3rd Grade / Science

Curriculum

Unit 1: Force & Motion

Unit Description: This introduction to forces will give students a new understanding of the invisible pushes and pulls that operate in the world around them. They will gain a very basic understanding of Newton's Three Laws of Motion, which involve concepts such as inertia, momentum, and acceleration. In addition, students learn to determine the effects of balanced and unbalanced forces on the motion of an object and the cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. They will then have the opportunity to apply their understanding of magnetic interactions to define a simple design problem that can be solved with magnets. What students learn in this unit will connect to the world around them, leading them to think about such things as the force of friction as they slide down a playground slide or the the invisible force that makes magnets cling to the refrigerator. Hands-on activities focus on engineering, investigation, and discovery.

Big Ideas: *Course Objectives / Content Statement(s)*

- Explain how different forces exerted on an object influence its motion.
- Identify unseen forces (e.g., friction, gravity) and seen forces (e.g., pushing, throwing).
- Describe how magnetism works in their everyday lives.
- Apply Newton's Three Laws of Motion to different scenarios, involving force and motion.
- Describe the relationship between force, mass, and acceleration.
- Analyze how energy is transferred from object to object or converted into a different type, but never created nor destroyed.

Essential Questions	**Enduring Understandings**
● What forces act on a roller coaster that cause it to move? ● How do "unseen" forces (i.e. friction, gravity, wind resistance) impact our lives? ● How does understanding how magnets attract (pull) and repel (push) other objects help us?	*What will students understand about the big ideas?* Students will understand that… ● Motion is caused by a push or a pull. A push or pull is called a force. An object can be set in motion by forces that come from direct contact, moving air, magnets or by gravity pulling it down toward the earth. Pushes and pulls can start motion, stop motion, speed it up, slow it down or change its direction. ● A magnet's push or pull can cause a magnetic object or another magnet to move without direct contact. The

	strength of a magnet's attractive force can be measured by recording the number or mass of the objects it attracts or the distance. ● The greater the force, the greater the change in motion. For example, two people can push a heavy box that could not be pushed by one person alone. ● The amount of force needed to move (accelerate) an object is related to the object's mass. The greater the object's mass, the greater the force needed to move it, stop it or change its speed or direction. ● When an object does not move in response to a push or a pull, it is because another equal-sized force, such as gravity or friction, is counteracting the push or pull. Gravity (the Earth's pulling force) and friction (the force between two surfaces) are common forces that work against motion. ● Different forces are responsible for the transfer of the different forms of energy (namely kinetic and potential).
Areas of Focus: Proficiencies (NGSS Standards) Students will: ● 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	**Examples, Outcomes, Assessments** Instructional Focus: ● Objects move in different ways. ● Any change of motion requires a force. ● A force is a push or pull on an object. ● Newton's Three Laws of Motion and concepts that are involved: ○ Inertia ○ Momentum/acceleration ○ Action-reaction force pair ● The relationship between an object's mass and the force needed to accelerate it ● Patterns of motion can be observed; when there are regular patterns of motion, future motions can be predicted.

applying scientific ideas about magnets.	● Magnetic forces between objects ● Gravity is the force that pulls masses toward the center of Earth. ● Energy cannot be created nor destroyed, but rather transferred from one form to another. Sample Assessments: ● Student work samples from their science notebooks, detailing their predictions, observations, and understandings. ● Exit slips, having students define key terms, fill in the blank, etc. ○ EX: Define motion. ○ EX: For every _____ force there is _____ force that is equal in strength, but opposite in direction. ● Design challenges: ○ Through a PBL, students can design a roller coaster that is faster than a current roller coaster at the Land of Make Believe in New Jersey. They will create a prototype, using foam insulators and tape, and test it using a marble. They will then evaluate their design, revise it, and submit a final written plan. ○ Students use magnets to design solutions to several real-world problems, such as retrieving a screw dropped in a gutter or getting a paper clip that has sunk to the bottom of a swimming pool. ● Summative quizzes, such as those located at: NJCTL. ● Performance tasks, in which students are asked to apply their learnings to real-life situations (see NGSS Unit Planner). Instructional Strategies: Interdisciplinary Connections

	● MATH - Students use stopwatches to measure how long it takes objects of various masses and weights to fall to the ground (to investigate gravity). They calculate the average of three trials. ● LITERACY - Students write a letter to a company that has asked them to design a solution to a problem, by using magnets. ● LITERACY - Students read about a concept related to force and motion and then respond, including text evidence to support the point that they are trying to make (Claim - Evidence - Reasoning). Technology Integration ● Videos from Mystery Science ● StudyJams on Force & Motion ● Kids Discover ● Skype with roller coaster or amusement park ride engineers ● Force & Motion for Kids ● Bill Nye Video Clip ● Physics 4 Kids ● Easy Science 4 Kids ● Comic Life ● Google Slides ● Videos on BrainPop and BrainPop Jr. Global Perspectives ● Compare and contrast gravity, as a force, in different locations in the universe (e.g., the Moon, Jupiter, Mars, Venus, etc.)

Third Grade
Unit 2: Ecosystems: Interactions, Energy, & Dynamics

Course Description: In this unit, students will explore how ecosystems function. Students will see how living things depend on each other, and work together to meet their everyday needs. Students will also see how changes in the environment can drastically affect an ecosystem.

Big Ideas: Course Objectives / Content Statement(s)

- Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles.
- Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different function and vary dramatically in size.
- 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.
- Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing.
- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.

Essential Questions	**Enduring Understandings**
● How does living in communities of the same or different species help organisms survive? ● How do bees and flowers help each other to survive? ● How is the life cycle of bees and food crops similar? How is the life cycle of bees and food crops different? ● Cross-pollination in crop plants is important; what would happen if cross pollination did not take place? ● How does the decrease in bee colonies affect crops (and other flowering plants), and needs of humans? ● What are some ways that organisms interact within ecosystems?	Students will understand that… -Living organisms have a variety of observable features that enable them to obtain food and reproduce. - I can understand how living in a social group/community can help an organism to survive. - All animals and most plants depend on both other organisms and their environments for their basic needs. - Sometimes differences between organisms of the same kind give advantages in surviving and reproducing in different environments. - Bees and other organisms are part of an interrelated system that regulates their life cycles and their interactions with the environment.

Areas of Focus: Proficiencies (Cumulative Progress Indicators)	**Examples, Outcomes, Assessments** *(see note below about the content of this section)*
Students will: 3-LS1-1 Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. 3-LS2-1. Construct an argument that some animals form groups that help members survive. 3-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.	Instructional Focus: - Plants and animals have different life cycles - Living things depend on others for survival - Changes of an environment can greatly affect its inhabitants. - Different organisms require different environments Sample Assessments: - Describe/draw and label an ecosystem - Create a model of the life cycle of a honey bee - Create a food chain diagram - Describe how honeybees work together to survive - Journal about the importance of pollinators to humans Instructional Strategies: - Take a nature walk around the school to make observations about the schoolyard ecosystems - Have students explore various books related to ecosystems - Use videos demonstrating the life cycle of an insect and have students create a model - Have students watch videos that demonstrate how different animals use each other for survival - Have students create a food chain, then discuss what happens when something is added/subtracted from the food chain Interdisciplinary Connections ELA/Literacy RI.3.7- Use information gained from illustrations and the words in a text

	SL.3.5-Create audio recordings of stories or poems to demonstrate fluid reading, add visual displays Math MP.4- Model with mathematics 3.NBT- Number and Operations in base ten 3.NF- Number and Operations-Fractions Technology Integration Global Perspectives

NOTE re: Examples, Outcomes and Assessments
The following skills and themes should be reflected in the design of units and lessons for this course or content area.

21st Century Skills:

Creativity and Innovation

Critical Thinking and Problem Solving

Communication and Collaboration

Information Literacy

Media Literacy

Life and Career Skills

21st Century Themes (as applies to content area):

Financial, Economic, Business, and Entrepreneurial Literacy

Civic Literacy

Health Literacy

Third Grade
Unit 3:Organisms Change Over TIme

Course Description: In this unit, students develop an understanding of the types of organisms that lived long ago and also about the nature of their environments. Students develop an understanding of the idea that when the environment changes, some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die. The crosscutting concepts of systems and system models; scale, proportion, and quantity; and the influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in asking questions and defining problems, analyzing and interpreting data, and engaging in argument from evidence. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Big Ideas:

- The past helps us understand the world today.
- 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.
- Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing.
- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.

Essential Questions	**Enduring Understandings**
● What do fossils tell us about the living organisms of yesterday and of today? ● How do animals change over time to survive? ● What happens to the plants and animals when the environment changes? ● How do humans impact how animals adapt? ● Why do some animals survive in some habitats but not others?	● Some kinds of plants and animals that once lived on Earth are not longer found anywhere but can provide information about the past and about organisms of today. ● There are consistent patterns in natural systems that we can use for information. ● Populations live in a variety of habitats, and changes in those habitats affect the organisms living there. ● 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, others move into the transformed environment, and some die.
Areas of Focus: Proficiencies Construct an argument that some animals form groups that help members survive. (3-LS2-1) 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. [Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.] 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. [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.] (3-LS4-3) 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.* [Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.] [Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.] (3-LS4-4)	**Examples, Outcomes, Assessments** Instructional Focus: - Fossils - Animal adaptations Sample Assessments: - Describe/draw, compare, and label fossils - Compare/contrast animal adaptations - Journal about what we learn from fossils Instructional Strategies: - Have students explore various fossils and books related to dinosaurs - Use videos demonstrating the extinction of dinosaurs Interdisciplinary Connections ELA/Literacy RI.3.7- Use information gained from illustrations and the words in a text SL.3.5-Create audio recordings of stories or poems to demonstrate fluid reading, add visual displays Math MP.4- Model with mathematics 3.NBT- Number and Operations in base ten 3.NF- Number and Operations-Fractions Technology Integration Global Perspectives

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- Critical Thinking and Problem Solving
- Communication and Collaboration
- Information Literacy
- Media Literacy
- Life and Career Skills

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- Civic Literacy
- Health Literacy

Third Grade
Unit 4:Weather

Course Description: In this unit of study, students organize and use data to describe typical weather conditions expected during a particular season. By applying their understanding of weather-related hazards, students are able to make a claim about the merit of a design solution that reduces the impacts of such hazards. The crosscutting concepts of patterns, cause and effect, and the influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in asking questions and defining problems, analyzing and interpreting data, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Big Ideas:

- Weather and climate patterns can be observed and predicted.
- Weather and climate has a large impact on human life.

Essential Questions	**Enduring Understandings**
● Why is weather important enough to be a part of the daily news? ● How does weather affect our daily lives? ● How can we protect people from weather related issues/disasters?	● Make predictions using patterns of change. ● Represent data in tables, bar graphs, and pictographs to reveal patterns that indicate relationships. ● Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. Examples of data could include: Average temperature, Precipitation, Wind direction ● Identify and test cause-and-effect relationships to explain change. ● Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard. Examples of design solutions to weather related hazards could include: ○ Barriers to prevent flooding ○ Wind-resistant roofs ○ Lightning rods ● Define a simple design problem reflecting a need or a want that

	includes specified criteria for success and constraints on materials, time, or cost.
Areas of Focus: Proficiencies Construct an argument that some animals form groups that help members survive. (3-LS2-1) 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. [Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.] 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. [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.] (3-LS4-3) 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.* [Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.] [Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.] (3-LS4-4)	**Examples, Outcomes, Assessments** Instructional Focus: - Understanding and defining weather - Predicting the weather - Water cycle - Clouds - Climate Sample Assessments: - Describe/draw, compare, and label weather patterns - Compare/contrast climate around the world - Monitor, graph and predict the weather Instructional Strategies: - Hands on weather simulations - Create a climograph - Weather design challenge - Collect weather data - Research types of weather Interdisciplinary Connections ELA/Literacy RI.3.7- Use information gained from illustrations and the words in a text SL.3.5-Create audio recordings of stories or poems to demonstrate fluid reading, add visual displays Math MP.4- Model with mathematics 3.NBT- Number and Operations in base ten 3.NF- Number and Operations-Fractions Technology Integration

	Global Perspectives

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Civic Literacy

Health Literacy