2-3) **ESS2.C: The Roles of Water in Earth's Surface Processes** χ Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations. (MS-ESS2-2)	

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Describe the rock cycle
- Determine what processes have changed the earth's surface over time (plate tectonics, large scale catastrophic events, weathering/erosion)
- Determine how fossils, rocks, continental shapes and seafloor structures show the past plate movements.
- Describe how the geologic time scale is used to show Earth's 4.6-billion-year history (formation of mountain chains, formation of the oceans, volcanic eruptions, glaciations, asteroid impacts, mass extinctions)
- Identify fossil record = documents the existence, diversity, extinction and change of many life forms throughout the history of Earth (Geologic Time Scale).
- Examine sedimentary rock layers and identify the relative ages of those layers, fossils
- Examine the anatomical structures of how organisms have changed throughout time
- Examine the evolutionary relationships among organisms in terms of similarities and/or differences in their anatomical structures.
- Compare embryological development of different species to show that similarities between species exist during early stages of development but may not be present when organism is fully formed.

Instructional Materials/Resources:	**Suggested Vocabulary:**
• Science text • Unit kit • Trade books	Plate tectonics, catastrophic, weathering, erosion, mid-ocean ridge, trench, fossil, rock cycle

• Labeled rocks and minerals • magnifying glasses • hammer • goggles • model of volcano	**Technology:** 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. • Related websites • Web quests • Publishing programs • Images and videos • Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- use playdoh and a continent cookie cutter to create all the modern continents and model Pangaea by putting all continents together.
- model how pangaea broke apart by putting all the continents in their current place using the map/placemat.
- use colored pencils to color code the five pieces of fossil evidence outlined one each of the five major landmasses (southern continents)
- put the landmasses together to recreate Gondwana (the southern part of Pangaea)
- receive two trays of mystery rocks, upon which they will utilize various resources (rock identification books) and their own observations (with hand lens and stereomicroscope) to identify each of the rocks.
- play a game simulating how rocks are constantly changing.
- Use various materials to create their own Rock Strata/Rock Layer Diagram
- List the different types of fossils
- Create a diagram showing how various types of fossils form

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Class Book • Computer project – web quest facts • Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas • Related experiments (home or school) • Oral presentations	Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections:

- ELA/Literacy – RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS1-4), (MS-ESS2-2), (MS-ESS2-3) 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). (MS-ESS2-3) 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. (MS-ESS2-3) WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-ESS1-4), (MS-ESS2-2) SL.8.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. (MS-ESS2-2)
- Mathematics – MP.2 Reason abstractly and quantitatively. (MS-ESS2-2), (MS-ESS2-3) 6. EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-ESS1-4), (MS-ESS2-2), (MS-ESS2-3) 7. EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (MS-ESS1-4),(MS-ESS2-2),(MS-ESS2-3)

Suggested Assessments:

Performance Task:

- Participation in Investigation Labs
- Completion of experiment recording sheet

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Weather & Climate	**Suggested Sequence: One Marking Period**

NJSLS:
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-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

Science and Engineering Practices:

Asking Questions and Defining Problems

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

χ Ask questions to identify and clarify evidence of an argument. (MS-ESS3-5)

Developing and Using Models

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

χ Develop and use a model to describe phenomena. (MS ESS2-6)

Planning and Carrying Out Investigations

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

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

Disciplinary Core Ideas:

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

χ The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (MS-ESS2-5)

χ Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS-ESS2- 6)

ESS2.D: Weather and Climate

χ Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. (MS-ESS2-6)

χ Because these patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5)

Crosscutting Concepts:

Cause and Effect

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

Systems and System Models

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

Stability and Change

χ Stability might be disturbed either by sudden events or gradual changes that accumulate over time. (MS-ESS3-5)

χ The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. (MS-ESS2-6) **ESS3.D: Global Climate Change** χ Human activities, such as the release of greenhouse gasses 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 of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3-5)	

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Describe how the Water Cycle is driven by energy from the sun and the force of gravity
- Determine how interactions of air masses results in changes in the weather conditions (examining changes in temperature, pressure, humidity, precipitation, and wind)
- Describe how movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents are major determinants of local weather patterns.
- Determine how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.
- Describe how variations in density due to temperature and salinity drive ocean currents

Instructional Materials/Resources:	**Suggested Vocabulary:**
• Science text • Unit kit	Transpiration, Evaporation, Condensation, Crystallization, Precipitation

	Technology: 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. • Related websites • Web quests • Publishing programs • Images and videos • Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Chart local weather daily for two weeks, then graph patterns
- Create a poster to show the first layers of the earth's atmosphere
- Create a barometer in a bottle
- Create a map to show pressure, wind and weather patterns over a specific region of the world
- Create a cloud in a bottle

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Class Book • Computer project – web quest, write a report using word processing software. • Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas • Related experiments (home or school) • Oral presentations	Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections:

- ELA/Literacy – RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS2-5), (MS-ESS3-5) 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. (MS-ESS2-5) WHST.6-8.8 Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources. (MS-ESS2-5) SL.8.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. (MS-ESS2-6)
- Mathematics – MP.2 Reason abstractly and quantitatively. (MS-ESS2-5), (MS-ESS3-5) 6. NS.C.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. (MS-ESS2-5) 6. EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-ESS3-5) 7. EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (MS-ESS3-5)

Suggested Assessments:

Performance Task:

- Map of weather patterns and trends
- Participation in Investigation Labs
- Completion of experiment recording sheet

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Cells/Human Body	**Suggested Sequence: One Marking Period**

NJSLS:

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 arguments 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 behavior or storage as memories.

Science and Engineering Practices:

Developing and Using Models

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

χ Develop and use a model to describe phenomena. (MS-LS1-2)

Planning and Carrying Out Investigations

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

χ Conduct an investigation to produce data to serve as the basis for evidence that meet the goals of an investigation. (MS-LS1-1)

Engaging in Argument from Evidence

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

χ Use an oral and written argument supported by evidence to support or refute an explanation or a model for a phenomenon. (MS-LS1-3)

Obtaining, Evaluating, and Communicating Information

Obtaining, evaluating, and communicating information in 6-8 builds on K-5 experiences and progresses to evaluating the merit and validity of ideas and methods.

χ Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-LS1-8)

Disciplinary Core Ideas:	**Crosscutting Concepts:**
LS1.A: Structure and Function χ 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). (MS-LS1-1) χ Within cells, special structures are responsible for particular functions, and the cell membrane forms the	**Cause and Effect** χ Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS1-8) **Scale, Proportion, and Quantity** χ Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-1) **Systems and System Models**

boundary that controls what enters and leaves the cell. (MS-LS1-2) χ 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. (MS-LS1-3) **LS1.D: Information Processing** χ Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1- 8)	χ Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. (MS-LS1-3) **Structure and Function** χ Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS1-2) **Connections to Engineering, Technology, and Applications of Science** **Interdependence of Science, Engineering, and Technology** χ Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-LS1- 1) **Connections to Nature of Science** **Science is a Human Endeavor** χ Scientists and engineers are guided by habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas. (MS-LS1-3)

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Determine the parts of a microscope
- Observe various non-living things under the microscope
- Describe the parts of a cell
- Classify bacteria, protists and other various cell types
- Determine how the body is a system of interacting subsystems composed of cells.
- Describe how sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.
- Describe Immediate behavioral responses (immediate use)

Instructional Materials/Resources:	**Suggested Vocabulary:**
• Science text • Unit kit	Microscope, non-living, cell, bacteria protists, various body parts as identified by students

• Trade books	**Technology:** 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. • Related websites • Web quests • Publishing programs • Images and videos • Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Label the parts of a microscope
- Use a microscope to look at various slides
- Label the parts of a cell
- utilize the computer/internet to create a google slide presentation featuring the six different systems of the human body
- use the National Geographic Website to follow the paths of several food items through the digestive tract
- use the Glencoe Website to map out and identify the various structures and their functions that make up the Respiratory System
- sequence the steps of inhalation.
- use the microscopes to observe three different types of muscular tissue under.
- conduct an experiment in order to determine how many bicep curls they can do using the right arm vs. their left arm. Students will discover that muscles work together in pairs to move (the skeletal system) parts of the body.
- work with a partner to smell 12 to 15 unknown samples (candles may work best) and try to identify the smell using the list provided on the board.
- identify and describe the purpose of Chemoreceptors found in the olfactory senses (the Nose).
- conduct several investigations in order to determine how blinking is controlled
- identify, describe, and classify the different types of stimuli and the types of neurons responsible for detecting them

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Class Book • Computer project – web quest facts • Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas	Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses,

• Related experiments (home or school) • Oral presentations • Provide a variety of trade books related to the unit	reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections:

- ELA/Literacy – RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-LS1-3) RI.6.8 Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not. (MS LS1-3) WHST.6-8.1 Write arguments focused on discipline content. (MS-LS1-3) WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-LS1-1) WHST.6-8.8 Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources. (MS-LS1-8) SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-LS1-2)
- Mathematics – 6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (MS-LS1-1),(MS-LS1-2),(MS-LS1-3)

Suggested Assessments: Performance Task:

- Participation in Investigation Labs
- Completion of experiment recording sheet
- Text or teacher prepared assessment

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Photosynthesis & Respiration	**Suggested Sequence: One Marking Period**

NJSLS:
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

Science and Engineering Practices:

Developing and Using Models

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

χ Develop a model to describe phenomena. (MS-LS2-3)

χ Develop a model to describe unobservable mechanisms. (MS-LS1-7)

Analyzing and Interpreting Data

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

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

Constructing Explanations and Designing Solutions

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

χ Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-LS1-6)

Engaging in Argument from Evidence

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

χ Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-LS2-4)

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

χ Science knowledge is based upon logical connections between evidence and explanations. (MS-LS1-6)

χ Science disciplines share common rules of obtaining and evaluating empirical evidence. (MS-LS2-4)

Disciplinary Core Ideas:	**Crosscutting Concepts:**
LS1.C: Organization for Matter and Energy Flow in Organisms χ 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	**Cause and Effect** χ Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-LS2-1) **Energy and Matter** χ Matter is conserved because atoms are conserved in physical and chemical processes. (MS-LS1-7)

sugars can be used immediately or stored for growth or later use. (MS-LS1-6) χ Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (MS-LS1-7) **LS2.A: Interdependent Relationships in Ecosystems** χ Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1) χ In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2- 1) χ Growth of organisms and population increases are limited by access to resources. (MS-LS2-1) **LS2.B: Cycle of Matter and Energy Transfer in Ecosystems** χ Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3) **LS2.C: Ecosystem Dynamics, Functioning, and Resilience** χ Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4) **PS3.D: Energy in Chemical Processes and Everyday Life** χ The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen. (secondary to MS-LS1-6)	χ Within a natural system, the transfer of energy drives the motion and/or cycling of matter. (MS-LS1-6) χ The transfer of energy can be tracked as energy flows through a natural system. (MS LS2-3) Stability and Change χ Small changes in one part of a system might cause large changes in another part. (MS LS2-4) **Connections to Nature of Science** **Scientific Knowledge Assumes an Order and Consistency in Natural Systems** χ Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS-LS2-3)

χ Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (secondary to MS-LS1-7)	

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- Determine the chemical compounds in cells
- Create models of molecules from atoms
- Describe the process of photosynthesis
- Describe the process of respiration

Instructional Materials/Resources: • Science text • Unit kit • Trade books	**Suggested Vocabulary:** Cell, atom, molecule, photosynthesis, respiration **Technology:** 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. • Related websites • Web quests • Publishing programs • Images and videos • Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- List the chemical compounds in cells
- Use clay to make various of models of atoms and molecules
- Draw a diagram of the process of photosynthesis in trees
- Draw a diagram of the process of respiration

Extension Strategies/Activities: • Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas • Related experiments (home or school) • Oral presentations	**Modification Strategies/Activities:** Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses,

• Provide a variety of trade books related to the unit	reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections:

- ELA/Literacy – RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-LS1-6), (MS-LS2-1), (MS-LS2-4) 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. (MS-LS1-6) 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). (MS-LS2-1) RI.8.8 Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims. (MS-LS2-4) WHST.6-8.1 Write arguments to support claims with clear reasons and relevant evidence. (MS-LS2-4) WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS1-6) WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. (MS-LS1-6), (MS-LS2-4) SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-LS1-7), (MS-LS2-3)
- Mathematics – 6. EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (MS-LS1-6),(MS-LS2-3)

Suggested Assessments:

Performance Task:

- Participation in Investigation Labs
- Completion of experiment recording sheet

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Energy flow & diversity in an Ecosystem	**Suggested Sequence: One Marking Period**

NJSLS:
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-LS2-3. 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-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

Science and Engineering Practices:
Developing and Using Models
Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.
χ Develop a model to describe phenomena. (MS-LS2-3)
χ Develop a model to describe unobservable mechanisms. (MS-LS1-7)
Analyzing and Interpreting Data
Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.
χ Analyze and interpret data to provide evidence for phenomena. (MS-LS2-1)
Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific knowledge, principles, and theories.
χ Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-LS1-6)
Engaging in Argument from Evidence
Engaging in argument from evidence in 6–8 builds on K– 5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).
χ Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-LS2-4)

Connections to Nature of Science
Scientific Knowledge is Based on Empirical Evidence
χ Science knowledge is based upon logical connections between evidence and explanations. (MS-LS1-6)
χ Science disciplines share common rules of obtaining and evaluating empirical evidence. (MS-LS2-4)

Disciplinary Core Ideas:	**Crosscutting Concepts:** **Cause and Effect**

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

χ Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. (MS-LS1-6)

χ Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (MS-LS1-7)

LS2.A: Interdependent Relationships in Ecosystems

χ Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)

χ In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2- 1)

χ Growth of organisms and population increases are limited by access to resources. (MS-LS2-1)

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

χ Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3)

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

χ Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4)

χ Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-LS2-1)

Energy and Matter

χ Matter is conserved because atoms are conserved in physical and chemical processes. (MS-LS1-7)

χ Within a natural system, the transfer of energy drives the motion and/or cycling of matter. (MS-LS1-6)

χ The transfer of energy can be tracked as energy flows through a natural system. (MS LS2-3)

Stability and Change

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

Connections to Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

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

PS3.D: Energy in Chemical Processes and Everyday Life χ The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen. (secondary to MS-LS1-6) χ Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (secondary to MS-LS1-7)	

Knowledge, Skills, and Instructional Objectives:

SWBAT:

- Determine how living things interact with their environment
- Describe how energy flows through an ecosystem
- Describe how ecosystems change due to physical or biological disruption
- Determine effects to the populations of organisms.
- Describe how Biodiversity and Environmental Health interact and affect an ecosystem
- Determine how changes in Biodiversity can affect humans
- Determine how to fix unwanted changes to Biodiversity

Instructional Materials/Resources:	**Suggested Vocabulary:**
• Science text • Unit kit • Trade books • Labeled rocks and minerals • magnifying glasses	Ecology, Ecosystem, Habitat, Biotic Factors, Abiotic Factors, Species, Population, and Community, Producers, Photosynthesis, Consumers, Herbivores, Carnivores, Scavenger, Omnivores, Decomposers

• hammer • goggles • model of volcano	**Technology:** 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. • Related websites • Web quests • Publishing programs • Images and videos • Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Use the pictures/info provided to construct two accurate food chains on a piece of construction paper or on a separate worksheet
- fill in the energy pyramid based on the organisms in their neighborhood.
- work together by reading a book about the disappearance of a species and the repercussions that occur because of that missing species. Students will have to present the book to the class by creating a Google Sheets Project.
- List physical or biological disruptions that can occur within an ecosystem

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Class Book • Computer project – web quest facts • Jigsaw groupings –students turn and teach • Class posters or chart, models, illustrations, diagrams, dioramas • Related experiments (home or school) • Oral presentations	Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections:

- ELA/Literacy – RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-LS1-6), (MS-LS2-1), (MS-LS2-4) 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. (MS-LS1-6) 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). (MS-LS2-1) RI.8.8 Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims. (MS-LS2-4) WHST.6-8.1 Write arguments to support claims with clear reasons and relevant evidence. (MS-LS2-4) WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS1-6) WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. (MS-LS1-6), (MS-LS2-4) SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-LS1-7), (MS-LS2-3)
- Mathematics – 6. EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (MS-LS1-6),(MS-LS2-3)

Suggested Assessments:

Performance Task:

- Participation in Investigation Labs
- Completion of experiment recording sheet

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Genetics	**Suggested Sequence: One Marking Period**

NJSLS:
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-LS4-5. Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

Science and Engineering Practices:
Developing and Using Models
Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.
χ Develop and use a model to describe phenomena. (MS LS3-1), (MS-LS3-2)
Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific knowledge, principles, and theories.
χ Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-LS1-5)
Engaging in Argument from Evidence
Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).
χ Use an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-LS1-4)
Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in 6–8 builds on K–5 experiences and progresses to evaluating the merit and validity of ideas and methods.
χ Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-LS4-5)

Disciplinary Core Ideas:	**Crosscutting Concepts:**
LS1.B: Growth and Development of Organisms χ Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. (secondary to MS-LS3-2) χ Animals engage in characteristic behaviors that increase the odds of reproduction. (MS-LS1-4) χ Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. (MS-LS1-4)	**Cause and Effect** χ Cause and effect relationships may be used to predict phenomena in natural systems. (MS LS3-2) χ Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. (MS-LS1-4), (MS-LS1-5), (MS-LS4- 5) **Structure and Function**

χ Genetic factors as well as local conditions affect the growth of the adult plant. (MS-LS1-5) **LS3.A: Inheritance of Traits** χ 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 (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. (MS-LS3-1) χ Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited. (MS-LS3-2) **LS3.B: Variation of Traits** χ 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. (MS-LS3-2) χ 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. (MS-LS3-1) **LS4.B: Natural Selection** χ 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. (MS-LS4-5)	χ Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS3-1) **Connections to Engineering, Technology, and Applications of Science Interdependence of Science, Engineering, and Technology** χ Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-LS4-5) **Connections to Nature of Science** **Science Addresses Questions About the Natural and Material World** χ Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS-LS4-5)

Knowledge, Skills, and Instructional Objectives:
SWBAT:

- 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
- 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
- Determine how mutations (structural changes to genes on chromosomes) can result in harmful, neutral, and beneficial effects to an organism.
- Describe the relationship between Proteins/DNA/Genes/Chromosomes

- Determine the difference between Asexual Vs Sexual Reproduction
- Sexual Reproduction → Punnett Squares
- Asexual Reproduction → Study planarians for asexual reproduction through regeneration
- Describe how adaptations (behaviors and structures) in plants and animals that increase their chances of reproduction
- Determine how environmental factors can affect the growth of an organism/species
- Describe how genetic factors can affect the growth of an organism/species

Instructional Materials/Resources:

- Science text
- Unit kit

Suggested Vocabulary:

Proteins, DNA, Genes, Chromosomes, gene, Asexual vs Sexual

Technology:

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

- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Use various materials to create a model of a gene structure
- Create a chart to illustrate the relationship between Proteins/DNA/Genes/Chromosomes
- Create a Venn diagram to illustrate Asexual Vs Sexual Reproduction
- Sexual Reproduction → Punnett Squares
- Asexual Reproduction → Study planarians for asexual reproduction through regeneration
- List the environmental factors can affect the growth of an organism/species

Extension Strategies/Activities:

- Class Book
- Computer project – web quest, write a report using word processing software.
- Jigsaw groupings –students turn and teach
- Class posters or chart, models, illustrations, diagrams, dioramas
- Related experiments (home or school)
- Oral presentations

Modification Strategies/Activities:

Books on tape, visual clues, study guide, modified expectations, modified assessments, modified homework and assignments, not accountable for spelling in non-content areas, allow oral responses, reword and clarify instructions as needed, peer tutoring, utilize computer

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections:

- ELA/Literacy – RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-LS1-4), (MS-LS1-5), (MS-LS3-1), (MS-LS3-2), (MS-LS4-5) 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. (MS-LS1-5) 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. (MS-LS3-1), (MS-LS3-2) 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). (MS-LS3-1), (MS-LS3-2) RI.6.8 Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not. (MSLS1-4) WHST.6-8.1 Write arguments focused on discipline content. (MS-LS1-4) WHST.6-8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS1-5) WHST.6-8.8 Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources. (MS-LS4-5) WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research. (MS-LS1-5) SL.8.5 Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. (MS-LS3-1), (MS-LS3-2)
- Mathematics – MP4 Model with mathematics. (MS-LS3-2) 6. SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. (MS LS1-4), (MS-LS1-5) 6. SP.B.4 Summarize numerical data sets in relation to their context. (MS-LS1-4), (MS-LS1-5) 6. SP.B.5 Summarize numerical data sets in relation to their context. (MS-LS3-2)

Suggested Assessments:

Performance Task:

- Participation in Investigation Labs
- Completion of experiment recording sheet

Other Assessment Evidence:

- Text or teacher prepared assessment

Theme/Unit: Structure and Properties of Matter	**Suggested Sequence:** 1st in sequence, 18 instructional days

NJSLS:
MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures.
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.

Science and Engineering Practices:

Developing and Using Models

- Develop a model to predict and/or describe phenomena. (MS-PS1-1)

Analyzing and Interpreting Data

- Analyze and interpret data to determine similarities and differences in findings. (MS-PS1-2)

Disciplinary Core Ideas:

- 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. (MS-PS1-1)
- Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals). (MS-PS1-1)
- Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-2)
- 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 of the reactants. (MS-PS1-2)

Crosscutting Concepts

Scale, Proportion, and Quantity

- Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-PS1-1)

Patterns

- Macroscopic patterns are related to the nurture of the microscope and atomic-level structure. (MS-PS1-2)

Scientific Knowledge is Based on Empirical Evidence

- Science knowledge is based upon logical and conceptual connections between evidence and explanations. (MS-PS1-2)

Knowledge, Skills, and Instructional Objectives:

- Design experiments to test whether the temperature of water affects the rate of evaporation and whether the temperature of the water vapor affects the rate of condensation.
- Examine water molecules to explain the state of changes in water.

- Explore the attractions and motion of atoms and molecules as observed in the heating and cooling of a solid, liquid, and gas.
- Analyze and interpret data on the properties of substances and to determine similarities and differences from results of chemical reactions between substances before and after they undergo a chemical process.
- Identify and describe possible correlation and causation relationships evidenced in chemical reactions.
- Explain states of matter and changes between the states.

Instructional Materials:

- Clear plastic cups (wide, tall and short)
- Droppers
- Flat toothpicks
- Quart-size zip-closing plastic storage bags
- 2 sets of large metal washers on a string
- Brown paper towel
- Styrofoam balls (1 inch, 1½-inch)
- Dry Ice
- Water (room temperature, hot, cold)
- 2 large index cards (5 × 8“)
- 8-oz plastic bottle
- Balance that measures in grams
- Ball and ring designed specifically for this demonstration
- Basketball, very deflated
- Bunsen burner for heating the ball
- Can of compressed gas (available at any office supply store)
- Detergent solution in a cup
- Food coloring (red, blue, yellow, green)
- Magnifier
- Popsicle sticks
- Pump
- Student thermometer
- Tape
- Wax paper
- White sheet of paper

Suggested Vocabulary:

Density
melting point
boiling point
solubility
flammability
odor
molecules
atoms
subunits
properties
matter

Instructional Resources:

http://www.middleschoolchemistry.com/lessonplans/chapter1

http://www.middleschoolchemistry.com/lessonplans/chapter2

Building Atomic Molecules Simulation (PhET internet activity)

Build a Molecule Simulation (PhET internet activity)

Chemical Reaction Demos (students determine the signs of a chemical change)

Why is the Statue of Liberty Green (Teachers Pay Teachers Lab)?

Can You Copperplate? Lab

Recommended Instructional Activities:

- Use interactive computer models to trace an atom’s trajectory at a certain physical stage, and investigate how molecular behavior is responsible for the substance’s state

- Explore the structure of a solid at the molecular level. Molecules are always in motion, though molecules in a solid move slowly. All molecules are attracted to each other. Molecules can be weakly or strongly attracted to each other. The way that large molecules interact in physical, chemical and biological applications is a direct consequence of the many tiny attractions of the smaller parts.
- Explore the structure of a liquid at the molecular level. Molecules are always in motion. Molecules in a liquid move moderately. All molecules are attracted to each other. Molecules can be weakly or strongly attracted to each other. The way that large molecules interact in physical, chemical and biological applications is a direct consequence of the many tiny attractions of the smaller parts.
- Explore the structure of a gas at the molecular level. Molecules are always in motion. Molecules in a gas move quickly. All molecules are attracted to each other. Molecules can be weakly or strongly attracted to each other. The way that large molecules interact in physical, chemical and biological applications is a direct consequence of the many tiny attractions of the smaller parts.
- Use ratio and rate reasoning to determine whether a chemical reaction has occurred.
- Display numerical data for properties such as density, melting point, solubility, flammability, and order in plots on a number line, including dot plots, histograms, and box plots.
- Density test tube challenge
- Marshmallow molecules

Extension Strategies/Activities:

- Integrate qualitative information (flowcharts, diagrams, models, graphs, or tables) about the characteristic properties of substances before and after a chemical process has occurred with a version of that information expressed visually, ***or*** integrate technical information about the characteristic properties of substances before and after a chemical process has occurred with a version of that information expressed visually.
- Develop a mathematical model to describe the atomic composition of simple molecules and extended structures.
- Use ratio and rate reasoning to describe the atomic composition of simple molecules and extended structures.

Technology:

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

- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections/Standards:

English Language Arts

Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.(MS-PS1-2) **RST.6-8.1**

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). (MS-PS1-1),(MS-PS1-2) **RST.6-8.7**

Mathematics

Reason abstractly and quantitatively. (MS-PS1-1),(MS-PS1-2) **MP.2**

Model with mathematics. (MS-PS1-1) **MP.4**

Use ratio and rate reasoning to solve real-world and mathematical problems. (MS-PS1-1),(MS-PS1-2) **6.RP.A.3**

Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. (MS-PS1-1) **8.EE.A.3**

Display numerical data in plots on a number line, including dot plots, histograms, and box plots. (MS-PS1-2) **6.SP.B.4**

Summarize numerical data sets in relation to their context. (MS-PS1-2) **6.SP.B.5**

Suggested Assessments:
Performance Task:

- Develop a model of a simple molecule and describe its atomic composition
- Develop a model of an extended structure and describe its repeating subunits

Other Assessment Evidence:

- Make logical and conceptual connections between evidence that chemical reactions have occurred and explanations of the properties of substances before and after they undergo a chemical process
- Density and atomic structure test

Theme/Unit: Interactions of Matter	**Suggested Sequence:** 2nd in sequence, 22 instructional days

NJSLS:
MS-PS-1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society
MS-PS-1-4 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-PS-1-5 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.

Science and Engineering Practices:

Obtaining, Evaluating, and Communicating Information

Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-PS1-3)

Developing and Using Models

Develop a model to predict and/or describe phenomena. (MS-PS1-4)

Disciplinary Core Ideas:	**Crosscutting Concepts:**
• Each pure substance has characteristic physical and chemical properties (for any bulk quantity	Structure and Function

under given conditions) that can be used to identify it. (MS-PS1-3) • Gasses and liquids are made of molecules or inert atoms that are moving about relative to each other. (MS-PS1-4) • 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. (MS-PS1-4) • 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 of the reactants. (MS-PS1-2),(MS-PS1-3)	• Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. (MS-PS1-3) Cause and Effect • Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS1-4) Interdependence of Science, Engineering, and Technology • Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-PS1-3) Influence of Science, Engineering and Technology on Society and the Natural World • The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time. (MS-PS1-3)

Knowledge, Skills, and Instructional Objectives:

- Develop a model that predicts and describes changes in particle motion that could include molecules or inert atoms or pure substances.
- Use cause-and-effect relationships to predict changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed in natural or designed systems.
- Obtain, evaluate, and communicate information to show that synthetic materials come from natural resources and affect society.
- Gather, read, and synthesize information about how synthetic materials formed from natural resources affect society.
- Assess the credibility, accuracy, and possible bias of each publication and methods used within the publication.
- Describe how information about how synthetic materials formed from natural resources affect society is supported or not supported by evidence.

- Use models to predict and describe the changes in particle motion, temperature, and state of a pure substance.
- Make sense of how natural resources react chemically to produce new substances.
- Understand that substances react chemically in very characteristic ways.

Instructional Materials:	**Suggested Vocabulary:**
• Plastic grocery bag • Balloons • Small pieces of paper, confetti-size	Thermal energy, particle motion, synthetic materials, pure substances

• 9-volt battery • 2 wires with alligator clips on both ends • Water • Salt • Clear plastic cup • Black paper • Cup with salt from evaporated saltwater • Magnifier • Styrofoam balls (small, large) • Deli containers (that cups easily fit inside) • Disposable cold packs • Disposable hot packs • Pennies • Calcium chloride • Cereal balls (Kix work well) • Club soda • Coarse kosher salt (sodium chloride) • Construction paper (white, black) • Corn syrup • Epsom salt (magnesium sulfate) • Food coloring • Graduated cylinders (50mL, 100mL) • Zip-closing plastic bag (quart-size, storage-grade) • Clear plastic cups • 2 6-well spot plates or 1 12-well spot plate • Glow sticks • Alka-Seltzer • Hydrogen peroxide (3%) • Instant heat pack (magnesium sulfate or calcium chloride) • Magnesium sulfate • Matches • Measuring spoons (⅛, ¼, and ½ teaspoon	**Instructional Resources/Technology:** http://www.middleschoolchemistry.com/lessonplans/chapter4 http://www.middleschoolchemistry.com/lessonplans/chapter5 http://www.middleschoolchemistry.com/lessonplans/chapter6 **Technology:** 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. • Related websites • Web quests • Publishing programs • Images and videos • Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Energy Changes in Chemical Reactions activity
- Balancing Chemical Equations simulation (PhET)

- Save the Reptile Eggs activity
- Design a Cool Pack Lab (Teachers Pay Teachers)
- Gas Laws Lab
- Heat, Temperature, Conduction Lab
- Crack that Marble Lab rotation
- Fishy Mixture Parts 1-4
- Natural Resources and Synthetic Materials Lab
- Carry out experiments that involve chemical reactions that release energy and chemical reactions that absorb energy
- Use ratio and rate to demonstrate that the total number of atoms involved in the chemical reactions does not change and therefore mass is conserved
- Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Analyze evidence that synthetic materials formed from natural resources affect society. • Use multiple print and digital sources about the impact on society of synthetic materials that are formed from natural resources. Use search terms effectively, assess the credibility and accuracy of each source, and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. • Integrate quantitative information about changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed that is expressed in words with a version of that information that is expressed visually. • Use positive and negative numbers to represent changes in particle motion and temperature when thermal energy is added or removed, explaining the meaning of zero in each situation. • Design a model to explain the structure of an atom.	• Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). • Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tools such as SKYPE, experts from the community helping with a project, journal articles, and biographies). • Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understanding. • Use project-based science learning to connect science with observable phenomena. • Structure the learning around explaining or solving a social or community-based issue.

	● Provide ELL students with multiple literacy strategies.

Career Ready Practices:
CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections/Standards:

English Language Arts

Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. (MS-PS1-3) **RST.6-8.1**

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). *(MS-PS1-4)* **RST.6-8.7**

Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-PS1-3) **WHST.6-8.8**

Mathematics

Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. (MS-PS1-4) **6.NS.C.5**

Suggested Assessments:
Performance Task:

- Use physical models or drawings, including digital forms, to represent atoms in a chemical process.
- Use mathematical descriptions to show that the number of atoms before and after a chemical process is the same.

Other Assessment Evidence:

- Lab assessments

Theme/Unit: Forces and Motion	**Suggested Sequence:** 3rd in sequence, 13 instructional days

NJSLS:
MS-PS-2-1 Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects
MS-PS-2-2 Plan an investigation to provide evidence that the change in an object's motion depends on the sum of forces on the object and the mass of the object

Science and Engineering Practices:

Planning and Carrying Out Investigations
Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how much data is needed to support a claim. (MS-PS2-2)

Constructing Explanations and Designing Solutions
Apply scientific ideas or principles to design an object, tool, process or system. (MS-PS2-1)

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). (MS-PS2-1)
- 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. (MS-PS2-2)
- All positions of objects and the directions of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared. (MSPS2-2)

Crosscutting Concepts:

Cause and Effect
Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS2-3)

Systems and System Models
Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy and matter flows within systems. (MS-PS2-1)

Stability and Change
Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and forces at different scales (MS-PS2-2)

Influence of Science, Engineering, and Technology on Society and the Natural World
The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. (MS-PS2-1)

Knowledge, Skills, and Instructional Objectives:

- Use system and system models and stability and change to understand ideas related to why some objects will keep moving and why objects fall to the ground

- Apply Newton's 3rd Law of Motion to related forces to explain the motion of objects
- Solve a problem caused when objects collide, applying engineering practices and concepts
- Analyze and interpret data to determine similarities and differences in findings
- Make logical and conceptual connections between evidence and explanations
- Examine changes over time and forces at different scales to explain the stability and change in designed systems
- Investigate the relationship between forces acting on an object and that object's motion
- Predict the motion of an object.

Instructional Materials/Resources:

Moving Marbles Lab
Simulation Investigation with online games to introduce concept
Diving Eggs demonstration
Bumper Boats Lab
Newton's Laws Graffiti
Landing on the Moon Lab

Suggested Vocabulary:
Newton's 3rd Law of Motion
Force, motion, collision, design solution, decision tree, balanced and unbalanced forces

Technology:

Newton's 3 Laws Disney Science of Imagineering Video

https://concord.org/stem-resources/seeing-motion
Explore straight-line motion using a motion sensor to generate distance versus time graphs. Learn how changes in speed and direction affect the graph. Gain an understanding of how motion can be represented on a graph.

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

- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Recommended Instructional Activities:

- Use models to represent the motion of objects in colliding systems and their interactions, such as inputs, processes, and outputs, as well as energy and matter flows within the systems
- Define a design problem involving the motion of two colliding objects that can be solved through the development of an object, tool, process, or system
- Design an investigation and identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data points are needed to support a claim

Extension Strategies/Activities:

- Draw evidence from informational texts to support analysis, reflection, and research about the application of Newton's third law when designing a solution to a problem involving the motion of two colliding objects.
- Analyze data in the form of numbers and symbols to draw conclusions about how the sum of the forces on an object and the mass of an object change the object's motion.
- When collecting and analyzing data from investigations about how the sum of the forces on an object and the mass of the object changes the object's motion, write, read, and evaluate expressions in which letters stand for numbers.

Modification Strategies/Activities:

- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tools such as SKYPE, experts from the community helping with a project, journal articles, and biographies).
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understanding.
- Use project-based science learning to connect science with observable phenomena.

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections/Standards:

English Language Arts

Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. (MS-PS2-1),(MS-ETS1-1),(MS-ETS1-2) **RST.6-8.1**

Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. (MS-PS2-1),(MS-PS2-2) **RST.6-8.3**

Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-ETS1-1) **WHST.6-8.8**

Draw evidence from informational texts to support analysis, reflection, and research. (MS-ETS1-2) **WHST.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. (MS-ETS1-2),(MS-ETS1-3) **RST.6-8.9**

Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-ETS1-2) **WHST.6-8.7**

Mathematics

Reason abstractly and quantitatively. (MS-PS2-1),(MS-PS2-2),(MS-PS2-3),(MS-ETS1-1),(MS-ETS1-2) **MP.2**

Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. (MS-PS2-1) **6.NS.C.5**

Write, read, and evaluate expressions in which letters stand for numbers. (MS-PS2-1),(MS-PS2-2) **6.EE.A.2**

Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form, using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. (MS-PS2-1),(MS-PS2-2) **7.EE.B.3**

Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (MS-PS2-1),(MS-PS2-2) **7.EE.B.4**

Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. (MS-ETS1-1),(MS-ETS1-2) **7.EE.3**

Suggested Assessments:
Performance Task:

- Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs
- 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

Other Assessment Evidence:

- Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading texts about the application of Newton's third law to the motion of two colliding objects Conduct a short research project to answer a question about the application of Newton's third law when designing a solution to a problem involving the motion of two colliding objects, drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
- Conduct a short research project to answer a question about how the sum of the forces on the object and the mass of the object change an object's motion, drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
- Gather relevant information from multiple print and digital sources that provide information about the application of Newton's third law when designing a solution to a problem involving the motion of two colliding objects; assess the credibility of each source and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.

Theme/Unit:	**Suggested Sequence:**
Types of Interactions (electric and magnetic forces)	4th in sequence, 13 instructional days

NJSLS:
MS-PS-2-3 Ask questions about data to determine the factors that affect the strength of electric and magnetic forces
MS-PS-2-4 Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects
MS-PS-2-5 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

Science and Engineering Practices:
Asking Questions and Defining Problems
Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles. (MS-PS2-3) **Planning and Carrying Out Investigations**
Conduct an investigation and evaluate the experimental design to produce data to serve as the basis for evidence that can meet the goals of the investigation. (MS-PS2-5)
Engaging in Argument from Evidence
Construct and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem (MS-PS2-4)

Disciplinary Core Ideas:	**Crosscutting Concepts:**
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. (MS-PS2-3) ● 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. (MS-PS2-4) ● 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). (MS-PS2-5)	**Cause and Effect** Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS2-3), (MS-PS2- 5) **Systems and System Models** Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy and matter flows within systems. (MS-PS2-4),

Knowledge, Skills, and Instructional Objectives:

- Use *cause and effect*; *system and system models*; and *stability and change* to understand ideas that explain why some materials are attracted to each other while others are not.
- Apply ideas about gravitational, electrical, and magnetic forces to explain a variety of phenomena including beginning ideas about why some materials attract each other while others repel.
- Develop understandings that gravitational interactions are always attractive but that electrical and magnetic forces can be both attractive and negative.
- Develop ideas that objects can exert forces on each other even though the objects are not in contact, through fields.
- Demonstrate proficiency in *asking questions*, *planning and carrying out investigations*, *designing solutions*, and *engaging in argument*.

Instructional Materials/Resources:

Gravity and Magnetism-Forces Conflict Lab
Gravity and Gravity's Effect on the Planets (PhET simulation)
Mass vs. Weight Lab
Weighed Down Lab
Electromagnets Lab
Exploring Magnetic Levitation Lab
Circuits Lab
Battery (D cell)
Wire (4-6 feet of 18 gauge)
Iron nail
Paper clips
Tape

Suggested Vocabulary:
Pith balls, electromagnetism, repulsive, attractive

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

- Related websites
- Web quests
- Publishing programs
- Images and videos
- Books on tape

8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
Gravity Video

Electromagnetic Lab

http://www.regent.edu/acad/schedu/pdfs/mcms/electromagnetic_power.pdf

Inspector Detector Challenge
https://mpbn.pbslearningmedia.org/resource/mss13.sci.engin.design.detect/inspector-detector-challenge/#.WYITHRUrLRY

Recommended Instructional Activities:

- Conduct an investigation and evaluate an experimental design to produce data that can serve as the basis for evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.
- Identify the cause-and-effect relationships between fields that exist between objects and the behavior of the objects.
- Ask questions about data to determine the effect of the strength of electric and magnetic forces that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles.
- Perform investigations using devices that use electromagnetic forces.
- Collect and analyze data that could include the effect of the number of turns of wire on the strength of an electromagnet or the effect of increasing the number or strength of magnets on the speed of an electric motor.

Extension Strategies/Activities:	**Modification Strategies/Activities:**
• Construct and present oral and written arguments supported by empirical evidence and scientific reasoning to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. • Allow students to create other tools using items they bring from home. These tools may be compound machines.	● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. ● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). ● Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tools, experts from the community helping with a project, journal articles, and biographies). ● Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). ● Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understanding.

	● Use project-based science learning to connect science with observable phenomena.

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections/Standards:

English Language Arts/Literacy

Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.(HS-PS2-5), (HS-PS2-3) **WHST.11-12.7**

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-PS2-5) **WHST.11-12.8**

Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS2-5) **WHST.11-12.9**

Mathematics

Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS2-5),(HS-PS2-4) **HSN.Q.A.1**

Define appropriate quantities for the purpose of descriptive modeling. (HS-PS2-5),(HS-PS2-4) **HSN.Q.A.2**

Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS2-5),(HS-PS2-4) **HSN.Q.A.3**

Reason abstractly and quantitatively. (HS-PS2-4) **MP.2**

Model with mathematics. (HS-PS2-4) **MP.4**

Interpret expressions that represent a quantity in terms of its context. (HS-PS2-4) **HSA.SSE.A.1**

Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. (HS-PS2-4) **HSA.SSE.B.3**

Suggested Assessments:

Performance Task:

- Use models to represent the gravitational interactions between two masses.

Other Assessment Evidence:

- Create a list of what they learned about electromagnets.
- Have students find an electromagnet in an everyday machine or gadget and explain in their science journals where it is and what it does

Theme/Unit: Relationships Among Forms of Energy (Potential and Kinetic Energy)	**Suggested Sequence:** 5th in sequence, 10 instructional days

NJSLS:
MS-PS-3-1 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-PS-3-2 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-PS-3-5 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

Science and Engineering Practices:

Developing and Using Models

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

Analyzing and Interpreting Data

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

Engaging in Argument from Evidence

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

Scientific Knowledge is Based on Empirical Evidence

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

Disciplinary Core Ideas:

PS3.A: Definitions of Energy

- Motion energy is properly called kinetic energy; it is proportional to the mass of the moving object and grows with the square of its speed. (MS-PS3-1)
- A system of objects may also contain stored (potential) energy, depending on their relative positions. (MS-PS3-2)

PS3.B: Conservation of Energy and Energy Transfer

Crosscutting Concepts:

Scale, Proportion, and Quantity

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

Systems and System Models

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

Energy and Matter

• When the motion energy of an object changes, there is inevitably some other change in energy at the same time. (MS-PS3-5) **PS3.C: Relationship Between Energy and Forces** • When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. (MS-PS3-2)	Energy may take different forms (e.g. energy in fields, thermal energy, energy of motion). (MS-PS3-5)

Knowledge, Skills, and Instructional Objectives:

- Investigate the potential energy stored in a variety of systems.
- Construct graphical displays of data that describe the relationships between kinetic energy and mass of an object and speed of an object.
- Use square root and cube root symbols to represent solutions to equations of the form $x^2=p$ and $x^3=p$, where p is a positive rational number
- Recognize and represent proportional relationships between kinetic energy and mass separately from kinetic energy and speed
- Use an understanding of kinetic and potential energy within a system to construct a claim about the relationship between the transfer of energy to or from an object and changes in kinetic energy
- Interpret the equation y = mx + b as defining a linear function whose graph is a straight line and be able to give examples of functions that are not linear when describing the change in the kinetic energy of an object and the energy transferred to or from the object

Instructional Materials/Resources:	**Suggested Vocabulary:**
Origami jumping frogs Kinetic energy ball drop Energy Skate Park (PhET simulation online)	Kinetic energy, potential energy, energy, temperature, chemical energy, force, friction,

Rubber Band Cannon Disney Roller Coaster ride builder Marshmallow Catapult	**Technology:** 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. ● Related websites ● Web quests ● Publishing programs ● Images and videos ● Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment. Soccer Demonstration Video http://pbskids.org/dragonflytv/show/soccerball.html PhET Demonstration (Skateboards, Kinetic and Potential Energy https://phet.colorado.edu/en/simulation/energy-skate-park-basics Podcast on Potential and Kinetic Energy: Energy, Stop Faking It! Simple Machines http://learningcenter.nsta.org/resource/?id=10.2505/14/PCE07_Jan9.3 Discovery School Video—Measure for Measure: Weights and Energy (Riding Roller Coasters, Rules of Physics)

Recommended Instructional Activities:

- Construct and interpret graphical displays of data to identify linear and nonlinear relationships of kinetic energy to the mass of an object and to the speed of an object.
- Develop a model to describe what happens to the amount of potential energy stored in the system when the arrangement of objects interacting at a distance changes
- Use models to represent systems and their interactions, such as inputs, processes, and outputs, and energy and matter flows within systems. Models could include representations, diagrams, pictures, and written descriptions.

- Construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.
- Conduct an inventory or other representation of the energy before and after the transfer in the form of temperature changes or motion of an object. Do not include calculations of energy.

Extension Strategies/Activities:

- 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, use square root and cube root symbols to represent solutions to equations of the form $x^2=p$ and $x^3=p$, where p is a positive rational number

Modification Strategies/Activities:

- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).
- Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tools, experts from the community helping with a project, journal articles, and biographies).
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences).
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understanding.
- Use project-based science learning to connect science with observable phenomena.

Career Ready Practices:

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections/Standards:

English Language Arts

Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. *(MS-PS3-1),(MS-PS3-5)* **RST.6-8.1**

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). (MS-PS3-1) **RST.6-8.7**

Write arguments focused on discipline content. *(MS-PS3-5)* **WHST.6-8.1**

Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-PS3-3) **WHST.6-8.7**

Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. *(MS-PS3-2)* **SL.8.5**

Mathematics

Reason abstractly and quantitatively. (MS-PS3-1),(MS-PS3-5) **MP.2**

Understand the concept of ratio and use ratio language to describe a ratio relationship between two quantities. (MS-PS3-1),(MS-PS3-5) **6.RP.A.1**

Understand the concept of a unit rate a/b associated with a ratio a:b with $b \neq 0$, and use rate language in the context of a ratio relationship. (MS-PS3-1) **6.RP.A.2**

Recognize and represent proportional relationships between quantities. (MS-PS3-1),(MS-PS3-5) **7.RP.A.2**

Know and apply the properties of integer exponents to generate equivalent numerical expressions. (MS-PS3-1) **8.EE.A.1**

Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational. (MS-PS3-1) **8.EE.A.2**

Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. (MS-PS3-1),(MS-PS3-5) **8.F.A.3**

Suggested Assessments:

Performance Task:

- Design multimedia presentations that could include diagrams, pictures, and/or written descriptions of the system examined. Represent interactions within systems, such as inputs, processes, and outputs, and energy flows within the system.

- Apply the forces of nature to a sport of their choice. Choose a sport from the following Web sites that provide information about the physics of sports. Explain which forces affect the sports and how they do so. Identify what you learn about forces and the role they play in sports?
  - http://www.exploratorium.edu/sports/ http://www.blackmagic.com/ses/surf/papers/physicsofsurf2.html http://www.thehoya.com/sports/020703/sports5.cfm http://www.physics.about.com/od/sportphysics/ http://www.geocities.com/thesciencefiles/physicsof/basketball.htm
  - During the next class period, ask students to share their sports and to explain which forces affect the sports and how they do so. 6. Conclude the lesson by asking students: What did you learn about forces and the role they play in sports? Did you learn anything surprising? Has the activity encouraged you to explore other forces of nature?

Other Assessment Evidence:

- constructing and interpreting graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object, interpret the equation y = mx + b as defining a linear function whose graph is a straight line

- Give examples of functions that are not linear when describing the change in the kinetic energy of an object and the energy transferred to or from the object.

Theme/Unit: Thermal Energy	**Suggested Sequence:** 6th in sequence, 15 instructional days

NJSLS:
MS-PS-3-3 Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.
MS-PS-3-4 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

Science and Engineering Practices:

Planning and Carrying Out Investigations

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

Constructing Explanations and Designing Solutions

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

Asking Questions and Defining Problems

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

Developing and Using Models

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

Analyzing and Interpreting Data

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

Engaging in Argument from Evidence

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

Disciplinary Core Ideas:	**Crosscutting Concepts:**
PS3.A: Definitions of Energy	**Scale, Proportion, and Quantity**

- Temperature is a measure of the average kinetic energy of particles of matter. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present. (MS-PS3-3),(MS-PS3-4)

PS3.B: Conservation of Energy and Energy Transfer

- The amount of energy transfer needed to change the temperature of a matter sample by a given amount depends on the nature of the matter, the size of the sample, and the environment. (MS-PS3-4)
- Energy is spontaneously transferred out of hotter regions or objects and into colder ones. (MS-PS3-3)

ETS1.A: Defining and Delimiting Engineering Problems

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

ETS1.B: Developing Possible Solutions

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

ETS1.C: Optimizing the Design Solution

- Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—
- Proportional relationships (e.g. speed as the ratio of distance traveled to time taken) among different types of quantities provide information about the magnitude of properties and processes. (MS-PS3-4)

Energy and Matter

- The transfer of energy can be tracked as energy flows through a designed or natural system. (MS-PS3-3)

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

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

that is, some of those characteristics may be incorporated into the new design. (MS-ETS1-3) The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (MS-ETS1-4)	

Knowledge, Skills, and Instructional Objectives:

- 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 particles as measured by the temperature of the sample.
- Identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how much data is needed to support a claim.
- Make logical and conceptual connections between evidence and explanations.
- Apply scientific ideas or principles to design, construct, and test a design of a device that either minimizes or maximizes thermal energy transfer.
- Determine design criteria and constraints for a device that either minimizes or maximizes thermal energy transfer.
- Test design solutions and modify them on the basis of the test results in order to improve them.
- Use a systematic process for evaluating solutions with respect to how well they meet criteria and constraints.

Instructional Materials/Resources:	**Suggested Vocabulary:**
• Heat and rate of reaction: Conduction-Alka Seltzer Lab • Thermal Protection Systems Lab	Energy transformations, conservation

	Technology: 8.1- Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate to create and communicate knowledge. • Related websites • Web quests • Publishing programs • Images and videos • Books on tape 8.2- Technology, Education, Engineering, Design, and Computational Thinking – Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment. PhET: States of matter (energy changes) https://phet.colorado.edu/en/simulation/states-of-matter;jsessionid=AC62BC80A24F40C8DBF64D00C012480A#for-teachers-header PhET Lab: Energy Forms and Changes https://phet.colorado.edu/en/simulation/energy-forms-and-changes

Recommended Instructional Activities:

- Gather relevant information to inform the design, construction, and testing of a device that either minimizes or maximizes thermal energy transfer using multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources. (build a thermos activity or design a solar cooker activity)
- Draw evidence from informational texts to support analysis, reflection, and research that informs the design, construction, and testing of a device that either minimizes or maximizes thermal energy transfer.
- Compare and contrast the information gained from experiments, simulations, or multimedia sources with that gained from reading text about devices that either minimize or maximize energy transfer.
- Summarize numerical data sets in relation to the amount of energy transferred, the type of matter, the mass, and the change in the average kinetic energy of particles in the sample as measured by the temperature of the sample.

Extension Strategies/Activities:	**Modification Strategies/Activities:**

• Reason abstractly and quantitatively while collecting and analyzing numerical and symbolic data as part of a systematic process for evaluating solutions with respect to how well they meet criteria and constraints of a problem involving the design of a device that either minimizes or maximizes thermal energy transfer.	• Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). • Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tools, experts from the community helping with a project, journal articles, and biographies). • Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understanding. • Use project-based science learning to connect science with observable phenomena.

Career Ready Practices:
CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and 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.

Cross-curricular Connections/Standards:

English Language Arts

Cite specific textual evidence to support analysis of science and technical texts. (MS-PS3-5),MS-ETS1-1),(MS-ETS1-2),(MS-ETS1-3) **RST.6-8.1**

Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. (MS-PS3-3),(MS-PS3-4) **RST.6-8.3**

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). (MS-PS3-3),(MS-PS3-4),(MS-ETS1-3) **RST.6-8.7**

Compare and contrast the information gained from experiments, simulations, videos, or multimedia sources with that gained from reading a text on the same topic. (MS-ETS1-2),(MS-ETS1-3) **RST.6-8.9**

Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-ETS1-2) **WHST.6-8.7**

Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-ETS1-1) **WHST.6-8.8**

Draw evidence from informational texts to support analysis, reflection, and research. (MS-ETS1-2) **WHST.6-8.9**

Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-ETS1-4) **SL.8.5**

Mathematics

Reason abstractly and quantitatively. (MS-PS3-4)**,**(MS-ETS1-1),(MS-ETS1-2),(MS-ETS1-3),(MS-ETS1-4) **MP.2**

Summarize numerical data sets in relation to their context. (MS-PS3-4) **6.SP.B.5**

Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. (MS-ETS1-1),(MS-ETS1-2),(MS-ETS1-3) **7.EE.3**

Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. (MS-ETS1-4) **7.SP**

Suggested Assessments:
Performance Task:

- Conduct short research projects to apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer, drawing on several sources and generating additional related, focused questions that allow for multiple avenue of exploration.
- Test design solutions and modify them on the basis of the test results in order to improve them.

Other Assessment Evidence:

- Make logical and conceptual connections between evidence and explanations.

Support Documents

Board Policies Applicable to Curriculum

2110 PHILOSOPHY OF EDUCATION

Free public education for all children is a cornerstone of a democratic society that values the worth and dignity of each individual. The primary goal of this Board of Education shall be to offer each child in this district the educational opportunity that will enable him/her to function politically, economically, and socially in that democratic society.

The Board, as the agent responsible for the education of the children of the district, will provide a planned program of learning that incorporates into its curriculum the lessons and experiences, within and without the classroom, needed to realize the educational goals of this district. The Board appreciates the need for constant improvement of the instructional program and will strive unremittingly to provide an educational system that assists each pupil in becoming a self-respecting individual who can function effectively and satisfyingly.

It is the expectation of this school district that all pupils achieve the New Jersey Core Curriculum Content Standards at all grade levels.

The Board will seek out and work cooperatively with the available resources of home and community including business and industry, in the improvement of the educational program.

The Board will endeavor to employ a high caliber, well-prepared staff of adequate size and wide-ranging abilities. Moreover, the Board will provide pupils and staff, as needs dictate and means permit, with adequate educational supplies, equipment, and facilities.

The purpose of education in the schools of this district is to facilitate the development of each child to his/her greatest potential. The school staff shall recognize individual differences among pupils and encourage their achievement and progress, not only in basic skills but in the ability to think independently and critically. The school staff shall help pupils to understand our democratic society; to believe in it and to act fairly in their relationships with others; to develop in themselves attitudes of respect and helpfulness toward others; to want, and to be able to perform well, some portion of the work of the world; to acquire knowledge and skills necessary to do this with satisfaction to themselves and society; to understand and use effective methods in framing the questions and tackling the problems that they encounter in their lives to the end that they may function politically, economically, and socially in a democratic society.

Adopted: 11 November 2008

2132 SCHOOL DISTRICT GOALS AND OBJECTIVES

The Board of Education adopts the following goals and objectives for the operation of the educational program of the school district:

1. Student Achievement:

Continue to implement formative and on-line assessments of student performance in order to ensure that our programs and their execution meet the expectations set forth in the Common Core State Standards.

2. Community Engagement:

Improve the frequency, quality and consistency of communication that will enhance parent and community involvement.

3. Human Resources:

Continue to work toward matching our community and student diversity in our staff.

N.J.A.C. 6A:32-12.2

Adopted: 8 September 2014

2200 CURRICULUM CONTENT
M

The Board of Education will provide the instruction and services mandated by law and rules as necessary for the implementation of a thorough and efficient system of free public education and such other instruction and services as the Board deems appropriate for the thorough and efficient education of the students of this district. The Board shall annually approve a list of all programs and courses that comprise the district's curriculum and shall approve any subsequent changes in the curriculum in accordance with Policy 2220.

For purposes of this policy “curriculum” means planned learning opportunities designed to assist students toward the achievement of the intended outcomes of instruction.

The curriculum will be reviewed by the Superintendent and approved annually by the Board. In accordance with law, the curriculum shall, as a minimum, include the curricular mandates of N.J.S.A. 18A - Education and N.J.A.C. 6 and 6A - Education and all of the New Jersey Core Curriculum Content Standards and Cumulative Progress Indicators.

The Superintendent is responsible for implementing the curriculum approved by the Board.

The Board directs the curriculum to be consistent with the educational goals and objectives of this district, the New Jersey Core Curriculum Content Standards and responsive to identified student needs. The Superintendent shall, in consultation with teaching staff members, assure the effective articulation of curriculum across all grade levels, between the schools of this district, and among the constituent districts of the Rancocas Valley Regional School District.

The curriculum shall provide programs in accordance with Board policies and the New Jersey Student Learning Standards, including but not limited to:

1. Preparation of all students for employment or post-secondary study upon graduation from high school;

2. Instruction in workplace readiness skills, visual and performing arts, comprehensive health and physical education, language arts literacy, mathematics, science, social studies (including instruction on the Constitution of the United States, United States history, Community Civics, and the geography, history and civics of New Jersey), and World Languages;

3. Continuous access to sufficient programs and services of a library/media facility, classroom collection, or both, to support the educational program of all students in accordance with Policy 2530;

4. Guidance and counseling to assist in career and academic planning for all students, in accordance with Policy 2411;

5. A continuum of educational programs and services for all children with disabilities, in accordance with Policy and Regulation 2460;

6. Bilingual education, English as a Second Language, and English language services for students of limited English language proficiency, when the number of such students so necessitates, in accordance with Policy 2423;

7. Programs and services for students at risk who require remedial assistance in accordance with Policies 2414, 2415, and 5460;

8. Equal educational opportunity for all students in accordance with Policies 2260, 5750, and 5755;

9. Career awareness and exploration as required, and vocational education as appropriate;

10. Educational opportunities for students with exceptional abilities, in accordance with Policy 2464;

11. Instruction in accident and fire prevention;

12. A substance abuse prevention program;

13. A program for family life education; and

14. Programs that encourage the active involvement of representatives from the community, business, industry, labor and higher education in the development of educational programs aligned with the standards.

N.J.S.A. 18A:6-2; 18A:6-3; 18A:35-1 et seq.

N.J.A.C. 6A:8-1.1 et seq.; 6A:14 et seq.

New Jersey Core Curriculum Content Standards

Adopted: 14 November 2016

2210 CURRICULUM DEVELOPMENT
M

The Board of Education is committed to the continuing improvement of the educational program of the district. To this end, the curriculum shall be evaluated and modified in accordance with a plan for curriculum development.

As educational leader of the district, the Superintendent shall be responsible to the Board for the development of curriculum and shall establish procedures for curriculum development that insure the effective participation of teaching staff members, pupils, the community, and members of the Board.

The Superintendent shall report to the Board the objectives, evaluative criteria and costs of each proposed program before seeking Board adoption. New programs and courses of study shall not be acted upon by the Board until the meeting following their presentation, in order for Board members to have an opportunity to review the proposed program.

Criteria by which the Board will judge the acceptability of new course offerings include:

1. Does it address an identified pupil need?

2. Is it relevant to the Board's philosophy and goals and does it offer real possibilities for progress toward these goals?

3. If the proposed course replaces an existing program, what defect in the previous program is it designed to overcome?

4. Does it include the criteria by which progress can be measured?

5. Has it been thoroughly studied and/or tested by district staff or by another district? What were the results?

6. Has a curriculum guide been completed? If not, when can it be expected?

7. Have the associated textbooks been recommended to the Board?

8. Have the costs and time of implementation including in-service training been reviewed?

A five-year plan for updating curriculum shall be developed and implemented. The Superintendent shall report annually on all progress in curriculum development and the implementation of the five-year curriculum plan at the time of the Board's annual adoption of curriculum.

The Superintendent may conduct experimental programs that are not part of the duly adopted curriculum and are deemed to be necessary to the continuing growth of the instructional program; he or she shall report to the Board any such pilot program conducted, along with its objectives, evaluative criteria, and costs, before each such program is initiated.

The Superintendent shall report to the Board periodically on all progress in curriculum development.

Adopted: 2 May 2000

2220 ADOPTION OF COURSES
M

The Board of Education shall provide a comprehensive instructional program to serve the needs of the children of this district. In furtherance of this goal and pursuant to law, the Board shall annually adopt the existing courses of study. Adoption includes both content and credit allocation. The Board's policy in this respect is to:

1. Adopt those core content standards mandated by the state in a form acceptable to the State Department of Education.

2. Adopt additional core content standards to meet the changing needs of pupils and the community.

3. Adapt and revise existing courses of study to meet the changing needs of pupils and the community.

Existing courses shall be reviewed at regular intervals and revised as necessary. No course of study shall be eliminated, revised or implemented without the approval of the Board.

The Board directs that the curriculum of this district:

1. Be consistent with written goals, objectives and identified pupil needs;

2. Develop individual talents and interests and serve diverse learning styles to motivate pupil achievement;

3. Provide for continuous learning through effective articulation;

4. Provide all pupils continuous access to sufficient programs and services of a library/media facility, classroom collection, or both, to support the educational program;

5. Provide all pupils guidance and counseling to assist in career and academic planning;

6. Provide a continuum of educational programs and services for handicapped children, pursuant to law and regulation;

7. Provide bilingual programs for pupils whose dominant language is not English, pursuant to law and regulation;

8. Provide compensatory education programs for pupils, pursuant to law and regulation;

9. Provide all pupils equal educational opportunity, pursuant to law and regulation;

10. Provide career awareness and vocational education, pursuant to law and regulation;

11. Provide educational opportunities for exceptionally gifted and talented pupils.

The Superintendent shall maintain a current list of all courses of study offered by this district; shall furnish each member of the Board of Education with a copy upon request; and shall provide a copy in the district office for public referral.

Adoption of courses shall be by a recorded roll call majority vote of the full membership of the Board. This includes the courses in the special education and ESL/bilingual programs, and those for the adult high school.

N.J.S.A. 18A:4-25; 18A:4-28; 18A:7A-6; 18A:33-1;
18A:35-1 et seq.
N.J.A.C. 6:4-1.1 et seq.; 6:8-4.6; 6:8-7.1; 6:39-1.2

Adopted: 2 May 2000

2230 COURSE GUIDES

M

The Superintendent shall oversee development of curriculum guides for every course and area of study for every grade level. Each guide shall contain objectives for concepts and skills to be taught and attitudes to be developed; necessary study skills; suggested materials and activities designed to achieve all of these; and evaluation criteria intended to test the extent to which learning objectives have been met.

Teachers shall use the guides as the core of their instructional planning. It shall be the responsibility of the building principal to ensure that curriculum guides are being followed.

A copy of each guide in use shall be kept on file in each school office. Such guides shall be available for inspection.

Because curriculum guides are the means of implementing instruction in courses adopted by the Board as the curriculum of the district, the Board shall approve any new curriculum guides or any revision to an existing guide before they are put into effect.

N.J.S.A. 18A:33-1
Adopted: 2 May 2000

Curriculum Revision Commentary

In order to achieve the district's philosophy of high quality educational experiences for all students, curriculum review and revision must become an ongoing process in Westampton Township Public Schools.

Recommended 5 Year Cycle - In an effort to streamline the process for future curriculum review and revision, the following five-year curriculum revision cycle will be implemented:

Year 1: Curriculum Evaluation and Development

- Examine the state statues, state administrative code, and board policy to ensure compliance and develop direction for curriculum revision.
- Research current data, trends, and best practices in the content area.
- Complete curriculum audit, including teacher surveys and discussions, to determine curriculum strengths and areas of concern
- Develop K-8 curriculum maps in the respective content area
- Determine learning outcomes, and assessments based on state standards
- Select and purchase new programs and materials, if necessary
- Plan district wide articulation sessions focusing on new initiatives

Year 2: Initial Implementation and Revision

- Create a new curriculum draft
- Plan professional development to facilitate the implementation of new instructional practices and programs relative to the new curriculum.
- Provide professional development for administrators to support the implementation and supervision of new curriculum.
- Use teacher feedback and recommendation to support revisions of the curriculum draft.
- Include additional instructional activities, cross-curricular connections and technology to move the document from being a work in progress to a finished product.
- Begin collecting and analyzing data to determine the impact of the new curriculum on student learning.

Years 3 and 4: Full Implementation

- Implement revisions to the curriculum
- Monitor the implementation of curriculum with the new revisions.
- Continue to provide support and staff development
- Identify further areas of revision and amend the curriculum, if necessary.
- Continue to collect and analyze data to determine the impact of curriculum on student learning.

Year 5: Full Implementation/Revision Planning

- Monitor the implementation of curriculum with the new revisions.
- Continue to provide support and staff development
- Identify further areas of revision and amend the curriculum, if necessary.
- Continue to collect and analyze data to determine the impact of curriculum on student learning.
- Plan for new curriculum revision cycle/curriculum evaluation and development.

It is important to note, however, that recent changes in NJ legislature states that if the NJSLS standards change, no district will be allowed to wait until they are in a curriculum revision year (i.e. year 5 of a five-year curriculum revision cycle) to revise the affected curriculum. Districts will have twelve months from the date the new standards are adopted to update and amend their curriculum documents.

Modifications and Extensions: A Guide for Differentiated Instruction

(Formerly Instructional Adaptations in the Classroom for Students with Diverse Needs)

Introduction

The students populating U.S. classrooms today are a diverse lot. They come from differing cultures and have differing learning styles. They arrive at school with differing levels of emotional and social maturity. Their interests differ greatly, both in topic and intensity. At any given time, they reflect differing levels of academic readiness in various subjects-and in various facets of a single subject.

In life, kids can choose from a variety of clothing to fit their differing sizes, styles, and preferences. We understand, without explanation, that this makes them more comfortable and gives expression to their developing personalities. In school, modifying or differentiating instruction for students of differing readiness and interests is also more comfortable, engaging, and inviting. One-size-fits-all instruction will inevitably sag or pinch-exactly as single-size clothing would-student who differ in need, even if they are chronologically the same age.

While the goal for each student is challenge and substantial growth, teachers must often define challenge and growth differently in response to students' varying interests and readiness levels.

– Carol Ann Tomlinson; How to Differentiating Instruction in Mixed-Ability Classrooms

The concept of differentiation, also referred to "differentiating instruction", "differentiated instruction", "differentiated learning", "adaptations", has become an important conversation in teaching and learning. This places students at the center of teaching and learning and upholds data and student needs as the vehicle to drive instructional planning and practices.

"Differentiating the curriculum" requires qualitative, proactive, and multiple approaches to learning in an effort to provide appropriate adjustments to content, teaching strategies, expectations of student mastery, and scope and sequence.

In a differentiated classroom, students work at different paces, have different strengths, and therefore, need instruction that is tailored to meet their individual needs. This need for differentiation is magnified when students have disabilities, are limited in English proficiency, or are advanced and need to be challenged academically to maintain motivation for learning.

This document is designed to offer support to teachers as a resource for strategies to use in their classroom considering that most classrooms contain a broad range of levels, skills, and interests. Please note that while this document is categorized to reflect specific student subgroups, many of the strategies can overlap and prove to be effective instructional practices for all students.

Students with Disabilities

Student Motivation

Rationale: Some students with disabilities may be reluctant to engage or persist in language arts literacy activities. This reluctance may be due to difficulties with aspects of language or literacy processes resulting in repeated failures despite students' initial efforts and desire to learn. Because of these difficulties motivational strategies are important to help students with disabilities become successfully involved in a variety of literacy experiences to develop proficiency, confidence, and enjoyment.

Purpose:	*Strategies:*
Create interest	Personally meaningful activity
Develop persistence	Activity choice
Build confidence	Hands-on, multimodal activities
Promote enjoyment	"Doable" tasks
Foster independence	Attention to learning style
Student involvement in goal setting	
Modified assessment activities	
Choice to work with others or alone	

Instructional Presentation

Rationale: Students with disabilities may require instructional presentations that will enable them to acquire, comprehend, recall, and apply science content and related processes. In addition, instructional presentation adaptations can enhance a student's attention and ability to focus on instruction.

The primary purpose of these adaptations is to provide special education students with teacher-initiated and teacher-directed interventions that prepare students for learning and engage students in the learning process (*Instructional Preparation)*; structure and organize information (*Instructional Prompts)*; foster understanding of new concepts and processes (*Instructional Application)*; and promote student self-reflection and self-management regarding tasks demands, goal attainment, and performance accuracy (*Instructional Monitoring)*.

Instructional Preparation

Purpose:	*Examples:*
Motivate	Previewing information/materials
Establish purpose and goals of lesson	Advanced organizers
Activate prior knowledge	Brainstorming and webbing
Build background	Questioning techniques
Focus	K-W-L strategies
Organize	Warm-ups
	Visual demonstrations, illustrations, models
	Mini-lessons

Instructional Prompts

Purpose:	*Examples:*

Organize information	Graphic organizers
Build whole-part relationships	Semantic organizers
Cue associations and connections	Outlines
Highlight essential concepts	Mnemonics
Generate categorization and comparisons	Analogies
Activate recall	Feature analysis
Summarize	Color coding
	Keywords/Labels
	Writing frames/templates
	Restating/clarifying oral directions
	Cue Cards
	Pictures
	Movement cues
	Note Taking guides
	Segmenting/chunking tasks
	Directions on overhead/board

Instructional Application

Purpose:	*Examples:*
Simplify abstract concepts	Graphics and charts
Provide concrete examples	Data charts
Extend ideas and elaborate understanding	Flow charts
Build connections and associations	Drawings and other illustrations
Relate to everyday experiences	Dramatics – role play
Promote generalization	Props and manipulatives
Engage multiple modalities	Field trips
Games and puzzles	
Models	
Interviews/surveys	
Think aloud - modeling	
Simulations	
Hands-on activities	
Constructions	
Dramatizations	
Music and movement	
Concept activities	
Application activities	
Real-life applications (write letter to editor)	

Instructional Monitoring

Purpose:	*Examples:*
Provide checks for understanding	Self-monitoring checklists
Redirect attention	Think-aloud

Direct on-task behavior
Promote participation
Check progress
Assist in goal setting
Establish timelines
Clarify assignments, directions, and directions
Provide reinforcement and corrective feedback
Promote strategy use and generalization
Manage student behavior and interactions
Develop self-questioning and self-regulation

Journal entries
Portfolios
Interviews
Questioning techniques
Student contracts
Reward system

Instructional Grouping

Purpose:	*Examples:*
Cooperative learning groups	Assist physically
Peer partners	Clarify
Buddy Systems	Prompt cue
Teams	Gestures and signals
	Interpret
	Reinforce
	Highlight
	Organize
	Focus

Student Response

Rationale: Students with disabilities may require specific adaptations in order to demonstrate acquisition, recall, understanding, and application of language arts and other content area procession in a variety of situations with varied materials while they are developing proficiencies in these areas.
The primary purpose of student performance responses is to provide students with disabilities a means of demonstrating process toward the lesson objectives related to the New Jersey Student Learning Standards.

Response Format Adaptation Examples:

- Dictation
- Use of PC/multimedia for composition of response
- Video and audiotapes
- Braille writing
- Signing with Interpretation
- Information and graphic organizers
- Illustrations
- Diagrams
- Construction – models, dioramas, mobiles
- Songs, raps, and/or poems
- Brochure
- Game or puzzle

- Flip book
- Create test questions

Response Procedure Adaptation Examples:
- Extended time
- Practice Exercises
- Interpreter
- Use of preferred response format

Limited English Proficiency Students

Teachers need to use a variety of strategies for monitoring student progress and to adjust their strategies and expectations to fit the level of language proficiency of the English language learner. With beginning language learners, emphasis should be on comprehension of named things and actions; more advanced students should begin demonstrating understanding of connections between things and subsequently their ability to articulate the relationship between ideas. Content area teachers should work closely with the bilingual/ESL teacher to identify instructional and assessment strategies that are appropriate to all aspects of the student's development and that permit teachers to expand expectations gradually over the school year.

Successful strategies for monitoring student progress in the content areas include:

- Providing periodic checks for understanding.
- Promoting nonverbal as well as verbal participation.
- Encouraging students to think aloud to practice concepts.
- Modeling responses that provide appropriate information using correct grammar.
- Breaking tasks down into sequentially developed parts using simple language.
- Structuring questions to the student's language level (e.g., begin with yes/no and embedded questions and advance to open-ended questions).
- Avoiding use of questioning techniques that contain negative structures, such as "all but", "everything is _____ except", or "one is NOT the reason/cause."
- Rephrasing questions and information when students do not understand the first time.
- Observing student's behaviors for evidence that they understand assignments, directions, and instructions.
- Reviewing student's work for evidence that they understand assignments, directions, and instructions.
- Using visual reviews (e.g., lists and charts) that enable students to show what they know and can do.
- Providing increased "wait time" to allow students time to process questions before responding.
- Providing modified "double" grading to assess the content as well as the structure of responses.

Four overarching strategies are most effective for assisting students from a background of limited English proficiency (LEP) to meet success in content area classes. These strategies include the following:

- integrate activities into thematic units

- tap students' prior knowledge and experience
- teach learning strategies and scaffold complex tasks
- group students into a variety of learning groups

Academically Talented Learners

Academically talented learners, also known as "gifted learners" or "gifted and talented," are oftentimes overlooked in classroom instruction. Consequently, some students find school boring and uninspiring due to knowing many of the concepts being introduced in the regular classroom. The exceptionally able or gifted students are those who

- demonstrate a high degree of intellectual, creative, and/or artistic ability
- possess exceptional leadership skills
- excel in specific fields
- function above grade level
- need accommodations or special instruction to achieve at levels commensurate with a challenge to his or her abilities
- have the ability to grasp concepts rapidly and/or intuitively
- have an intense curiosity about principles and how things work
- have the ability to generate theories and hypotheses and purse methods of inquiry
- produce products that express insight, creativity and/or excellence

In the past, the term "gifted" described people with high scores on I.Q. tests. Today, new concepts connected to creative thinking models and multiple intelligences have expanded the definition of intelligence to include other dimensions. Giftedness reflects a multifaceted, multicultural, and multidimensional perspective and is defined by aptitude, traits, and behaviors rather than changeless test performance. These students are found in all cultural groups and across all economic levels. Increased understanding of culturally determined and environmentally affected behaviors will enable teachers and administrators to interpret performance indicators of creative potential.

Strategies for Academically Talented Learners

Gifted students are more likely to develop study and production skills, experience success and struggle, and feel challenged in a classroom setting that encourages learners to master information more quickly.

Adaptation strategies include the following:

- interdisciplinary and problem-based assignments with planned scope and sequence
- advance, accelerated, or compacted content
- abstract and advanced higher-level thinking
- allowance for individual student interests
- assignments geared to development in areas of affect, creativity, cognition, and research skills
- complex, in-depth assignments
- diverse enrichment that broadens learning

- variety in types of resources
- community involvement
- cultural diversity
- internship, mentorship, and other forms of apprenticeship

Miscellaneous/All Learners

Adaptations in the Classroom Environment

- Classical background music to enhance concentration
- Variety of workspace arrangement (individual, small, and large group)
- Privacy work seats – carrels
- Conferencing area for one-on-one teacher/student interaction
- Charts and poster to enhance memory and self-reliance
- Organization tools – labeled bins or cabinets for materials, assignments, or supplies
- Seating arrangements – minimize distractions, provide positive student models

Adaptive Equipment and Instructional Materials

- Leveled classroom libraries
- Books on tape
- Directions on tape
- Tape recorders
- Simplified written directions
- Adjusted formats of text
- Computers with adaptive software
- Speech synthesizer
- Communication boards
- Close-captioned video/television