Grade 4 Science Yearlong Curriculum Plan

Last modified: June 2018

SUMMARY

This curriculum plan provides a year-long overview of 4th grade science standards as they are taught in the 5DP. The first chart shows an overview of where standards are taught during the school year, and the second gives the full set of standards for the grade level.

Additional Resources:

Massachusetts Curriculum Frameworks: http://www.doe.mass.edu/frameworks/

GRADE 4 SCIENCE STANDARDS OVERVIEW					
SCIENCE, TECHNOLOGY & ENGINEERING STANDARDS	**B1**	**B2**	**B3**	**B4**	**B5**
Earth's Place in the Universe					
4-ESS1-1	X				
Earth's Systems					
4-ESS2-1	X				
4-ESS2-2		X			
Earth and Human Activity					
4-ESS3-1		X			
4-ESS3-2		X			
From Molecules to Organisms: Structures and Processes					
4-LS1-1					X
Energy					
4-PS3-1			X		
4-PS3-2			X		
4-PS3-3			X		
4-PS3-4			X		
Waves and their Application in Technologies for Information Transfer					
4-PS4-1				X	
4-PS4-2				X	
4-PS4-3				X	
Engineering Design and Technology Systems*					
3-5-ETS1-3		X			
3-5-ETS1-5 MA	X				

GRADE 4 SCIENCE – Block 1 (September-October)	
SCIENCE STANDARDS	
4-ESS1-1	Construct a claim with evidence that changes to a landscape due to erosion and deposition over long periods of time result in rock layers and landforms that can be interpreted today. 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.
4-ESS1-1 Mastery Checklist	1. Review simple landforms (e.g., valleys, hills, mountains, plains, and canyons). ***2-ESS2-2 - Taught in 2nd Grade*** 2. Explain different rock layers found in an area (e.g., rock layers taken from the same location show marine fossils in some layers and land fossils in other layers) indicating a change from deposition on land to deposition in water over time (e.g., canyon with rock layers and rivers). 3. Understand ordering of rock layers (e.g., layer with marine fossils is found below layer with land fossils). 4. Identify presence of particular fossils (e.g., shells, land plants) in specific rock layers.
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 by water, ice, wind, and vegetation.
4-ESS2-1 Mastery Checklist	1. Interpret the change in the relative steepness of slope of the area (e.g., no slope, slight slope, steep slope). 2. Identify the kind of weathering or erosion to which the Earth material is exposed. 3. Explain the change in the shape of Earth materials as the result of weathering (frost wedging, abrasion, and root wedging) or the rate of erosion by the motion of water, ice (melting and freezing processes), wind (speed and direction), and vegetation.
ENGINEERING DESIGN STANDARDS	
3-5-ETS1-5	Evaluate relevant design features that must be considered in building a model or prototype of a solution to a given design problem.
Stem Scopes and Other Resources	Priority Scopes: Rock Patterns and Changing Land Supplemental Scope: n/a
Suggested Learning Events	1. Exploring the different ways in which weathering occurs, what it looks like and how it happens via stations. a. Rock Bang b. Science Observation Walk 2. Exploring the different ways that erosion occurs, what it looks like and how it happens via stations. a. Water & Wind Models 3. Exploring the different ways that deposition occurs, what is looks like and how its happens via stations. a. Glacial Deposition with Ice Cubes

GRADE 4 SCIENCE – Block 2 (November-December)	
SCIENCE STANDARDS	
4-ESS2-2	Analyze and interpret maps of Earth's mountain ranges, deep ocean trenches, and the placement of volcanoes and earthquakes to describe patterns of these features and their locations relative to boundaries between continents and oceans.
4-ESS2-2 Mastery Checklist	1. Organize data using graphical displays from maps of Earth's features (e.g., locations of mountains, continental boundaries, volcanoes, earthquakes, deep ocean trenches, and ocean floor structures). a. including volcanoes and earthquakes occur in bands that are often along the boundaries between continents and oceans. b. Major mountain chains form inside continents or near their edges.
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 non renewable.
4-ESS3-1 Mastery Checklist	1. Identify how energy resources are derived from natural sources (renewable and non renewable). 2. Understand how they address human energy needs (renewable and non renewable). 3. Consider the positive and negative environmental effects of using each energy resource (renewable and non renewable). 4. Provide evidence in the role of technology in improving or mediating the environmental effects of using a given resource.
4-ESS3-2	Evaluate the design of a solution on its potential to reduce the impacts of an earthquake, flood, tsunami or volcanic eruption on humans.
4-ESS3-1 Mastery Checklist	1. Create and compare solutions for natural Earth process (e.g., earthquake restraint, improved monitoring of volcanic activity).
ENGINEERING DESIGN AND TECHNOLOGICAL SYSTEMS STANDARDS	
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.*
Stem Scopes and Other Resources	Priority Scopes: Plate Tectonics. Resources, and Natural Processes Supplemental Scope: n/a
Suggested Learning Events	1. Exploring different types of tectonic plate boundaries via stations. a. Graham Cracker Lab (Transform, Convergent and Divergent Boundaries). 2. Identifying where volcanic eruptions, earthquakes and tsunami occur based on fault lines/tectonic boundaries

	a. Exploring maps with tectonic outlines, volcanoes, mountain ranges, earthquakes identified and drawing conclusions. 3. Design and create a structure that can withstand the effects of an earthquake a. Earthquake resistant houses - Engineering Design Challenge 4. When given a natural Earth process that can have a negative effect on humans (e.g., an earthquake, volcano, flood, or landslide), students can use scientific information about that Earth process and its effects to design at least two solutions that reduce its effect on humans.

GRADE 4 SCIENCE – Block 3 (January-February)	
SCIENCE STANDARDS	
4-PS3-1	Use evidence to construct an explanation relating the speed of an object to the energy of that object.
4-PS3-1 Mastery Checklist	1. Analyze kinetic vs. potential energy. 2. Determine the indicators of the amount of energy of an object as determined from a transfer of energy (e.g., more or less sound produced in a collision, more or less heat produced when objects rub together, relative speed of a ball that was stationary following a collision with a moving object, more or less distance a stationary object is moved).
4-PS3-2	Make observations to show that energy can be transferred from place to place by sound, light, heat, and electric currents.
4-PS3-2 Mastery Checklist	1. Provide evidence to explain how energy can be transferred from place to place by moving objects, sound, light, heat, and electrical currents. 2. Understand and explain the transfer of energy in the collision between objects, light traveling from one place to another, electric currents producing motion, sound, heat, or light, sound traveling from one place to another, and heat passing from one object to another. 3. Observe the different types of energy (heat, sound, motion, and light) caused after an interaction (collision, object slowing down or speeding up, sound or heat causing motion, and electrical current).
4-PS3-3	Ask questions and predict outcomes about the changes in energy that occur when objects collide.
4-PS3-3 Mastery Checklist	1. Interpret the mechanism of energy transfer during a collision. 2. Understand the transfer of energy by contact forces between two colliding objects that results in a change in the motion of the objects.
4-PS3-4	Apply scientific principles of energy and motion to test and refine a device that converts motion energy to electrical energy or uses stored energy to cause motion or produce light or sound.
4-PS3-4 Mastery Checklist	1. Specify the initial and final forms of energy. 2. Identify the device by which the the energy will be transformed (e.g., a light bulb to convert electrical energy into light energy, a motor to convert electrical energy into energy of motion).
Stem Scopes and Other Resources	Priority Scopes: Energy and Speed, Transfer of Energy in Collision Supplemental Scope: Chemical Processes

Suggested Learning Events	1. Determine the speed of an object (how fast or how slow) and observe how energy is lost during a collision (sound/heat) a. Simulation of objects moving and what happens when objects move on different surfaces, have different weights, etc. 2. Observe the results of a collision (Directionality of objects, how different speeds produce different results). a. Simulation of collisions 3. Observe transfer of energy via light, sound, heat and electricity. a. Stations include tin can/paper cup sound transfer of energy, shadows and light transfer of energy, rubbing hands/creating friction to transfer heat, etc. 4. Design, test and regine a device that converts energy a. Testing an electrical circuit and making changes to correct the circuit

GRADE 4 SCIENCE – Block 5 (March - April)	
SCIENCE STANDARDS	
4-PS4-1	Develop a model of a simple wave to communicate that waves: a. are regular patterns of motion along which energy travels, and b. can differ in amplitude and wavelength.
4-PS4-1 Mastery Checklist	1. Develop a model (diagrams, analogies, and physical models) to show relevant components of waves, wave amplitude, wavelength, and motion of objects. 2. Identify and describe how a model shows waves in terms of patterns of repeating amplitude and wavelength. 3. Understand that waves can cause an object to move. 4. Explain how the motion of objects varies with the amplitude and wavelength of the wave carrying it.
4-PS4-2	Develop a model to describe that light must bounce off an object and enter the eye for the object to be seen.
4-PS4-2 Mastery Checklist	1. Create a model to show the relationship between light reflection and visibility of objects including light, objects, the path it follows, and the eye. 2. Identify and describe relationships between light entering the eye, light reflecting off of objects and then to the eye, and how objects can be seen only if the light follows a path between a light source, the object, and the eye. 3. Understand that in order to see objects that do not produce their own light, light must reflect off the object and into the eye (e.g., removing, blocking, or changing the light source, closing the eye, and changing the path of the light).
4-PS4-3	Develop and compare multiple ways to transfer information through encoding, sending, receiving, and decoding a pattern.
4-PS4-3 Mastery Checklist	1. Describe how patterns are used transmit information. 2. Identify ways that high-tech devices convert and transmit information 3. Interpret the accuracy and restraints of transmitting information including distance information is being transmitted, safety considerations, and materials available.
Stem Scopes and Other Resources	Priority Scopes: Motion of Waves, Light Reflection Supplemental Scope: Information Technology
Suggested Learning Events	1. Observing of water (Beach, kiddie pool, etc.) or simulations of water moving (Electronically) to view and understand: ○ Patterns of motion ○ Objects can be moved by water ○ Ways in which amplitude and wavelength can change 2. Observation of light moving from one place to another ○ Light boxes, experimenting with flashlights and varying degrees of light (Connects to 1-PS4-3 - Taught in 1st Grade). 3. Demonstrate and explain how technology converts and transmits information from one place to another. ○ Coding messages using binary code (Practicing encoding & decoding messages mirroring what technology does when they send/receive messages).

	○ Other types of codes include: Morse code, Navajo, Braille, and Semaphore Flags

GRADE 4 SCIENCE – Block 5 (May - June)	
SCIENCE STANDARDS	
4-LS1-1	Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction.
4-LS1-1 Mastery Checklist	1. Identify the internal and external parts of plants and their primary functions, including leaves, roots, stems, bark, branches, flowers, fruit, and seeds. 2. Identify the internal and external parts of animals and their primary functions, including legs, wings, fins, feathers, trunks, claws, horns, antennae, eyes, ears, nose, heart, stomach, lung, brain, and skin. 3. Explain how plant and animal structures support survival, growth, behavior, and/or reproduction. 4. Understand internal and external structures serve specific functions to support survival, growth, behavior, and/or reproduction (e.g., heart pumps blood to the body which allows access to oxygen and nutrients, and thorns discourage predators which allows the plant to grow and reproduce). 5. Explain how different structures work together as part of a system to support survival, growth, behavior, and/or reproduction.
Stem Scopes and Other Resources	Priority Scopes: Plant and Animal Parts Supplemental Scope: n/a
Suggested Learning Events	1. Exploring Animal Stations -- Identifying the physical structures of animals and recording via pictures & words how those structures impact animal life. 2. Exploring Animals by habitat -- Identifying and exploring the physical structures of animals in various habitats and taking notes via pictures and words on how those structures impact survival, reproduction, growth and behavior. 3. Exploring Plants by habitat -- Identifying and exploring the physical structures of animals in various habitats and taking notes via pictures and words on how those structures impact survival, reproduction, growth and behavior. 4. Research and Present Findings to your class via PPT, Presentation Poster, etc.

