Third Grade Foss Pacing Guide 2017-2018

Quarter 1	Quarter 2	Quarter 3	Quarter 4
Unit 1: Motion & Matter **Aug 21 - Nov 3** (approx. 51 days) Investigation 1: Forces Investigation 2: Patterns of Motion Investigation 3: Engineering Investigation 4: Mixtures			
	Unit 2: Water & Climate **Nov 6 - Jan 29** (approx. 42 days) Investigation 1: Water Observations Investigation 2: Hot Water, Cold Water Investigation 3: Weather and Water Investigation 4: Seasons and Climate Investigation 5: Waterworks		
		**Unit 3: Structures of Life** **January 30 - May 18** (approx. 74 days) Investigation 1: Origin of Seeds Investigation 2: Growing Further Investigation 3: Meet the Crayfish Investigation 4: Human Body	

Unit Title: Motion & Matter
Quarter 1 & 2

Teaching Dates	(51 Teaching Days) August 21 through November 3
Domains	Physical Science (PS), Engineering, Technology, & Applications of Science
Performance Expectations	**Students who demonstrate understanding can:** **Physical Science** • **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.[Clarification Statement: Examples could include an unbalanced force on one side of a ball can make it start moving; and, balanced forces pushing on a box from both sides will not produce any motion at all.] [Assessment Boundary: Assessment is limited to one variable at a time: number, size, or direction of forces. Assessment does not include quantitative force size, only qualitative and relative. Assessment is limited to gravity being addressed as a force that pulls objects down.] • **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. [Clarification Statement: Examples of motion with a predictable pattern could include a child swinging in a swing, a ball rolling back and forth in a bowl, and two children on a see-saw.] [Assessment Boundary: Assessment does not include technical terms such as period and frequency.] • **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. [Clarification Statement: Examples of an electric force could include the force on hair from an electrically charged balloon and the electrical forces between a charged rod and pieces of paper; examples of a magnetic force could include the force between two permanent magnets, the force between an electromagnet and steel paperclips, and the force exerted by one magnet versus the force exerted by two magnets. Examples of cause and effect relationships could include how the distance between objects affects strength of the force and how the orientation of magnets affects the direction of the magnetic force.] [Assessment Boundary: Assessment is limited to forces produced by objects that can be manipulated by students, and electrical interactions are limited to static electricity.] • **3-PS2-4:** Define a simple design problem that can be solved by applying scientific ideas about magnets. [Clarification Statement: Examples of problems could include constructing a latch to keep a door shut and creating a device to keep two moving objects from touching each other.] **Engineering, Technology & Applications of Science** • **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 **(I-Check 1, Inv 2, Pt3; Inv3,Pt3; Inv4,Pt1)** • Developing and using models **(I-Check)** • Planning and carrying out investigations **(I-Check 2, I-Check 3, Inv1, Pt2; Inv2,Pt3; Inv3,Pt3; Inv4,Pt1)** • Analyzing and interpreting data **(I-Check 1,I-Check 2, I-Check 3, Inv1, Pt2; Inv3,Pt3)** • Using mathematics and computational thinking **(I-Check 1, I-Check 3, Inv1, Pt2)** • Engage in argument from evidence **(I-Check 3, Inv4,Pt1)** • Obtaining, evaluating, and communicating information **(Inv2, Pt3)**

	• Constructing explanations & Designing solutions **(I-Check 1, Inv3,Pt3; Inv4,Pt1)**
Disciplinary Core Ideas	**Physical Science** • **PS2.A**:*How can one predict an object's continued motion, changes in motion, or stability?* [Each force acts on one particular object and has both a strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. The patterns of an object's motion in various situations can be observed and measured; when past motion exhibits a regular pattern, future motion can be predicted from it. **(I-Check 1, I-Check 2)** • ***PS2.B:*** *What underlying forces explain the variety of interactions observed?* [Objects in contact exert forces on each other (friction, elastic pushes and pulls.) Electric, magnetic, and gravitational forces between a pair of objects do not require that the objects be in contact-for example, magnets push or pull at a distance. 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. The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.] **(I-Check 1; I-Check 2, I-Check 3)** • **PS1A: Structures and properties of matter**: *How do particles combine to form the variety of matter one observes?* [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 (e.g., by weighing or by its effects on other objects). For example, a model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon; the effects of air on larger particles or objects (e.g., leaves in wind, dust suspended in air); and the appearance of visible scale water droplets in condensation, fog, and, by extension, also in clouds or the contrails of a jet.] • **PS1B**: **Chemical reactions**: *How do substances combine or change (react) to make new substances? How does one characterize and explain these reactions and make predictions about them?* [When two or more different substances are mixed, a new substance with different properties may be formed; such occurrences depend on the substances and the temperature. No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level)] **Engineering, Technology and Applications of Science** • **ETS1.A: Defining and delimiting an engineering problem**: *What is a design for? What are the criteria and constraints of a successful solution?* [Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.] **(I-Check 3)** • **ETS 1.B: Developing possible solutions:** *What is the process for developing potential design solutions?* [Research on a problem should be carried out before beginning to design a solution. An often productive way to generate ideas is for people to work together to brainstorm, test, and refine possible solutions. Testing a

	solution involves investigating how well it performs under a range of likely conditions. Tests are often designed to identify failure points or difficulties, which suggest the elements of a design that need to be improved. At whatever stage, communication with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.] (I-Check 3) • **ETS1.C: Optimizing the design solution** *How can the various proposed design solutions be compared and improved?* [Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.] (I-Check 3) • **ETS2.A: Interdependence of science, engineering, & technology:** *What are the relationships among science, engineering, and technology?* [Tools and instruments (e.g., rulers, balances, thermometers, graduated cylinders, telescopes, microscopes) are used in scientific exploration to gather data and help answer questions about the natural world. Engineering design can develop and improve such technologies. Scientific discoveries about the natural world can often lead to new and improved technologies, which are developed through the engineering design process. Knowledge of relevant scientific concepts and research findings is important in engineering.] • **ETS2.B: Influence of engineering, technology, & science on society and the natural world:** *How do science, engineering, and the technologies that result from them affect the ways in which people live? How do they affect the natural world?* [Over time, people's needs and wants change, as do their demands for new and improved technologies. Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands. When new technologies become available, they can bring about changes in the way people live and interact with one another.] (I-Check 3)
Cross Cutting Concept	**Patterns (I-Check 1, I-Check 2, Inv1,Pt2)** • Similarities and differences in patterns can be used to sort and classify natural phenomena. Patterns of change can be used to make predictions. **Cause and Effect (I-Check 1, I-Check 2, I-Check 3, Inv2,Pt3; Inv3,Pt3)** • Cause-and-effect relationships are routinely identified and used to explain change. **Scale, Proportion, and quantity** • Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. **Systems and system models (I-Check 1, I-Check 3** • A system can be described in terms of its components and their interactions. **Energy and Matter** • Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substances does not change. This is what is meant by conservation of matter. Matter is transported into, out of, and within systems.
Required Investigations	**Investigation 1: Forces** **Investigation 2: Patterns of Motion** **Investigation 3: Engineering** **Investigation 4: Mixtures**
Required Summative	**Science and Engineering Practices** • Investigation 1, Part 2

Assessments	● Investigation 2, Part 3 ● Investigation 3, Part 3 ● Investigation 4, Part 1 **Performance Expectations (conceptual understanding)** ● I-Check 1 ● I-Check 2 ● I-Check 3

Unit Title: Water & Climate Quarter 2 & 3	
Approximate Teaching Dates	(42 Teaching Days) November 6 through January 29 *Please make sure to check important module updates*
Domain(s)	Earth and Space Science (ESS), Engineering, Technology & Applications of Science (ETS)
Performance Expectations	**Students who demonstrate understanding can:** **Earth and Space Science** • **3-ESS2-1** Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. *[Clarification Statement: Examples of data could include average temperature, precipitation, and wind direction.]* [Assessment Boundary:Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.] • **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.* [Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lightning rods.] **Engineering, Technology, & Applications of Science** • **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 define problems **(I-Check 1, Inv 5 Pt3)** • Developing and using models • Planning and carrying out investigations **(I-Check 1, I-Check 3, Inv 1 Pt 2, Inv 2 Pt 3, Inv 3 Pt 1, Inv 5 Pt 3** • Analyzing and interpreting data (**I-Check 2, Inv 3, Pt 1, Inv 3 Pt 3, Inv 5 Pt 3** • Using mathematics and computational thinking **(I-Check 1, I-Check 4, Inv 3 Pt 3)** • Constructing explanations and designing solutions **(I-Check , Inv 2 Pt 3, Inv 3 Pt 3, Inv 5 Pt 3)** • Engaging in argument from evidence **(Inv 3 Pt 3)** • Obtaining, evaluating, and communicating information **(Inv 3 Pt 1, Inv 3, Pt 3, Inv 5 Pt 3)**
Disciplinary Core Ideas	**Earth and Space Science** • **ESS2.C: The Roles of Water in Earth's surface processes:** *How do the properties and movements of water shape Earth's surface and affect its systems?* [Water is found almost everywhere on Earth: as vapor; as fog or clouds in the atmosphere; as rain or snow falling from clouds; as ice, snow, and running water on land and in the ocean; and as groundwater beneath the surface. The downhill movement of

	water as it flows to the ocean shapes the appearance of the land. 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.] (I-Check 1, I-Check 2, I-Check 3) • **ESS2.D: Weather and climate:** *What regulates weather and climate?* [Weather is the minute-by-minute to day-by-day variation of the atmosphere's condition on a local scale. Scientists record the patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. Climate describes the ranges of an area's typical weather conditions and the extent to which those conditions vary over years to centuries.] (I-Check 2, I-Check 4) • **ESS3.A: Natural resources:** *How do humans depend on Earth's resources?* [All materials, 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.] (I-check 2, I-Check 3, I-Check 4) • **ESS3.B: Natural hazards**: *How do natural hazards affect individuals and societies?* [A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions, severe weather, floods, coastal erosion). Humans cannot eliminate natural hazards but can take steps to reduce their impacts.] (I-Check 4) • **ESS3.C: Human impact on Earth's systems**: *How do humans change the planet?* [Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.] (I-Check 4) **Engineering Technology, and Applications of Science** • **ETS1.A: Defining and delimiting an engineering problem** *What is a design for? What are the criteria and constraints of a successful solution?* [Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.] • **ETS1.B: Developing possible solutions** *What is the process for developing potential design solutions?* [Research on a problem should be carried out before beginning to design a solution. An often productive way to generate ideas is for people to work together to brainstorm, test, and refine possible solutions. Testing a solution involves investigating how well it performs under a range of likely conditions. Tests are often designed to identify failure points or difficulties, which suggest the elements of a design that need to be improved. At whatever stage, communication with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.] (I-Check 1, I-Check 4) • **ETS1.C: Optimizing the design solution** *How can the various proposed design solutions be compared and improved?* [Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.]
Cross Cutting Concepts	**Patterns**

	• Similarities and differences in patterns can be used to sort and classify natural phenomena. Patterns of change can be used to make predictions. **(I-Check 1, I-Check 2, I-Check 3, I-Check 4, Inv 3 Pt 1)** **Cause & Effect** • Cause-and-effect relationships are routinely identified and used to explain change (**I-Check 1, I-Check 2, I-Check 3; Inv 1 Pt 2, Inv 2 Pt 3, Inv 3 Pt 3)** **Scale, proportion, & quantity** • Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. • Observable phenomena exist from very short to very long time periods **(I-Check 2, I-Check 4)** **Systems and system models** • A system can be described in terms of its components and their interactions. **(I-Check 3, I-Check 4, Inv 5 Pt 3)**
Required Investigations	**Investigation 1: Water Observations** **Investigation 2: Hot Water, Cold Water** **Investigation 3: Weather and Water** **Investigation 4: Seasons and Climate** **Investigation 5: Waterworks**
Required Summative Assessment(s)	**Science and Engineering Practices** • Inv 1, Pt 2: performance assessment • Inv 2, Pt 3: performance assessment • Inv 3, Pt 1: performance assessment • Inv 3, Pt 3: performance assessment • Inv 5, Pt 3 : performance assessment **Performance Expectations (conceptual understanding)** • I-Check 1 • I-Check 2 • I-Check 3 • I-Check 4

Unit 3 Title: Structures of Life Quarters 3 and 4	
Teaching Dates	(74 Teaching Days) January 30 through May 18
Domain	Life Science (LS) (Note: No ETS standards)
Performance Expectations	**Students who demonstrate understanding can:** **Life Science** **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. [Clarification Statement: Changes organisms go through during their life form a pattern.] [Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.] **3-LS2-1.** Construct an argument that some animals form groups that help members survive. **3-LS3-1.** Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms. [Clarification Statement: Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans.] [Assessment Boundary: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.] **3-LS3-2.** Use evidence to support the explanation that traits can be influenced by the environment. [Clarification Statement: Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight.] **3-LS4-1.** Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. [Clarification Statement: Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.] [Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.] **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.] **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. [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-LS4-4**. 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. [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.]
Science and Engineering Practices	• Asking Questions (for science) and Defining Problems (for engineering) • Developing and Using Models • Planning and Carrying Out Investigations **(I-Check 1, I-Check 2, Inv1. Pt 3, Inv 4 Pt 2)** • Using Mathematics and Computational Thinking

	• Analyzing and Interpreting Data **(I-Check 1, I-Check 2, I-Check 3, Inv 1, Pt 3, Inv 3 Pt 3, Inv 4 Pt 2)** • Constructing Explanations (for science) and Designing Solutions (for engineering) **(Inv 1 Pt 3, Inv 4 Pt 2)** • Engaging in Argument from Evidence • Obtaining, Evaluating, and Communicating Information
Disciplinary Core Ideas	**Life Science** **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) **(I-Check 1, I-Check 2)** **LS2.D: Social Interactions and Group Behavior** Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size. (3-LS2-1) **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) **(I-Check 2, I-Check 3)** **LS3.B: Variation of Traits** Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)**(I-Check 1, I-Check 3)** The environment also affects the traits that an organism develops. (3-LS3-2) **I-Check 2, I-Check 3,)** **LS2.C: Ecosystem Dynamics, Functioning, and Resilience** When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary to 3-LS4-4) **(I-Check 3)** **LS4.A: Evidence of Common Ancestry and Diversity** Some kinds of plants and animals that once lived on Earth are no longer found anywhere. Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1) **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) **(I-Check 1, I-Check 3)** **LS4.C: Adaptation** For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3) **(I-Check 3)** **LS4.D: Biodiversity and Humans** Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4) **(I-Check 3)**

Cross Cutting Concept	**Patterns** • Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. **(I-Check 1, I-Check 2, Inv 3 Pt 3)** **Cause and Effect** • Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering **(I-Check 1, I-Check 2, Inv 1 Pt 3)** **Scale Proportion & Quantity** • Relative scales allow objects and events to be compared and described. **System and System Models** • A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems. **Structure and Function** • The way an object is shaped or structured determines many of its properties and functions **(I-Check 1, I-Check 2, I-Check 3, Inv 4 Pt 2)**
Required Summative Investigations	**Investigation 1:** Origin of Seeds **Investigation 2: Growing Further** **Investigation 3: Meet the Crayfish** **Investigation 4: Human Body**
Required Summative Assessments	**Science and Engineering Practices** Inv 1, Pt 3 Performance Assessment Inv 3, Pt 3 Performance Assessment Inv 4, Pt 2 Performance Assessment **Performance Expectations (conceptual understanding)** • Investigation 1 I-Check • Investigation 2 I-Check • Investigation 3 I-Check