Kenilworth Public Schools

Curriculum Guide

Content Area: Science
Grade: 4
BOE Approved: 7/11/2016

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Science - Grade 4 Scope and Sequence

Unit 1- Physical Science (Energy & Waves and Their Application)	Unit 2- Earth Science (Earth's Systems & Human Activity)	Unit 3- Life Science (Environments)
6-8 Weeks	6 Weeks	6 Weeks
Unit Description: This unit exposes students to physical science dealing with energy and change. Students will investigate electricity and magnetism as related effects and engage in engineering design while learning useful applications of electromagnetism in everyday life. Students will explore energy transfer through waves, repeating patterns of motion that result in sound and motion.	*Unit Description:* This unit provides the students with four investigations that focus on the concepts that weathering by ice, water, wind, living organisms and gravity break rocks into smaller pieces, erosion (water, ice and wind) transports earth materials to new locations, and deposition is the result of that transport process that builds new land. Students will be given the opportunity to conduct controlled experiments by incrementally changing specific environmental conditions to determine the impact of changing the variables of slope and amount of water in stream tables. Students will interpret data from diagrams and visual representations to build explanations from evidence and make predictions of future events.	*Unit Description:* This unit provides students with the opportunity to observe and describe the living and nonliving components in terrestrial environments. They will investigate the response of Isopods to varying environmental factors. Students will create a freshwater aquarium with different kinds of fish, plants, and other organisms where they will monitor the environmental factors in the system and look for feeding interaction among the population. Students will learn about the role of producers, consumers, and decomposers in food chains and webs in terrestrial and aquatic systems, including a marine ecosystem. Through an outdoor simulation, students learn how food affects a population's home range. Students explore how animals receive information from their environment through their sensory system and use the information to guide their actions.
Unit Targets: • Energy is evident whenever there is motion, electric current, sound, light, or heat. Energy can transfer from place to place.	*Unit Targets:* • Soils can be described by their properties. • Soils are composed of different kinds and amounts of earth materials and humus.	*Unit Targets:* • An environment is everything living and nonliving that surrounds and influences an organism.

• An electric circuit is a system that includes a complete pathway through which electric current flows from an energy source to its components. • Conductors are materials through which electric current can flow; all metals are conductors. • In a series circuit, there is a single pathway from the energy source to the components; in a parallel circuit, each component has its own direct pathway to the energy source. • The energy of two energy sources (D-cells or solar cells) adds when they are wired in series, delivering more energy than a single source. Two cells in parallel deliver the same energy as a single cell. • Magnets interact with each other and with some materials. • Magnets stick to (attract) objects that contain iron. Iron is the only common metal that sticks to magnets. • All magnets have two poles, a north pole at one end (side) and a south pole at the other end (side). Like poles of magnets repel each other, and opposite poles attract. • Magnets are surrounded by an invisible magnetic field, which acts through space and through most materials. • When an iron object enters a magnetic field, the field induces magnetism in the iron object, and the object becomes a temporary magnet. • The magnetic force acting between magnets declines as the distance between them increases.	• Weathering is the breakdown of rocks and minerals at or near the Earth's surface. • The physical-weathering processes of abrasion and freezing break rocks and minerals into smaller pieces. • Chemical weathering occurs when exposure to water and air changes rocks and minerals into something new. • Weathered rock material can be reshaped into new landforms by the slow processes of erosion and deposition. • Erosion is the transport (movement) of weathered rock material (sediments) by moving water or wind. • Deposition is the settling of sediments when the speed of moving water or wind declines. • The rate and volume of erosion relate directly to the amount of energy in moving water or wind. • The energy of moving water depends on the mass of water in motion and its velocity. The greater the mass and velocity, the greater the energy. • Fossils provide evidence of organisms that lived long ago as well as clues to changes in the landscape and past environments. • A topographic map uses contour lines to show the shape and elevation of the land. • The change in elevation between two adjacent contour lines is always uniform. The closer the contour lines, the steeper the slope and vice versa. • A profile is a side view or cross-section	• A relationship exists between environmental factors and how well organisms grow. • Animals have structures and behaviors that function to support survival, growth, and reproduction. • Every organism has a set of preferred environmental conditions. • Designing an investigation involves controlling the factors so that the effect of one factor can be observed. • Isopods prefer moist, dark environments. • Aquatic environments include living and nonliving factors (water and temperature). • An aquatic environment can contain many different kinds of organisms that interact. • The interaction of organisms with one another and with the nonliving environment is an ecosystem. • Organisms interact in feeding relationships in ecosystems. • Producers (plants, algae, phytoplankton) make their own food, which is also used by animals (consumers). • Organisms may compete for resources in an ecosystem. • Decomposers eat dead plant and animal materials and recycle the nutrients in the system. • When the environment changes, some plants and animals survive and reproduce; others move to new locations, and some die. • Animals communicate to warn others of danger, scare predators away, or locate others

• Earth has a magnetic field. • A magnetic field surrounds a wire through which electric current is flowing. • The magnetic field produced by a current-carrying wire can induce magnetism in a piece of iron or steel. • An electromagnet is made by sending electric current through an insulated wire wrapped around an iron core. • The number of winds of wire in an electromagnet coil affects the strength of the magnetism induced in the core. • The amount of electric current flowing in an electromagnet circuit affects the strength of the magnetism in the core (more current = stronger magnetism). • A telegraph system is an electromagnet-based technology used for long-distance communication. • Energy is evident whenever there is motion, electric current, sound, light, or heat. Energy can be transferred from place to place. • Objects in motion have energy. The faster a given object is moving, the more kinetic energy it has. • When objects collide, energy can transfer between objects, thereby changing their motion. • Kinetic energy is energy of motion; potential energy is energy of position or condition. For identical objects at rest, the objects at higher positions have more potential energy than the objects at lower positions.	representation of a landform, and can be derived from the information on a topographic map. • The surface of Earth is constantly changing; sometimes those changes take a long time to occur and sometimes they happen rapidly. • Catastrophic events have the potential to change Earth's surface quickly. • Scientists and engineers can do things to reduce the impacts of natural Earth processes on humans. • Natural resources are natural materials taken from the environment and used by humans. • Rocks and minerals are natural resources important for shelter and transportation. • Concrete is an important building made from earth materials (limestone to make cement, sand and gravel for aggregates, and water for mixing). • Some natural resources are renewable (sunlight, air and wind, water, soil, plants, and animals) and some are nonrenewable (minerals and fossil fuels). • Alternative sources of energy include solar, wind, and geothermal energy. • Scientists and engineers work together to improve the use of natural resources to make them more durable and useful.	of their kind, including family members. • Organisms have sensory systems to gather information about their environment and act on it. • An environmental factor is one part of an environment which can be living or nonliving. • Organisms have ranges of tolerance for environmental factors. • Within a range of tolerance, there are optimum conditions that produce maximum reproduction and growth. • Individuals of the same kind differ in their characteristics, and sometimes the differences give individuals an advantage in surviving and reproducing. • Every organism has a range of tolerance for each factor in its environment. • Organisms have specific requirements for successful growth, development, and reproduction. • Optimum conditions are those most favorable to an organism. • Fossils are important evidence about extinct organisms and past environments. • Adaptations are structures and behaviors of an organism that help it survive and reproduce.

• Waves are a repeating pattern of motion that transfer energy from place to place. Some electromagnetic waves can be detected by humans (light); others can be detected by designed technologies (radio waves). • Sound energy can be represented as waves; the amplitude and frequency of the waveform represent the properties of the energy. • Light travels in straight lines and can reflect (bounce) off surfaces. Light can refract (change direction) when it passes from one transparent material into another. • Matter can absorb light. • An object is seen only when light from that object enters and is detected by an eye. • Solar cells are designed technologies to transfer visible light into electricity.		

Science – Grade 4 Physical Science

Unit Title: Physical Science – Energy & Waves and Their Application

Unit Summary: This unit exposes students to physical science dealing with energy and change. Students will investigate electricity and magnetism as related effects and engage in engineering design while learning useful applications of electromagnetism in everyday life. Students will explore energy transfer through waves, repeating patterns of motion that result in sound and motion.

Primary Interdisciplinary Connections: NJSLS ELA RI.4.1, RI.4.3, RI.4.9, W.4.2, W.4.7, W.5.8, W.4.9, SL.4.5 and NJSLS Math 4.OA.A.3, 4.G.A.1

Career Readiness, Life Literacies, and Key Skills:

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.

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

Learning Targets

NJSLS Standards: 4-PS3-1, 4-PS3-2, 4-PS3-3, 4-PS3-4, 4-PS4-1, 4-PS4-2, 4-PS4-3, 3-5-ETS1-3

Computer Science and Design Thinking Standards: 8.1.5.DA.1, 8.1.5.DA.3, 8.1.5.DA.5

Climate Change Standards: 4-ESS3-1

Content Statements:

1	PS3.A: Definitions of Energy
2	PS3.B: Conservation of Energy and Energy Transfer
3	PS3.C: Relationship Between Energy and Forces
4	PS3.D: Energy in Chemical Processes and Everyday Life
5	ETS1.A: Defining Engineering Problems
6	PS4.A: Wave Properties
7	PS4.B: Electromagnetic Radiation
8	PS4.C: Information Technologies and Instrumentation
9	ETS1.C: Optimizing The Design Solution

Big Idea: The study of the energy is transferred from place to place through the movement of sound, light, heat, and electric currents.

Unit Essential Questions:	**Unit Enduring Understandings:**
• What are waves and what are some things they can do? • How can water, ice, wind and vegetation change the land? • What patterns of Earth's features can be determined with the use of maps? • How do internal and external structures support the survival, growth, behavior, and reproduction of plants and animals? • What is energy and how is it related to motion? • How is energy transferred? • How can energy be used to solve a problem?	• Sound waves are regular patterns of change in matter. • Light can be reflected, refracted, or absorbed. • Technology uses electricity and magnetism to produce light, heat, sound and motion • Forces are part of all the motions of everyday life. The interactions among gravity, friction, and masses are a vital part of everyday motions.

Unit Learning Targets

Students will know…

- Energy is evident whenever there is motion, electric current, sound, light, or heat. Energy can transfer from place to place.
- An electric circuit is a system that includes a complete pathway through which electric current flows from an energy source to its components.
- Conductors are materials through which electric current can flow; all metals are conductors.
- In a series circuit, there is a single pathway from the energy source to the components; in a parallel circuit, each component has its own direct pathway to the energy source.
- The energy of two energy sources (D-cells or solar cells) adds when they are wired in series, delivering more energy than a single source. Two cells in parallel deliver the same energy as a single cell
- Magnets interact with each other and with some materials.
- Magnets stick to (attract) objects that contain iron. Iron is the only common metal that sticks to magnets.
- All magnets have two poles, a north pole at one end (side) and a south pole at the other end (side). Like poles of magnets repel each other, and opposite poles attract.
- Magnets are surrounded by an invisible magnetic field, which acts through space and through most materials.
- When an iron object enters a magnetic field, the field induces magnetism in the iron object, and the object becomes a temporary magnet.
- The magnetic force acting between magnets declines as the distance between them increases.
- Earth has a magnetic field.
- A magnetic field surrounds a wire through which electric current is flowing.
- The magnetic field produced by a current-carrying wire can induce magnetism in a piece of

iron or steel.

- An electromagnet is made by sending electric current through an insulated wire wrapped around an iron core.
- The number of winds of wire in an electromagnet coil affects the strength of the magnetism induced in the core.
- The amount of electric current flowing in an electromagnet circuit affects the strength of the magnetism in the core (more current = stronger magnetism).
- A telegraph system is an electromagnet-based technology used for long-distance communication.
- Energy is evident whenever there is motion, electric current, sound, light, or heat. Energy can be transferred from place to place.
- Objects in motion have energy. The faster a given object is moving, the more kinetic energy it has.
- When objects collide, energy can transfer between objects, thereby changing their motion.
- Kinetic energy is energy of motion; potential energy is energy of position or condition. For identical objects at rest, the objects at higher positions have more potential energy than the objects at lower positions.
- Waves are a repeating pattern of motion that transfer energy from place to place. Some electromagnetic waves can be detected by humans (light); others can be detected by designed technologies (radio waves).
- Sound energy can be represented as waves; the amplitude and frequency of the waveform represent the properties of the energy.
- Light travels in straight lines and can reflect (bounce) off surfaces. Light can refract (change direction) when it passes from one transparent material into another.
- Matter can absorb light.
- An object is seen only when light from that object enters and is detected by an eye.
- Solar cells are designed technologies to transfer visible light into electricity.

Evidence of Learning

Summative Assessment: Foss Formal Lab Report and Mystery Science Unit Assessment

Formative Assessments:

- Foss Investigation 1.5
- Foss Investigation 2.4
- Foss Investigation 3.4
- Foss Investigation 4.4
- Foss Investigation 5.5
- Mystery Science Waves of Sound Lesson Checks
- Mystery Science Energize Everything Lesson Checks

Lesson Plans

Activities/Interdisciplinary Connections	*Timeframe*
• Foss Investigation-Energy and Circuits:1.1-1.4 • Foss Investigation- The Force of Magnetism:2.1-2.3 • Foss Investigation-Electromagnets: 3.1-3.3 • Foss Investigation-Energy Transfer: 4.1-4.3 • Foss Investigation-Waves:5.1-5.3 • Mystery Science -Waves of Sound Lessons 1-3 • Mystery Science – Energizing Everything Lessons 1-8	6-8 Weeks
Teacher Resources	*Teacher Note*
• FOSS Kit Energy Investigations Guide • FOSS Web Resources for the Energy Module • Science Notebooks • Science Resources Book • Assessment Guide • Smart Board or Interactive White Board • Energy Kit Materials • Digital subscription to Mystery Science • Laptops or computers/headphones	Utilize Foss hardcover resource books to enrich vocabulary STEAM activities will align with units of study.

Differentiating Instruction: Students with Disabilities, English Language Learners, and Gifted & Talented Students

Strategies and Practices that Support Students with Disabilities:
• Use of visual and multisensory formats
• Use of assisted technology
• Use of prompts
• Modification of content and student products
• Testing accommodations
• Authentic assessments

Strategies and Practices that Support Gifted & Talented Students:
• Merge cube hands on activities
• Adjusting the pace of lessons
• Curriculum compacting
• Inquiry-based instruction
• Independent study
• Higher-order thinking skills
• Interest-based content
• Student-driven instruction
• Real-world problems and scenarios

Strategies and Practices that Support English Language Learners:

• Pre-teaching of vocabulary and concepts
• Visual learning, including graphic organizers
• Use of cognates to increase comprehension
• Teacher modeling
• Pairing students with beginning English language skills with students who have more advanced English language skills
• Scaffolding
•Word walls
•Sentence frames
•Think-pair-share
•Cooperative learning groups

Science – Grade 4 Earth Science

Unit Title: Earth Science – Earth's Systems & Earth and Human Activity

Unit Summary: This unit provides the students with four investigations that focus on the concepts that weathering by ice, water, wind, living organisms and gravity break rocks into smaller pieces, erosion (water, ice and wind) transports earth materials to new locations, and deposition is the result of that transport process that builds new land. Students will be given the opportunity to conduct controlled experiments by incrementally changing specific environmental conditions to determine the impact of changing the variables of slope and amount of water in stream tables. Students will interpret data from diagrams and visual representations to build explanations from evidence and make predictions of future events.

Primary Interdisciplinary Connections: NJSLS ELA RI.4.1, RI.4.7, RI.4.9, W.4.7, W.4.8, W.4.9 and NJSLS Math 4.MD.A.1, 4.MD.A.2, 4.OA.A.1 and Technology 8.1.2.A.4

Career Readiness, Life Literacies, and Key Skills:

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.

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

Learning Targets

NJSLS Standards: 4-ESS1-1, 4-ESS2-1, 4-ESS2-2, 4-ESS3-1, 4-ESS3-2

Computer Science and Design Thinking Standards: 8.1.5.DA.1, 8.1.5.DA.3, 8.1.5.DA.5

Climate Change Standards: 3-LS4-4, 4-ESS3-2, 5-LS2-1

Content Statements:

1	ESS1.C: The History of Planet Earth
2	ESS2.A: Earth Materials and Systems
3	ESS2.B: Plate Tectonics and Large-Scale System Interactions
4	ESS2.E: Biogeology
5	ESS3.A: Natural Resources
6	ESS3.B: Natural Hazards
7	ETS1.B: Designing Solutions to Engineering Problem

Big Idea: Geology is the study of our planet's earth materials and natural resources.

Unit Essential Questions:	**Unit Enduring Understandings:**
• How do living organisms alter Earth's processes and structures? • How do people reconstruct and date events in Earth's planetary history? • How do Earth's major systems interact? • Why the continents move, and what do causes earthquakes and volcanoes? • How do natural hazards affect individuals and societies? • What is the process for developing potential design solutions? • How do humans depend on Earth's resources? • What is a design for? • What are the criteria and constraints for a successful solution?	Students will understand that… • Identifying evidence from patterns in rock formations and fossils in rock layers can support an explanation for changes in a landscape over time. • Measurements and/or observations can provide evidence of the effects of weathering or the rate of erosion by water, ice, wind or vegetation. • Analyzing and interpreting data from maps are used to describe patterns of Earth's features. • Multiple solutions can be generated and compared to reduce the impacts of natural Earth processes on humans.

Unit Learning Targets

Students will know…

- Soils can be described by their properties.
- Soils are composed of different kinds and amounts of earth materials and humus.
- Weathering is the breakdown of rocks and minerals at or near the Earth's surface.
- The physical-weathering processes of abrasion and freezing break rocks and minerals into smaller pieces.
- Chemical weathering occurs when exposure to water and air changes rocks and minerals into something new.
- Weathered rock material can be reshaped into new landforms by the slow processes of erosion and deposition.
- Erosion is the transport (movement) of weathered rock material (sediments) by moving water or wind.
- Deposition is the settling of sediments when the speed of moving water or wind declines.
- The rate and volume of erosion relate directly to the amount of energy in moving water or wind.
- The energy of moving water depends on the mass of water in motion and its velocity. The greater the mass and velocity, the greater the energy.
- Fossils provide evidence of organisms that lived long ago as well as clues to changes in the landscape and past environments.
- A topographic map uses contour lines to show the shape and elevation of the land.
- The change in elevation between two adjacent contour lines is always uniform. The closer the contour lines, the steeper the slope and vice versa.

- A profile is a side view or cross-section representation of a landform, and can be derived from the information on a topographic map.
- The surface of Earth is constantly changing; sometimes those changes take a long time to occur and sometimes they happen rapidly.
- Catastrophic events have the potential to change Earth's surface quickly.
- Scientists and engineers can do things to reduce the impacts of natural Earth processes on humans.
- Natural resources are natural materials taken from the environment and used by humans.
- Rocks and minerals are natural resources important for shelter and transportation.
- Concrete is an important building made from earth materials (limestone to make cement, sand and gravel for aggregates, and water for mixing).
- Some natural resources are renewable (sunlight, air and wind, water, soil, plants, and animals) and some are nonrenewable (minerals and fossil fuels).
- Alternative sources of energy include solar, wind, and geothermal energy.
- Scientists and engineers work together to improve the use of natural resources to make them more durable and useful.

Evidence of Learning

Summative Assessment: Foss Formal Lab Report and Mystery Science Unit Assessment

Formative Assessments:

- Foss Investigation 1.5
- Foss Investigation 2.5
- Foss Investigation 3.5
- Foss Investigation 4.4
- Mystery Science Rock Cycle, Erosion, and Natural Hazards Lesson Checks

Lesson Plans

Activities/Interdisciplinary Connections	*Timeframe*
• Foss Investigation-Soils and Weathering:1.1-1.4 • Foss Investigation- Landforms:2.1-2.4 • Foss Investigation-Mapping Earth's Surface: 3.1-3.4 • Foss Investigation-Natural Resources: 4.1-4.3 • Mystery Science - Rock Cycle, Erosion, and Natural Hazards Lessons 1-4	6 Weeks
Teacher Resources	*Teacher Note*
• FOSS Kit Energy Investigations Guide • FOSS Web Resources for the Soils, Rocks, and Landforms Module • Science Notebooks • Science Resources Book	Utilize Foss hardcover resource books to enrich vocabulary STEAM activities will align with units of study.

• Assessment Guide • Smart Board or Interactive White Board • Energy Kit Materials • Digital subscription to Mystery Science • Laptops or computers/headphones	

Differentiating Instruction: Students with Disabilities, English Language Learners, and Gifted & Talented Students

Strategies and Practices that Support Students with Disabilities:
• Use of visual and multisensory formats
• Use of assisted technology
• Use of prompts
• Modification of content and student products
• Testing accommodations
• Authentic assessments

Strategies and Practices that Support Gifted & Talented Students:
• Merge cube hands on activities
• Adjusting the pace of lessons
• Curriculum compacting
• Inquiry-based instruction
• Independent study
• Higher-order thinking skills
• Interest-based content
• Student-driven instruction
• Real-world problems and scenarios

Strategies and Practices that Support English Language Learners:
• Pre-teaching of vocabulary and concepts
• Visual learning, including graphic organizers
• Use of cognates to increase comprehension
• Teacher modeling
• Pairing students with beginning English language skills with students who have more advanced English language skills
• Scaffolding
•Word walls
•Sentence frames
•Think-pair-share
•Cooperative learning groups

Science – Grade 4 Life Science

Unit Title: Life Science – Environments

Unit Summary: This unit provides students with the opportunity to observe and describe the living and nonliving components in terrestrial environments. They will investigate the response of Isopods to varying environmental factors. Students will create a freshwater aquarium with different kinds of fish, plants, and other organisms where they will monitor the environmental factors in the system and look for feeding interaction among the population. Students will learn about the role of producers, consumers, and decomposers in food chains and webs in terrestrial and aquatic systems, including a marine ecosystem. Through an outdoor simulation, students learn how food affects a population's home range. Students explore how animals receive information from their environment through their sensory system and use the information to guide their actions.

Primary Interdisciplinary Connections: NJSLS ELA W.4.1, SL.4.5 and NJSLS Math 4.G.A.1 and 4.G.A.3

Career Readiness, Life Literacies, and Key Skills:

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.

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

Learning Targets

NJSLS Standards: 4-LS1-1, 4-LS1-2, 4-ESS3-1, 4-PS4-2

Computer Science and Design Thinking Standards: 8.1.5.DA.1, 8.1.5.DA.3, 8.1.5.DA.5

Climate Change Standards: 3-LS4-4, 3-ESS2-2, 4-ESS3-1, 4-ESS3-2

Content Statements:

1	LS1.A: Structure and Function
2	LS1.D: Information Processing
3	LS2.C: Ecosystem Dynamics, Functioning, and Resilience
4	LS4.A: Evidence of Common Ancestry and Diversity
5	LS4.B: Natural Selection
6	LS4.C: Adaptation
7	LS4.D: Biodiversity and Humans

8	ESS3.A: Natural Resources

Big Idea: The study of the structures and behaviors of organisms and the relationships between one organism and its environment builds knowledge of all organisms

Unit Essential Questions:	**Unit Enduring Understandings:**
● How do structures of organisms enable life's functions? ● How do organisms detect, process, and use information about the environment? ● How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms? ● What is biodiversity, how do humans affect it, and how does it affect humans? ● How does genetic variation among organisms affect survival and reproduction? ● How do Earth's surface processes and human activity affect each other? ● What evidence shows that different species are related?	• All living things are grouped into one of five kingdoms. Single-celled organisms include bacteria and protists. Plants are either vascular or nonvascular. Animals are either vertebrates or invertebrates. • Plants and animals grow and develop in many different ways and environments. • All living things have basic needs and have adapted to their environments to meet these needs. • An ecosystem is the interaction among the parts of an environment where humans affect it in positive and negative ways. • Plants us energy from the sun to make their food. Animals get energy and nutrients by eating plants and other animals.

Unit Learning Targets

Students will know…

● An environment is everything living and nonliving that surrounds and influences an organism.

● A relationship exists between environmental factors and how well organisms grow.

● Animals have structures and behaviors that function to support survival, growth, and reproduction.

● Every organism has a set of preferred environmental conditions.

● Designing an investigation involves controlling the factors so that the effect of one factor can be observed.

● Isopods prefer moist, dark environments.

● Aquatic environments include living and nonliving factors (water and temperature).

● An aquatic environment can contain many different kinds of organisms that interact.

● The interaction of organisms with one another and with the nonliving environment is an ecosystem.

● Organisms interact in feeding relationships in ecosystems.

● Producers (plants, algae, phytoplankton) make their own food, which is also used by animals (consumers).

● Organisms may compete for resources in an ecosystem.

● Decomposers eat dead plant and animal materials and recycle the nutrients in the system.

● When the environment changes, some plants and animals survive and reproduce; others move to new locations, and some die.
● Animals communicate to warn others of danger, scare predators away, or locate others of their kind, including family members.
● Organisms have sensory systems to gather information about their environment and act on it.
● An environmental factor is one part of an environment which can be living or nonliving.
● Organisms have ranges of tolerance for environmental factors.
● Within a range of tolerance, there are optimum conditions that produce maximum reproduction and growth.
● Individuals of the same kind differ in their characteristics, and sometimes the differences give individuals an advantage in surviving and reproducing.
● Every organism has a range of tolerance for each factor in its environment.
● Organisms have specific requirements for successful growth, development, and reproduction.
● Optimum conditions are those most favorable to an organism.
● Fossils are important evidence about extinct organisms and past environments.
● Adaptations are structures and behaviors of an organism that help it survive and reproduce.

Evidence of Learning

Summative Assessment: Foss Formal Lab Report and Mystery Science Unit Assessment

Formative Assessments:

• Foss Investigation 1.4
• Foss Investigation 2.5
• Foss Investigation 3.5
• Foss Investigation 4.4
• Mystery Science Human Machine Lesson Checks

Lesson Plans

Activities/Interdisciplinary Connections	*Timeframe*
• Foss Investigation- Environmental Factors: 1.1-1.3 • Foss Investigation- Ecosystems: 2.1-2.4 • Foss Investigation- Brine Shrimp Hatching: 3.1-3.4 • Foss Investigation- Range of Tolerance: 4.1-4.3 • Mystery Science – Human Machine Lessons 1-4	6 Weeks
Teacher Resources	*Teacher Note*
• FOSS Kit Energy Investigations Guide • FOSS Web Resources for the Energy Module • Science Notebooks • Science Resources Book • Assessment Guide • Smart Board or Interactive White Board	Utilize Foss hardcover resource books to enrich vocabulary STEAM activities will align with units of study.

• Energy Kit Materials • Digital subscription to Mystery Science • Laptops or computers/headphones	

Differentiating Instruction: Students with Disabilities, English Language Learners, and Gifted & Talented Students

Strategies and Practices that Support Students with Disabilities:
• Use of visual and multisensory formats
• Use of assisted technology
• Use of prompts
• Modification of content and student products
• Testing accommodations
• Authentic assessments

Strategies and Practices that Support Gifted & Talented Students:
• Merge cube hands on activities
• Adjusting the pace of lessons
• Curriculum compacting
• Inquiry-based instruction
• Independent study
• Higher-order thinking skills
• Interest-based content
• Student-driven instruction
• Real-world problems and scenarios

Strategies and Practices that Support English Language Learners:
• Pre-teaching of vocabulary and concepts
• Visual learning, including graphic organizers
• Use of cognates to increase comprehension
• Teacher modeling
• Pairing students with beginning English language skills with students who have more advanced English language skills
• Scaffolding
•Word walls
•Sentence frames
•Think-pair-share
•Cooperative learning groups