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Alignment to 2016 Massachusetts Science and Technology/Engineering Curriculum Framework

Grade K

Earth and Space Sciences

State Standard	FOSS Program
ESS2. Earth's Systems	
K-ESS2-1. Use and share quantitative observations of local weather conditions to describe patterns over time. Clarification Statements: • Examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month, and relative temperature. • Quantitative observations should be limited to whole numbers.	**FOSS Next Generation Trees and Weather** **TE:** Investigation 3; Parts 1-3 Investigation 4; Parts 3,6,9 **SE:** *Up in the Sky, Weather, Maple Trees* **DR:** *Come a Tide, Once There Was a Tree, Summer*
K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment. Clarification Statement: • Examples of plants and animals changing their environment could include a squirrel digging holes in the ground and tree roots that break concrete.	**FOSS Next Generation Trees and Weather** **TE:** Investigation 1; Part 1 Investigation 2, Part 5 Investigation 4; Part 9 **SE:** *Maple Trees,* **DR:** *Summer, Once There Was a Tree* **FOSS Next Generation Animals Two by Two** **TE:** Investigation 1; Part 5 Investigation 3; Parts 2, 3 **SE:** *Birds Outdoors, Worms in Soil*
ESS3. Earth and Human Activity	
K-ESS3-2. Obtain and use information about weather forecasting to prepare for, and respond to, different types of local weather.	**FOSS Next Generation Trees and Weather** **TE:** Investigation 1; Parts 1-3 **SE:** *Up in the Sky, Weather* **DR:** *Come A Tide*
K-ESS3-3. Communicate solutions to reduce the amount of natural resources an individual uses. Clarification Statement: • Examples of solutions could include reusing paper to reduce the number of trees cut down and recycling cans and bottles to reduce the amount of plastic or metal used.	**FOSS Next Generation Materials and Motion** **TE:** Investigation 2; Part 4,5 Investigation 3; Part 5 **SE:** *Land, Air and Water, I Am Wood* **DR:** *Once There Was a Tree, Recycling Center, Environmental Health*

Life Science

State Standard	FOSS Program
LS1. From Molecules to Organisms: Structures and Processes	
K-LS1-1. Observe and communicate that animals (including humans) and plants need food, water, and air to survive. Animals get food from plants or other animals. Plants make their own food and need light to live and grow.	**FOSS Next Generation Animals Two by Two** **TE:** Investigation 1; Parts 2,4,5 Investigation 2; Parts 1,3 Investigation 3; Parts 1,2,3 Investigation 4; Parts 2,3,4 **SE:** *Fish, Same and Different, Fish Live in Many Places, Birds Outdoors, Water and Land Snails, Worms in Soil, Isopods, Animals All Around Us, Living and Nonliving* **FOSS Next Generation Trees and Weather** **TE:** Investigation 1; Part 6 **SE:** *What do Plants Need*
K-LS1-2 (MA). Recognize that all plants and animals grow and change over time.	**FOSS Next Generation Animals Two by Two** **TE:** Investigation 4; Part 4 **SE:** *Living and Nonliving* **FOSS Trees and Weather**

TE: Teacher Editions-Investigations Guide, Teacher Resources • **SE:** Student Edition-Science Resources Book • **DR:** Digital Resources

Grade K

	TE: Investigation 4; Parts 2,3,4,6,9 **SE:** *My Apple Tree, Maple Trees, Orange Trees* **DR:** *Summer*

Physical Science

State Standard	FOSS Program
PS1. Matter and Its Interactions	
K-PS1-1 (MA). Investigate and communicate the idea that different kinds of materials can be solid or liquid depending on temperature. Clarification Statements: • Materials chosen must exhibit solid and liquid states in a reasonable temperature range for kindergarten students (e.g., 0-80°F), such as water, crayons, or glue sticks. • Only a qualitative description of temperature, such as hot, warm, and cool, is expected.	**FOSS Next Generation Trees and Weather** **TE:** Investigation 3; Part 2 **FOSS Next Generation Materials and Motion** **TE:** Investigation 3, Part 6
PS2. Motion and Stability: Forces and Interactions	
K-PS2-1. Compare the effects of different strengths and different directions of pushes and pulls on the motion of an object. Clarification Statements: • Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other. • Comparisons should be on different relative strengths or different directions, of both at the same time. • Non-contact pushes or pulls such as those produced by magnets are not expected.	**FOSS Next Generation Materials and Motion** **TE:** Investigation 4; Parts 1,2,3,4 **SE:** *Collisions, Pushes and Pulls* **DR:** *Roller Coaster Builder*
PS3. Energy	
K-PS3-1. Make observations to determine that sunlight warms materials on Earth's surface. Clarification Statements: • Examples of materials on Earth's surface could include sand, soil, rock, and water. • Measures of temperature should be limited to relative measures such as warmer/cooler.	**FOSS Next Generation Trees and Weather** **TE:** Investigation 3; Part 2 **SE:** *Up in the Sky* **FOSS Next Generation Materials and Motion** **TE:** Investigation 3; Part 6
K-PS3-2. Use tools and materials to design and build a model of a structure that will reduce the warming effect of sunlight on an area.	**FOSS Next Generation Materials and Motion** **TE:** Investigation 3; Part 6

Grade 1

Earth and Space Sciences

State Standard	NGSS FOSS Program
ESS1. Earth's Place in the Universe	
1-ESS1-1. Use observations of the Sun, Moon, and stars to describe that each appears to rise in one part of the sky, appears to move across the sky, and appears to set.	**FOSS Next Generation Air and Weather** **TE:** Investigation 2; Parts 2,4 Investigation 4; Parts 1,2,3 **SE:** *Changes in the Sky, Seasons, Getting Through the Winter*
1-ESS1-2. Analyze provided data to identify relationships among seasonal patterns of change, including relative sunrise and sunset time changes, seasonal temperature and rainfall or snowfall patterns, and seasonal changes to the environment. Clarification Statement: • Examples of seasonal changes to the environment can include foliage changes, bird migration, and differences in amount of insect activity.	**FOSS Next Generation Air and Weather** **TE:** Investigation 4, Parts 1,2,3 **SE:** *Changes in the Sky, Seasons, Getting Through the Winter* **DR:** *What's the Weather?*

Life Science

State Standard	NGSS FOSS Program
LS1. From Molecules to Organisms: Structures and Processes	
1-LS1-1. Use evidence to explain that (a) different animals use their body parts and senses 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, and (b) plants have roots, stems, leaves, flowers, and fruits that are used to take in water, air, and other nutrients, and produce food for the plant. Clarification Statement: • Descriptions are not expected to include mechanisms such as the process of photosynthesis.	**FOSS Next Generation Plants and Animals** **TE:** Investigation 1; Parts 1,2,3 Investigation 2; Parts 1,2,3 Investigation 3; Parts 2,3,4 Investigation 4; Parts 1,2,3 **SE:** *What do Plants Need? The Story of Wheat, Plants and Animals Around the World, Learning from Nature* **DR:** *How Plants Grow, How Plants Live in Different Places, Sorting Animals by Different Structure. Animal Growth, Watch It Grow*
1-LS1-2. Obtain information to compare ways in which the behavior of different animal parents and their offspring help the offspring to survive. Clarification Statement: • Examples of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).	**FOSS Next Generation Plants and Animals** **TE:** Investigation 4; Part 3 **SE:** *Animals and Their Young* **DR:** *Animal Offspring and Caring for Animals, Find the Parent*
LS3. Heredity: Inheritance and Variation of Traits	
1-LS3-1. Use information from observations (first-hand and from media) to identify similarities and differences among individual plants or animals of the same kind. Clarification Statements: • Examples of observations could include that leaves from the same kind of plant are the same shape but can differ in size. • Inheritance, animals that undergo metamorphosis, or hybrids are not expected.	**FOSS Next Generation Plants and Animals** **TE:** Investigation 1; Part 4 Investigation 4; Part 1,2 **SE:** *Variation* **DR:** *Animal Growth, Watch It Grow*

Physical Science

Grade 1

State Standard	NGSS FOSS Program
PS4. Waves and Their Applications in Technologies for Information Transfer	
1-PS4-1. Demonstrate that vibrating materials can make sound and that sound can make materials vibrate. Clarification Statements: • Examples of vibrating materials that make sound could include tuning forks, a stretched string or rubber band, and a drum head. • Examples of how sound can make materials vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.	**FOSS Next Generation Sound and Light** **TE:** Investigation 1; Parts 1,2,3 Investigation 2; Parts 1,2,3,4 **SE:** *Vibrations and Sound, Listen to This, Strings in Motion, More Musical Instruments.* **DR:** *Sorting Sounds, All about Sound*
1-PS4-3. Conduct an investigation to determine the effect of placing materials that allow light to pass through them, allow only some light through them, block all the light, or redirect light when put in the path of a beam of light. Clarification Statements: • Effects can include some of all light passing through, creation of a shadow, and redirecting light. • Quantitative measures are not expected.	**FOSS Next Generation Sound and Light** **TE:** Investigation 3; Parts 1,2,3 Investigation 4; Parts1,2 **SE:** *Playing in the Light, Light and Materials, Reflections* **DR:** *Light and Shadows, All About Light, My Shadow*
1-PS4-4. Use tools and materials to design and build a device that uses light or sound to send a signal over a distance. Clarification Statements: • Examples of devices could include a light source to send signals, paper cup and string "telephones", and a pattern of drum beats. • Technological details for how communication devices work are not expected.	**FOSS Next Generation Sound and Light** **TE:** Investigation 2; Part 4 Investigation 4; Part 4 **SE:** *Communicating with Light*

Technology/Engineering

State Standard	NGSS FOSS Program
ETS1. Engineering Design	
1.K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change that can be solve developing or improving an object or tool.	**FOSS Next Generation Air and Weather** **TE:** Investigation 1; Part 2 **SE:** *What Is All around Us?* **DR:** *Friction and Air Resistance* **FOSS Next Generation Sound and Light** **TE:** Investigation 2; Part 4 Investigation 4; Part 4 **SE:** *Communicating with Light* **FOSS Next Generation Plants and Animals** **TE:** Investigation 3; Part 4 **SE:** *Learning from Nature* **DR:** *Animal Growth*
1.K-2-ETS1-2. Generate multiple solutions to a design problem and make a drawing (plan) to represent one or more of the solutions.	**FOSS Next Generation Air and Weather** **TE:** Investigation 1; Part 2,5 **SE:** *What Is All around Us?* **DR:** *Friction and Air Resistance*

TE: Teacher Editions-Investigations Guide, Teacher Resources • **SE:** Student Edition-Science Resources Book • **DR:** Digital Resources

Grade 1

	FOSS Next Generation Sound and Light **TE:** Investigation 2, Part 4 Investigation 4, Part 4 **SE:** *Communicating with Light*

[K-2-ETS1-3 is found in grade 2.]

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Alignment to 2016 Massachusetts Science and Technology/Engineering Curriculum Framework

Grade 2

Earth and Space Sciences

State Standard	NGSS FOSS Program
ESS2. Earth's Systems	
2-ESS2-1. Investigate and compare the effectiveness of multiple solutions designed to slow or prevent wind or water from changing the shape of the land. Clarification Statements: • Solutions to be compared could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land. • Solutions can be generated or provided.	**FOSS Next Generation Pebbles, Sand and Silt** **TE:** Investigation 4; Part 4 **SE:** *Erosion, Ways to Represent Land and Water* **DR:** *All About Landforms (review)*
2-ESS2-2. Map the shapes and types of landforms and bodies of water in an area**.** Clarification Statements: • Examples of types of landforms can include hills, valleys, river banks, and dunes. • Examples of water bodies can include streams, ponds, bays, and rivers. • Quantitative scaling in models or contour mapping is not expected.	**FOSS Next Generation Pebbles, Sand and Silt** **TE:** Investigation 4; Part 4 **SE:** *Erosion, Ways to Represent Land and Water* **DR:** *All About Landforms (review)*
2-ESS2-3. Use examples obtained from informational sources to explain that water is found in the ocean, rivers and streams, lakes and ponds, and may be solid or liquid.	**FOSS Next Generation Pebbles, Sand and Silt** **TE:** Investigation 4; Part 3 **SE:** *Where is Water Found?, States of Water*
2-ESS2-4 (MA). Observe how blowing wind and flowing water can move Earth materials from one place to another and change the shape of a landform. Clarification Statement: • Examples of types of landforms can include hills, valleys, river banks, and dunes.	**FOSS Next Generation Pebbles, Sand and Silt** **TE:** Investigation 2; Parts 2,3,4 **SE:** *The Story of Sand, Rocks Move, Landforms* **DR:** *All About Land Formations*

Life Science

State Standard	NGSS FOSS Program
LS2. Ecosystems: Interactions, Energy, and Dynamics	
2-LS2-3 (MA). Develop and use models to compare how plants and animals depend on their surroundings and other living things to meet their needs in the places they live. Clarification Statement: • Animals need food, water, air, shelter and favorable temperature; plants need sufficient light, water, minerals, favorable temperature, and animals or other mechanisms to disperse seeds.	**FOSS Next Generation Insects and Plants** **TE:** Investigation 1; Parts 1,2 Investigation 2; Parts 1-4 Investigation 3; Parts 2-4 Investigation 4; Parts 1,4 Investigation 5; Parts 3,4 **SE:** *Animals and Plants in Their Habitats, Flowers and Seeds, How Seeds Travel, So Many Kinds, So Many Places, Life Goes Around* **DR:** *All About Water Ecosystems, Where Does It Live?, What Doesn't Belong, Organism Match, Habitat Gallery, How Plants Grow, What is Pollination, Watch It Grow, How seeds Get Here... and There, House and Backyard Insects, Bugs, Insect Hunt, Habitat Havoc, Insect Hunt*
LS4. Biological Evolution: Unity and Diversity	
2-LS4-1. Use texts, media, or local environments to observe and compare (a) different kinds of living things in an area, and (b) differences in the kinds of living things in different types of areas.	**FOSS Next Generation Insects and Plants** **TE:** Investigation 1; Parts 1,2 Investigation 2, Part 4

TE: Teacher Editions-Investigations Guide, Teacher Resources • **SE:** Student Edition-Science Resources Book • **DR:** Digital Resources

Grade 2

Clarification Statements: • Examples of areas to compare can include temperate forest, desert, tropical rain forest, grassland, arctic, and aquatic. • Specific animal and plant names in specific areas are not expected.	Investigation 3; Parts 2,4 Investigation 4; Parts 2,3,4 Investigation 5; Parts 3,4 **SE:** *Animals and Plants in Their Habitats, How Seeds Travel, So Many Kinds, So Many Places, Insect Shapes and Colors, Insect Life Cycles, Life Goes Around* **DR:** *All About Water Ecosystems, Where Does It Live?, What Doesn't Belong?, Organism Match, Habitat Gallery, How Seeds Get Here...and There, House and Backyard Insects, Bugs, Insect Hunt, Habitat Havoc, Insect, What is Pollination*

{2-LS2-1 is included in other standards, including K-LS1-1 and 2-LS2-3(MA).

Physical Science

State Standard	NGSS FOSS Program
PS1. Matter and Its Interactions	
2-PS1-1. Describe and classify different kinds of materials by observable properties of color, flexibility, hardness, texture, and absorbency.	**FOSS Next Generation Solids and Liquids** **TE:** Investigation 1; Parts 1,2,3,4,5 Investigation 2; Parts 2-4 Investigation 3; Parts 1-5 **SE:** *Everything Matters*, *Solid Objects and Materials, Towers, Bridges, Liquids, Pouring*, *Comparing Solids and Liquids* **DR:** *Clothing and Building Materials, Properties of Materials, All About Properties of Matter, Falling Bottle Puzzle* **FOSS Next Generation Pebbles, Sand and Silt** **TE:** Investigation 1; Parts 1-5 Investigation 2; Parts 1,2,4 Investigation 4; Part 2 **SE:** *Exploring Rocks, Colorful Rocks, The Story of Sand, Rocks Move, What is in Soil?,Testing Soil* **DR:** *Rock Sorting, Property Chain,* All about Soil
2-PS1-2. Test different materials and analyze the data obtained to determine which materials have the properties that are best suited for an intended purpose. Clarification Statements: • Examples of properties could include color, flexibility, hardness, texture, and absorbency. • Data should focus on qualitative and relative observations.	**FOSS Next Generation Solids and Liquids** **TE:** Investigation 1; Parts 2,4 **SE:** *Solid Objects and Materials, Tower, Bridges* **DR:** *Properties of Materials, Clothing and Building Materials* **FOSS Next Generation Pebbles, Sand and Silt** **TE:** Investigation 3, Parts 1-5 Investigation 4; Part 4 **SE:** *Making Things with Rocks, What Are Natural Resources, Erosion* **DR:** *Find Earth Materials*
2-PS1-3. Analyze a variety of evidence to conclude that when a chunk of material is cut or broken into pieces, each piece is still the same material and, however small each piece is, has weight. Show that the material properties of a small set of pieces do not change when the pieces are used to build larger objects. Clarification Statements: • Materials should be pure substances or microscopic mixtures that appear contiguous at observable scales. • Examples of pieces could include blocks, building bricks, and other assorted small objects.	**FOSS Next Generation Solids and Liquids** **TE:** Investigation 4; Parts 1-5 **SE:** *Mix It Up* **DR:** *Change It!* **FOSS Next Generation Pebbles, Sand and Silt** **TE:** Investigation 1; Part 1 Investigation 2; Part 2 **SE:** *The Story of Sand*

TE: Teacher Editions-Investigations Guide, Teacher Resources • **SE:** Student Edition-Science Resources Book • **DR:** Digital Resources

Grade 2

2-PS1-4. Construct an argument with evidence that some changes to materials caused by heating or cooling can be reversed and some cannot. Clarification Statements: • Examples of reversible changes could include materials such as water and butter at different temperatures. • Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and burning paper.	**FOSS Next Generation Solids and Liquids** **TE:** Investigation 4, Part 4 **SE:** *Heating and Cooling, Is Change Reversible?* **DR:** *Change It! Solids and Liquids*
PS3. Energy	
2-PS3-1 (MA). Design and conduct an experiment to show the effects of friction on the relative temperature and speed of objects that rub against each other. Clarification Statements: • Examples could include an object sliding on rough vs. smooth surfaces. • Observations of temperature and speed should be qualitative.	**FOSS Next Generation Pebbles, Sand and Silt** **TE:** Investigation 3, Part 2

Technology/Engineering

State Standard	NGSS FOSS Program
ETS1. Engineering Design	
2.K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same design problem to compare the strength and weaknesses of how each object performs. Clarification Statements: • Data can include observations and be either qualitative or quantitative. • Examples can include how different objects insulate cold water or how different types of grocery bags perform.	**FOSS Next Generation Solids and Liquids** **TE:** Investigation 1, Part 4 **SE:** *Tower, Bridges* **DR:** *Properties of Materials*

[K-2-ETS1-1 and K-2-ETS1-2 are found in grade 1.}

Grade 3

Earth and Space Science

State Standard	NGSS FOSS Program
ESS2. Earth's Systems	
3-ESS2-1. Use graphs and tables of local weather data to describe and predict typical weather during a particular season in an area. Clarification Statements: • Examples of weather data could include temperature, amount and type of precipitation (e.g., rain, snow), wind direction, and wind speed. • Graphical displays should focus on pictographs and bar graphs.	**FOSS Next Generation Water and Climate** **TE:** Investigation 3; Part 1 Investigation 4; Parts 1,2 **SE:** *Studying Weather, Climate Regions* **DR:** *All about Meteorology, Weather Grapher, Weather Forecast Websites, All about Climate and Seasons, Climate-Regions Map*
3-ESS2-2. Obtain and summarize information about climate of different regions of the world to illustrate that typical weather conditions over a year vary by region. Clarification Statement: • Examples of information can include climate data (average temperature, average precipitation, average wind speed) or comparative descriptions of seasonal weather for different regions. State Assessment Boundary: • An understanding of climate change is not expected in state assessment.	**FOSS Next Generation Water and Climate** **TE:** Investigation 4; Part 2 **SE:** *Climate Regions* **DR:** *All about Climate and Seasons, Climate-Regions Map*
ESS3. Earth and Human Activity	
3-ESS3-1. Evaluate the merit of a design solution that reduces the damage caused by weather. Clarification Statement: • Examples of design solutions to reduce weather-related damage could include a barrier to prevent flooding, a wind-resistant roof, and a lightning rod.	**FOSS Next Generation Water and Climate** **TE:** Investigation 4; Part 3 **SE:** *Wetlands for Flood Control, Conserving Water during Droughts* **DR:** *Come a Tide, Floods*

Life Science

State Standard	NGSS FOSS Program
LS1. From Molecule to Organisms: Structures and Processes	
3-LS1-1. Use simple graphical representation to show that different types of organisms have unique and diverse life cycles. Describe that all organisms have birth, growth, reproduction, and death in common but there are a variety of ways in which these happen. Clarification Statement: • Examples can include different ways plants and animals begin(e.g., sprout from a seed, born from an egg), grow (e.g., increase in size and weight, produce a new part), reproduce (e.g., develop seeds, root runners, mate and lay eggs that hatch), and die (e.g., length of life). • Plant life cycles should focus on those of flowering plants. • Describing variation in organism life cycles should focus on comparisons of the general stages of each, not specifics.	**FOSS Next Generation Structures of Life** **TE:** Investigation 1; Parts 1-3 Investigation 2, Parts 2,3 Investigation 3; Parts 1,3 **SE:** *The Reason for Fruit, The Most Important Seed, Barbara McClintock, Life Cycles, Crayfish, Life on Earth* **DR:** *Plant Basic Needs, How Plants Get Food, All about Animal Life Cycle, Structure and Function of Plants, Animal Basic Needs, All About Animal Behavior and Communication*

TE: Teacher Editions-Investigations Guide, Teacher Resources • **SE:** Student Edition-Science Resources Book • **DR:** Digital Resources

Grade 3

State Assessment Boundary: • Detailed descriptions of any one organism's cycle, the differences of "complete metamorphosis" and "incomplete metamorphosis," or details of human reproduction are not expected in state assessment.	
LS3. Heredity: Inheritance and Variation of Traits	
3-LS3-1. Provide evidence, including through analysis of data, that plants and animals have traits inherited from parents and that variation of these traits exist in a group of similar organisms. Clarification Statements: • Examples of inherited traits that vary can include the color of fur, shape of leaves, length of legs, and size of flowers. • Focus should be on non-human examples. State Assessment Boundary: • Genetic mechanisms of inheritance or prediction of traits are not expected in state assessment.	**FOSS Next Generation Structures of Life** **TE:** Investigation 1; Part 3 Investigation 2; Parts 2,3 Investigation 3; Parts 1,2 Investigation 4; Part 2 **SE:** *Barbara McClintock,* Life Cycles, *Crayfish, Adaptations, Barn Owls, Fossils, Skeletons on the Outside, Crayfish, Snails, and Humans* **DR:** *How Plants Get Food, All about Animal Life Cycles, All about Animal Adaptations, Walking Stick Survival, All about Fossils*
3-LS3-2. Distinguish between inherited characteristics and those characteristics that result from a direct interaction with the environment. Give examples of characteristics of living organisms that are influenced by both inheritance and the environment. Clarification Statements: • Examples of the environment affecting a characteristic could include normally tall plants stunted because they were grown with insufficient water or light, a lizard missing a tail due to a predator, and a pet dog becoming overweight because it is given too much food and little exercise. • Focus should be on non-human examples.	**FOSS Next Generation Structures of Life** **TE:** Investigation 2; Part 3 Investigation 3; Parts 1,2 **SE:** Life Cycles, *Crayfish, Adaptations* **DR:** *How Plants Get Food, All about Animal Life Cycles, Animal Basic Needs, All about Animal Adaptations, Walking Stick Survival*
LS4. Biological Evolution: Unity and Diversity	
3-LS4-1. Use fossils to describe the types of organisms and their environments that existed long ago and compare those to living organisms and their environments. Recognize that most kinds of plants and animals that once lived on Earth are no longer found anywhere. Clarification Statement: • Comparisons should focus on physical or observable features. State Assessment Boundary: • Identification of specific fossils or specific present-day plants and animals, dynamic processes, or genetics are not expected in state assessment.	**FOSS Next Generation Structures of Life** **TE:** Investigation 4; Part 2 **SE:** *Barn Owls, Fossils* **DR:** *All about Fossils*
3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals within the same species may provide advantages to these individuals in their survival and reproduction. Clarification Statements: • Examples can include rose bushes of the same species, one with slightly longer thorns than the other which may prevent its predation by deer, and color variation within a species that may provide advantages so one organism may be more likely to survive and therefore more likely to produce offspring.	**FOSS Next Generation Structures of Life** **TE:** Investigation 3; Parts 2,5 **SE:** *Adaptations, Food Chains* **DR:** *All about Animal Adaptations, Walking Stick Survival*

Grade 3

• Examples of evidence could include needs and characteristics of the organisms and habitats involved.	
3-LS4-3. Construct an argument with evidence that in a particular environment some organisms can survive well, some survive less well, and some cannot survive. Clarification Statement: • Examples of evidence could include needs and characteristics of the different organisms (species) and habitats involved.	**FOSS Next Generation Structures of Life** **TE:** Investigation 3; Parts 2,3,4,5 **SE:** *Crayfish, Adaptations, Life on Earth, A Change in the Environment, Food Chains* **DR:** *All about Animal Adaptations, Walking Stick Survival, All about Animal Behavior and Communication, Humphrey, the Lost Whale: A True Story, Where Does It Live?, What Doesn't Belong?, Organism Match, Habitat Gallery, Crayfish vs. Snail vs. Mantis, Life Cycles*
3-LS4-4. Analyze and interpret given data about changes in a habitat and describe how the changes may affect the ability of organisms that live in that habitat to survive and reproduce. Clarification Statements: • Changes should include changes to landforms, distribution of water, climate, and availability of resources. • Changes in the habitat could range in time from a season to a decade. • While it is understood that ecological changes are complex, the focus should be on a single change to the habitat.	**FOSS Next Generation Structures of Life** **TE:** Investigation 3; Parts 4,5 **SE:** *Change in the Environment, Food Chains* **DR:** *Where Does It Live?, What Doesn't Belong?, Organism Match, Habitat Gallery, Crayfish vs. Snail vs. Mantis, Life Cycles*
3-LS4-5 (MA). Provide evidence to support a claim that the survival of a population is dependent upon reproduction. State Assessment Boundary: • Details of reproduction are not expected in state assessment.	**FOSS Next Generation Structures of Life** **TE:** Investigation 1; Parts 1,3 Investigation 3; Parts 1,2 5 **SE:** *The Reason for Fruit, Barbara McClintock, Crayfish, Adaptations, Food Chains* **DR:** *All about Animal Adaptations, Walking Stick Survival*

Physical Science

State Standard	NGSS FOSS Program
PS2. Motion and Stability: Force and Interactions	
3-PS2-1. Provide evidence to explain the effect of multiple forces, including friction, on an object. Include balanced forces that do not change the motion of the object and unbalanced forces that do change the motion of the object. Clarification Statements: • Descriptions of force magnitude should be qualitative and relative. • Force due to gravity is appropriate but only as a force that pulls objects down. State Assessment Boundaries: • Quantitative force magnitude is not expected in state assessment. • State assessment will be limited to one variable at a time: number, size, or direction of forces.	**FOSS Next Generation Motion and Matter** **TE:** Investigation 1; Parts 1,2,3 Investigation 2; Parts 1-4 **SE:** *Magnetism and Gravity, What Scientists Do, Change of Motion, Patterns of Motion, What Goes Around* **DR:** *Magnetic Poles, All about Motion and Balance, All about Magnets, Roller Coaster Builder*
3-PS2-3. Conduct an investigation to determine the nature of the forces between two magnets based on their orientations and distance relative to each other. Clarification Statement: • Focus should be forces produced by magnetic objects that are easily manipulated.	**FOSS Next Generation Motion and Matter** **TE:** Investigation 1; Parts 1,2 **SE:** *Magnetism and Gravity, What Scientists Do* **DR:** *Magnetic Poles, All about Magnets*

Grade 3

3-PS2-4. Define a simple design problem that can be solved by using interactions between 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.	**FOSS Next Generation Motion and Matter** **TE:** Investigation 1; Parts 1,2 Investigation 3, Part 4 **SE:** *Magnetism and Gravity, What Scientists Do, Magnets at Work* **DR:** *Magnetic Poles, All about Magnets*

Technology/Engineering

State Standard	NGSS FOSS Program
ETS1. Engineering Design	
3.3-5-ETS1-1. Define a simple design problem that reflects a need or a want. Include criteria for success and constraints on materials, time, or cost that a potential solution must meet.	**FOSS Next Generation Motion and Matter** **TE:** Investigation 2; Parts 1-4 Investigation 3; Parts 1-4 **SE:** *Patterns of Motion, What Goes Around, What Engineers Do, Science Practices, Engineering Practices, Soap Box Derby, The Metric System, How Engineers and Scientists Work Together, Magnets at Work* **DR:** *Roller Coaster Builder, Measuring Length, Measurement Logic* **FOSS Next Generation Water and Climate** **TE:** Investigation 5; Part 3 **SE:** *Using the Energy of Water*
3.3-5-ETS1-2. Generate several possible solutions to a given design problem. Compare each solution based on how well each is likely to meet the criteria and constraints of the design problem. Clarification Statement: • Examples of design problems can include adapting a switch on a toy for children who have a motor coordination disability, designing a way to clear or collect debris or trash from a storm drain, or creating safe moveable playground equipment for a new recess game.	**FOSS Next Generation Motion and Matter** **TE:** Investigation 3; Parts 1,2,4 **SE:** *What Engineers Do, Science Practices, Engineering Practices, Soap Box Derby, The Metric System, How Engineers and Scientists Work Together, Magnets at Work* **DR:** *Measuring Length, Measurement Logic* **FOSS Next Generation Water and Climate** **TE:** Investigation 5; Part 3 **SE:** *Using the Energy of Water* **FOSS Next Generation Structures of Life** **TE:** Investigation 1; Part 4 **SE:** *Nature Journal--How Seeds Travel* **DR:** *How Seeds Get Here... and There*
3.3-5-ETS1-4 (MA). Gather information using various informational resources on possible solutions to a design problem. Present different representations of a design solution. Clarification Statements: • Examples of informational resources can include books, videos, and websites. • Examples of representations can include graphic organizers, sketches, models, and prototypes.	**FOSS Next Generation Motion and Matter** **TE:** Investigation 3, Parts 1,2,4 **SE:** *What Engineers Do, Science Practices, Engineering Practices, Soap Box Derby, The Metric System, How Engineers and Scientists Work Together, Magnets at Work* **DR:** *Measuring Length, Measurement Logic* **FOSS Next Generation Water and Climate** **TE:** Investigation 5; Part 3 **SE:** *Using the Energy of Water*

[3-5-ETS1-3 and 3-5-ETS1-5(MA) are found in grade 4.]

Grade 4

Earth and Space Science

State Standard	NGSS FOSS Program
ESS1. Earth's Place in the Universe	
4-ESS1-1. Use evidence from a given landscape that includes simple landforms and rock layers to support a claim about the role of erosion or deposition in the formation of the landscape over long periods of time. Clarification Statements: • Examples of evidence and claims could include rock layers with shell fossils above rock layers with plant fossils and no shells, indicating a change from deposition on land to deposition in water over time; and a canyon with rock layers in the walls and a river in the bottom, indicating that a river eroded the rock over time. • Examples of simple landforms can include valleys, hills, mountains, plains, and canyons. • Focus should be on relative time. State Assessment Boundary: • Specific details of the mechanisms of rock formation or specific rock formations and layers are not expected In state assessment.	**FOSS Next Generation Soils, Rocks, and Landforms** **TE:** Investigation 2; Parts 1,2,3 **SE:** *Erosion and Deposition, Landforms Photo Album* **DR:** *Weathering and Erosion, Videos: Stream Tables, Tutorial--Stream Tables: Slope and Flood, Virtual Investigation--Stream Tables*
ESS2. Earth's Systems	
4-ESS2-1. Make observations and collect data to provide evidence that rocks, soils, and sediments are broken into smaller pieces through mechanical weathering and moved around through erosion. Clarification Statement: • Mechanical weathering processes can include frost wedging, abrasion, and tree root wedging. • Erosion can include movement by blowing wind, flowing water, and moving ice. State Assessment Boundary: • Chemical processes are not expected in state assessment.	**FOSS Next Generation Soils, Rocks, and Landforms** **TE:** Investigation 1; Parts 1,2,3,4 Investigation 2; Parts 1,2,3 **SE:** *What Is Soil?, Weathering, Erosion and Deposition, Landforms Photo Album* **DR:** *Weathering and Erosion, Soils, Tutorial: Weathering, Virtual Investigation: Water Retention of Soils, Weathering and Erosion, Videos: Stream Tables, Tutorial--Stream Tables: Slope and Flood, Virtual Investigation--Stream Tables*
4-ESS2-2. Analyze and interpret maps of Earth's mountain ranges, deep ocean trenches, volcanoes, and earthquake epicenters to describe patterns of these features and their location relative to boundaries between continents and oceans.	**FOSS Next Generation Soils, Rocks, and Landforms** **TE:** Investigation 3; Parts 1-4 **SE:** *Topographic Maps, The Story of Mount Shasta, Mount St. Helens Impact, It Happened So Fast* **DR:** *Volcanoes, Topographer, All about Earthquakes*
ESS3. Earth and Human Activity	
4-ESS3-1. Obtain information to describe that energy and fuels humans use are derived from natural resources and that some energy and fuel sources are renewable, and some are not. Clarification Statements: • Examples of renewable energy resources could include wind energy, water behind dams, tides, and sunlight. • Non-renewable energy resources are fossil fuels and nuclear materials.	**FOSS Next Generation Soils, Rocks, and Landforms** **TE:** Investigation 4; Part 1 **SE:** *Monumental Rocks, Geoscientists at Work* **DR:** *Natural Resources*, *Resource ID* **FOSS Next Generation Energy** **TE:** Investigation 4; Part 1 Investigation 5; Part 3 **SE:** *Energy, Alternative Sources of Electricity, Ms. Osgood's Class Report* **FOSS Next Generation Environments** **TE:** Investigation 2; Parts 2,3 **SE:** *What is an Ecosystem?, Food Chains and Food Webs, Human Activities and Aquatic Ecosystems,*

TE: Teacher Editions-Investigations Guide, Teacher Resources • **SE:** Student Edition-Science Resources Book • **DR:** Digital Resources

Grade 4

	Comparing Aquatic and Terrestrial Ecosystems **DR:** *Virtual Terrarium and Aquarium*
4-ESS3-2. Evaluate different solutions to reduce the impacts of a natural event such as an earthquake, blizzard, or flood on humans. Clarification Statement: • Examples of solutions could include an earthquake-resistant building or a constructed wetland to mitigate flooding.	**FOSS Next Generation Soils, Rocks, and Landforms** **TE:** Investigation 3; Parts 2,3,4 **SE:** *The Story of Mount Shasta, It Happened So Fast* **DR:** *Mount St. Helens Impact, Volcanoes, Topographer, All about Earthquakes*

Life Science

State Standard	NGSS FOSS Program
LS1. From Molecule to Organisms: Structures and Processes	
4-LS1-1. Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction. Clarification Statements: • Animal structures can include legs, wings, fins, feathers, trunks, claws, horns, antennae, eyes, ears, nose, heart, stomach, lung, brain, and skin. • Plant structures can include leaves, roots, stems, bark, branches, flowers, fruit, and seeds. State Assessment Boundary: • State assessment will be limited to macroscopic structures.	**FOSS Next Generation Environments** **TE:** Investigation 1; Parts 1,2,3 Investigation 2, Parts 1,2,3,4 Investigation 4, Part 3 **SE:** *Two Terrestrial Environments, Darkling Beetles, Setting Up a Terrarium, Isopods, Amazon Rain Forest Journal, Freshwater Environments, What Is An Ecosystem?, Food Chains and Food Webs, Human Activities and Aquatic Ecosystems, Comparing Aquatic and Terrestrial Ecosystems, Animal Sensory Systems, Saving Murrelets through Mimicry* **DR:** *Deserts, Animals of the Rain Forest, Animal Needs, Virtual Terrarium and Aquarium, Animal Language And Communication, All about the Senses, All about Plant Adaptations*

Physical Science

State Standard	NGSS FOSS Program
PS3. Energy	
4-PS3-1. Use evidence to construct an explanation relating the speed of an object to the energy of that object. State Assessment Boundaries: • State assessment will be limited to analysis of kinetic energy. • Accounting for mass, quantitative measures of changes in the speed of an object, or any precise or quantitative definition of energy is not expected in state assessment.	**FOSS Next Generation Energy** **TE:** Investigation 4; Parts 2-3 **SE:** *What Causes Change of Motion? Bowling, Force and Energy, Potential and Kinetic Energy at Work* **DR:** *Soccer, Wagon, All about Transfer of Energy*
4-PS3-2. Make observations to show that energy can be transferred from place to place by sound, light, heat, and electric currents. Clarification Statement: • Evidence of energy being transferred can include vibrations felt a small distance from a source, a solar-powered toy that moves when placed in direct light, warming a metal object on one end and observing the other end getting warm, and a wire carrying electric energy from a battery to light a bulb.	**FOSS Next Generation Energy** **TE:** Investigation 1; Parts 1-4 Investigation 3; Parts 1-3 Investigation 4; Part 1 Investigation 5; Parts 1-3 **SE:** *Edison Sees the Light, Energy Sources, Series and Parallel Circuits, Science Practices, Engineering Practices, Thinking Like an Engineer, Engineering a Solar Lighting Solution, Electricity Creates Magnetism, Using Magnetic Fields, Electromagnets Everywhere, Morse Gets Clicking, Energy, Waves, More About Sound, Light Interactions,*

Grade 4

State Assessment Boundary: • Quantitative measurements of energy are not expected in state assessment.	*More Light on the Subject, Alternative Sources of Electricity* **DR:** *Lighting a Bulb, Flow of Electricity, Tutorial: Simple Circuits, Tutorial: Conductors and Insulators, Turn on the Switch, Conductor Detector, D-cell Orientation, Tutorial: Series and Parallel Circuits, Tutorial: Electromagnets, Virtual Investigation: Electromagnet Experiments, Virtual Electromagnet, Kitchen Magnets, Tutorial: Creating Graphs, Tutorial: Interpreting Graphs, Sound Energy, Waves, Real World Science: Sound, All abut Waves , All about Light*
4-PS3-3. Ask questions and predict outcomes about the changes in energy that occur when objects collide. Clarification Statement: • Changes in energy can include a change in the object's motion, position, and the generation of heat and/or sound. State Assessment Boundary: • Analysis of forces or quantitative measurements of energy are not expected in state assessment.	**FOSS Next Generation Energy** **TE:** Investigation 4; Part 3 **SE:** *Bowling, Force and Energy, Potential and Kinetic Energy at Work* **DR:** *All about the Transfer of Energy*
4-PS3-4. Apply scientific principles of energy and motion to test and refine a device that converts kinetic energy to electrical energy or uses stored energy to cause motion or produce light or sound. Clarification Statement: • Sources of stored energy can include water in a bucket or a weight suspended at a height, and a battery.	**FOSS Next Generation Energy** **TE:** Investigation 3; Part 3 Investigation 5; Parts 3 **SE:** *Morse Gets Clicking, Alternative Sources of Energy* **DR:** *Wave*
PS4. Waves and Their Applications in Technologies for Information Transfer	
4-PS4-1. Develop a model of a simple mechanical wave (including sound) to communicate that waves (a) are regular patterns of motion along which energy travels and (b) can cause objects to move. Clarification Statement: • Examples of models could include diagrams, analogies, and physical models. State Assessment Boundary: • Interference effects, electromagnetic waves, or non-periodic waves are not expected in state assessment.	**FOSS Next Generation Energy** **TE:** Investigation 5; Part 1 **SE:** *Waves, More About Sound* **DR:** *Sound Energy, Waves, Real World Science: Sound, All about Waves*
4-PS4-2. Develop a model to describe that light must reflect off an object and enter the eye for the object to be seen. State Assessment Boundary: • Specific colors reflected and seen, the cellular mechanisms of vision angles of incidence and reflection, or how the retina works are not expected in state assessment.	**FOSS Next Generation Energy** **TE:** Investigation 5; Part 2 **SE:** *Light Interactions, Throw a Little Light on Sight, More Light on the Subject* **DR:** *All about Light, Reflecting Light, Tutorial: Reflection, Virtual Extension: Color, Extension: Colored Light*
4-PS4-3. Develop and compare multiple ways to transfer information through encoding, sending, receiving, and decoding a pattern. Clarification Statement: • Examples of solutions could include drums sending coded information through sound waves, using a grid of 1s and 0s representing black and white to send information about a picture, and using Morse code to	**FOSS Next Generation Energy** **TE:** Investigation 3; Part 3 **SE:** *Morse Gets Clicking*

Grade 4

send text.	

Technology/Engineering

State Standard	NGSS FOSS Program
ETS1. Engineering Design	
4.3-5-ETS1-3. Plan and carry out tests of one or more design features of a given model or prototype in which variables are controlled and failure points are considered to identify which features need to be improved. Apply the results of tests to redesign a model or prototype. Clarification Statement: • Examples of design features can include materials, size, shape, and weight.	**FOSS Next Generation Energy** **TE:** Investigation 1; Parts 3-4 **SE:** *Series and Parallel Circuits, Science Practices, Engineering Practices, Thinking Like an Engineer, Engineering a Solar Lighting Solution* **DR:** *D-cell Orientation, Tutorial: Series and Parallel Circuits*
4.3-5-ETS1-5 (MA). Evaluate relevant design features that must be considered in building a model or prototype of a solution to a given design problem.	**FOSS Next Generation Energy** **TE:** Investigation 1; Part 4 Investigation 3; Part 3 Investigation 5; Parts 3 **SE:** *Science Practices, Engineering Practices, Thinking Like an Engineer, Engineering a Solar Lighting Solution, Morse Gets Clicking, Alternative Sources of Energy* **DR:** *Wave* **FOSS Next Generation Environments** **TE:** Investigation 1; Part 2 **SE:** Setting Up a Terrarium, Isopods

[3-5-ETS1-1, 3-5-ETS1-2, and 3-5 ETS1-4 (MA) are found in grade 3.]

Grade 5
Earth and Space Science

State Standard	NGSS FOSS Program
ESS1. Earth's Place in the Universe	
5-ESS1-1. Use observations, first hand and from various media, to argue that the Sun is a star that appears larger and brighter than other stars because it is closer to Earth. State Assessment Boundary: • Other factors that affect apparent brightness (such as stellar masses, age, or stage) are not expected in state assessments.	**FOSS Next Generation Earth and Sun** **TE:** Investigation 2; Parts 1,5 **SE:** *The Night Sky, Looking through Telescopes, Stargazing, Star Scientists, Our Galaxy* **DR:** *All about Stars, Star Maps, Stellar Motions*
5-ESS1-2. Use a model to communicate Earth's relationship to the Sun, Moon, and other stars that explain (a) why people on Earth experience day and night (b) patterns in daily changes in length and direction of shadows over a day, and (c) changes in the position of the Sun, Moon and stars at different times during a day, over a month, and over a year. Clarification Statement: • Models should illustrate that the Earth, Sun, and Moon are spheres; include orbits of the Earth around the Sun and of the Moon around Earth; and demonstrate Earth's rotation about its axis. State Assessment Boundary: • Causes of lunar phases or seasons or use of Earth's tilt are not expected in state assessment.	**FOSS Next Generation Earth and Sun** **TE:** Investigation 1; Parts 1-3 Investigation 2; Parts 1,2,3,5 **SE:** *Changing Shadows, Sunrise and Sunset, The Night Sky, Looking Through Telescopes, Changing Moon, Lunar Cycle, Eclipses, Star Gazing, Our Galaxy* **DR:** *Tutorial: Sun Tracking, Shadow Tracker, Seasons, All about the Moon, Lunar Calendar, All about Stars, Star Maps, Stellar Motions*
ESS2. Earth's Systems	
5-ESS2-1. Use a model to describe the cycling of water through a watershed through evaporation, precipitation, absorption, surface runoff, and condensation. State Assessment Boundary: • Transpiration or explanations of mechanisms that drive the cycle are not expected in state assessment.	**FOSS Next Generation Earth and Sun** **TE:** Investigation 5; Part 3 **SE:** *Where is Earth's Water, The Water Cycle* **DR:** *Water Cycle, Water -Cycle Game*
5-ESS2-2. Describe and graph the relative amounts of salt water in the ocean; freshwater in lakes, rivers, and groundwater; and freshwater frozen in glaciers and polar ice caps to provide evidence about the availability of fresh water in Earth's biosphere. State Assessment Boundary: • Inclusion of the atmosphere is not expected in state assessment.	**FOSS Next Generation Earth and Sun** **TE:** Investigation 5; Part 3 **SE:** *Where is Earth's Water, The Water Cycle* **DR:** *Water Cycle, Water -Cycle Game*
ESS3. Earth and Human Activity	
5-ESS3-1. Obtain and combine information about ways communities reduce human impact on the Earth's resources and environment by changing an agricultural, industrial, or community practice or process. Clarification Statement: • Examples of changed practices or processes include treating sewage, reducing the amounts of materials used, capturing polluting emissions from factories or power plants, and preventing runoff from agricultural activities. State Assessment Boundary: • Climate change or social science aspects of practices	**FOSS Next Generation Mixtures and Solutions** **TE:** Investigation 4; Part 4 **SE:** *East Bay Academy for Young Scientists, Drinking Ocean Water, Creative Solutions* **EA:** Science notebook entry **DR:** *The Water Cycle* **FOSS Next Generation Living Systems** **TE:** Investigation 4; Part 3 **SE:** *Monarch Migration* **DR:** *Bugs*, *Incredible Journeys: A Butterfly's Relay*

TE: Teacher Editions-Investigations Guide, Teacher Resources • **SE:** Student Edition-Science Resources Book • **DR:** Digital Resources

Grade 5

such as regulation or policy are not expected in state assessment.	**FOSS Next Generation Earth and Sun** **TE:** Investigation 5; Part 4 **SE:** *Earth's Climates, Global Climate Change* **DR:** *Climate and Seasons*
5-ESS3-2(MA). Test a simple system designed to filter particulates out of water and propose one change to the design to improve it.*	**FOSS Next Generation Mixtures and Solutions** **TE:** Investigation 3; Part 3 Investigation 4; Part 4 **SE:** *East Bay Academy for Young Scientists, Drinking Ocean Water, Creative Solutions, The Air* **DR:** *The Water Cycle,* Tutorial: Concentration, Virtual *Investigation: Saltwater Concentration*

Life Science

State Standard	NGSS FOSS Program
LS1. From Molecule to Organisms: Structures and Processes	
5-LS1-1. Ask testable questions about the process by which plants use air, water, and energy from sunlight to produce sugars and plant materials needed for growth and reproduction. State Assessment Boundary: • The chemical formula or molecular details about the process of photosynthesis are not expected in state assessment.	**FOSS Next Generation Living Systems** **TE:** Investigation 2; Part 2 **SE:** *Producers*
LS2. Ecosystems: Interactions, Energy, and Dynamics	
5-LS2-1. Develop a model to describe the movement of matter among producers, consumers, decomposers, and the air, water, and soil in the environment to (a) show that plants produce sugars and plant materials, (b) show that animals can eat plants and/or other animals for food, and (c) show that some organisms, including fungi and bacteria, break down dead organisms and recycle some materials back to the air and soil. Clarification Statement: • Emphasis is on matter moving throughout the ecosystem. State Assessment Boundary: • Molecular explanations, or distinctions among primary, secondary, and tertiary consumers, are not expected in state assessment.	**FOSS Next Generation Living Systems** **TE:** Investigation 1; Parts 2,3,4 Investigation 2; Part 2,3 Investigation 4; Part 4 **SE:** *Is Earth a System?, The Biosphere, Monterey Bay National Marine Sanctuary, Comparing Aquatic and Terrestrial Ecosystems, Nature's Recycling System, Producers, Getting Nutrients, North Atlantic Ocean Ecosystem* **DR:** *Physical Systems, Web of Life: Life in the Sea, Simulation: Food Webs, Food Chains, Marine Ecosystems*
5-LS2-2(MA). Compare at least two designs for a composter to determine which is most likely to encourage decomposition of materials.* Clarification Statement: • Measures or evidence of decomposition should be on qualitative descriptions or comparisons.	**FOSS Next Generation Living Systems** **TE:** Investigation 1; Part 4 Investigation 4, Part 4 **SE:** *Nature's Recycling System, North Atlantic Ocean Ecosystem* **DR:** *Marine Ecosystems*

Grade 5
Physical Science

State Standard	NGSS FOSS Program
PS1. Matter and Its Interactions	
5-PS1-1. Use a particle model of matter to explain common phenomena involving gases, and phase changes between gas and liquid and between liquid and solid. Clarification Statement: • Examples of common phenomena the model should be able to describe include adding air to expand a balloon, compressing air in a syringe, and evaporating water from a salt water solution. State Assessment Boundary: • Atomic-scale mechanisms of evaporation and condensation or defining unseen particles are not expected in state assessment.	**FOSS Next Generation Mixtures and Solutions** **TE:** Investigation 1; Parts 1-4 Investigation 2; Part 3 Investigation 3; Parts 1-3 **SE:** *Mixtures, Taking Mixtures Apart, Science Practices, Engineering Practices, Extracts, The Story of Salt, Solid to Liquid, Liquid and Gas Changes, Solutions Up Close, Concentrated Solutions, The Air* **DR:** *Tutorial: Mixtures, Tutorial: Solutions, Separating Mixtures, Virtual Investigation: Separating Mixtures, Elements, Compounds, and Mixtures, Changes in Properties of Matter, Tutorial: Models, Tutorial: Concentration, Virtual Investigation: Saltwater Concentration*
5-PS1-2. Measure and graph the weights (masses) of substances before and after a reaction or phase change to provide evidence that regardless of the type of change that occurs when heating, cooling, or combining substances, the total weight (mass) of matter is conserved. Clarification Statement: • Assume that reactions with any gas production are conducted in a closed system. State Assessment Boundary: • Distinguishing mass and weight is not expected in state assessment.	**FOSS Next Generation Mixtures and Solutions** **TE:** Investigation 2; Part 3 Investigation 5; Parts 1-3 **SE:** *Solid to Liquid, Liquid and Gas Changes, Ask a Chemist, When Substances Change, Air Bags* **DR:** *Changes in Properties of Matter, Tutorial: Models, Fizz Quiz, Chemical Reactions, Changes in Properties of Matter, Tutorial: Reaction or Not?*
5-PS1-3. Make observations and measurements of substances to describe characteristic properties of each, including color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility. Clarification Statements: • Emphasis is on describing how each substance has a unique set of properties. • Examples of substances could include baking soda and other powders, metals, minerals, and liquids. State Assessment Boundary: • Density, distinguishing mass and weight, or specific tests or procedures are not expected in state assessment.	**FOSS Next Generation Mixtures and Solutions** **TE:** Investigation 1; Parts 1-4 Investigation 3; Parts 1-3 Investigation 4; Parts 1-3 Investigation 5; Parts 1-3 **SE:** *Mixtures, Taking Mixtures Apart, Science Practices, Engineering Practices, Extracts, The Story of Salt, Solutions Up Close, Concentrated Solutions, The Air, A Sweet Solution, Sour Power, Ask A Chemist, When Substances Change, Air Bags* **DR:** *Tutorial: Mixtures, Tutorial: Solutions, Separating Mixtures, Virtual Investigation: Separating Mixtures, Elements, Compounds, and Mixtures, Tutorial: Concentration, Virtual Investigation: Saltwater Concentration, Tutorial: Saturation, Virtual Investigation: Solubility, Fizz Quiz, Chemical Reactions, Changes in Properties of Matter, Tutorial: Reaction or Not?*
5-PS1-4. Conduct an experiment to determine whether the mixing of two or more substances results in new substances with new properties (a chemical reaction) or not (a mixture).	**FOSS Next Generation Mixtures and Solutions** **TE:** Investigation 5; Parts 1-3 **SE:** *Ask A Chemist, When Substances Change, Air Bags* **DR:** *Fizz Quiz, Chemical Reactions, Changes in Properties of Matter, Tutorial: Reaction or Not?*
PS2. Motion and Stability: Forces and Interactions	
PS2-1. Support an argument with evidence that the gravitational force exerted by Earth on objects is directed toward Earth's center. State Assessment Boundary: • Mathematical representations of gravitational force are	**FOSS Next Generation Earth and Sun** **TE:** Investigation 2; Part 4 **SE:** *Exploring the Solar System, Planets of the Solar System, Why Doesn't Earth Fly Off into Space?* **DR:** The Planets and the Solar System

TE: Teacher Editions-Investigations Guide, Teacher Resources • **SE:** Student Edition-Science Resources Book • **DR:** Digital Resources

Grade 5

not expected in state assessment.	
PS3. Energy	
5-PS3-1. Use a model to describe that the food animals digest (a) contains energy that was once energy from the Sun, and (b) provides energy and nutrients for life processes, including body repair, growth, motion, body warmth, and reproduction. Clarification Statement: • Examples of models could include diagrams and flow charts. State Assessment Boundary: • Details of cellular respiration, ATP, or molecular details of the process of photosynthesis or respiration are not expected in state assessment.	**FOSS Next Generation Living Systems** **TE:** Investigation 1; Part 2 Investigation 2, Parts 2,3 **SE:** *Is Earth a System? , The Biosphere, Producers, Getting Nutrients* **DR:** Physical Systems, *Food Chains*

Technology/Engineering

State Standard	NGSS FOSS Program
ETS3. Technological Systems	
5.3-5-ETS3-1(MA). Use informational text to provide examples of improvements to existing technologies (innovations) and the development of new technologies (inventions). Recognize that technology is any modification of the natural or designed world done to fulfill human needs or wants.	**FOSS Next Generation Mixtures and Solutions** **TE:** Investigation 3; Parts 3,4 Investigation 4; Part 4 Investigation 5; Parts 2,3 **SE:** *Famous Scientists, Carbon Dioxide Concentration in the Air, The Frog Story, East Bay Academy for Young Scientists, Drinking Ocean Water, Creative Solutions, When Substances Change, Air Bags* **DR:** *Virtual Investigation: Saltwater Concentration, Why are Oceans Salty?, Changes in Properties of Matter* **FOSS Next Generation Earth and Sun** **TE:** Investigation 2; Parts 1,2,5 Investigation 3; Part 3 Investigation 4; Part 3,4 Investigation 5; Part 4 **SE:** *Looking Through Telescopes, Star Scientists, Apollo 11 Space Mission, Weather Instruments, Wind Power, Solar Technology, Global Climate Change* **DR:** *All About Stars, All about Meteorology, Weather Grapher, Climate and Seasons* **FOSS Next Generation Living Systems** **TE:** Investigation 3; Part 1 Investigation 4; Part 4 **SE:** *The Story of Maple Syrup. Plant Vascular Systems, North Atlantic Ocean Ecosystem* **DR:** *Plant Structure and Growth, Plant Vascular System, Marine Ecosystems*
5.3-5-ETS3-2(MA). Use sketches or drawings to show how each part of a product or device relates to other parts in the product or device.*	**FOSS Next Generation Mixtures and Solutions** **TE:** Investigation 2, Parts 1,2 **DR:** Black Box