Vocabulary

Boulder
Changes in the Earth's surface
Clay
Coal
Constructed environment
Crude oil
Earth materials
Earthquake
Erosion
Forests
Freshwater
Fuels
Garbage
Glacier
Gravel
Habitat destruction
Harmful changes
Hlepful chance
Ice
Land management
Landslide
Metal (s)
Mineral
Natural environment
Natural gas
Natural resources
Non-renewable resources
Oil
Recycle
Reduce
Renewal
Renewable resources
Reuse
Rock
Rock breakage
Sand
soil
Soil color
Soil texture
Volcanic eruptions
Water
Weathered rock
Weathering
Wind

Crosscutting Concepts

4-ESS1-1	4-ESS2-1	4-ESS2-2	4-ESS3-1	4-ESS3-2
Patterns	**Cause and Effect**	**Patterns**	**Cause and Effect**	**Cause and Effect**
Patterns can be used as evidence to support an explanaton.	Cause and effect relationships are routinely identified, tested, and used to explain change.	Patterns can be used as evidence to support an explanaton.	Cause and effect relationships are routinely identified and used to explain change.	Cause and effect relationships are routinely identified, tested, and used to explain change.

Resources *

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Superintendent

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Deputy Superintendent

Mara Lud
Executive Director of Instructional Learning

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Fourth Grade • First Quarter

Pacing Guide

Science

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Grade 4 Science First Quarter

Earth's Place 4-ESS1-1	Earth's System 4-ESS2-1	Earth's System 4-ESS2-2	Earth and Humans 4-ESS3-1	Earth and Humans 4-ESS3-2
I CAN STATEMENT				
☐ **I CAN** explain land changes over time using evidence from rock layers and fossils.	☐ **I CAN** explain 'weathering' and 'erosion'. ☐ **I CAN** identify some causes of 'weathering' and 'erosion' ☐ **I CAN** describe how water, ice, wind and vegetation can change the land. ☐ **I CAN** make observations and/or measurements to prvide evidence of weathering and erosion.	☐ **I CAN** analyze and interpret data from a variety of maps to describe patterns of Earth's features.	☐ **I CAN** collect information to describe where energy and fuels come from. ☐ **I CAN** identify natural resources as renewable or non-renewable. ☐ **I CAN** explain how energy being gathered and used can affect the environment.	☐ **I CAN** identify and compare multiple ways to reduce the impacts of natural Earth processes (earthquakes, floods, tsunamis, and volcanic eruptions) on humans.
Core Idea				
The History of Planet Earth Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed.	**Earth Materials and Systems** Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. **Biogeology** Living things affect the physical characteristics of their regions.	**Plate Tectonics and Large-Scale System Interactions** The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth.	**Natural Resources** 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.	**Natural Hazards** A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts.
Standard				
Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. *Clarification Statement: Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and, a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.*	**Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.** *Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.*	**Analyze and interpret data from maps to describe patterns of Earth's features.** *Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.*	**Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment**. *Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.*	**Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.** *Clarification Statement: Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.*
Science and Engineering Practices				
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 3– 5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. ► Identify the evidence that supports particular points in an explanation.	**Planning and Carrying Out Investigations** Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. ► Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.	**Analyzing and Interpreting Data** Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. ► Analyze and interpret data to make sense of phenomena using logical reasoning.	**Obtaining, Evaluating, and Communicating Information** Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluate the merit and accuracy of ideas and methods. ► Obtain and combine information from books and other reliable media to explain phenomena.	**Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. ► Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.

Vocabulary

appliance
attract
battery
bulb
Celsius
closed circuit
compass
conductor
decrease
device
electric current
electricity
energy
energy transfer
evident
Fahrenheit
friction
generator
heat
increase
iron filings
lines of force
magnet
magnetic field
magnetic poles
open circuit
power source
repel
simple circuit
substance
temperature
thermometer
wire
conduct
conduction
resistance
electromagnet
three dimensional

Crosscutting Concepts

4-PS3-1 4-PS3-2 4-PS3-3 4-PS3-4

Energy and Matter

Energy can be transferred in various ways and between objects.

Resources *

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Fourth Grade • Second Quarter

Pacing Guide

Science

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Grade 4 Science Second Quarter

Physical Science - Energy 4-PS3-1	Physical Science - Energy 4-PS3-2	Physical Science - Energy 4-PS3-3	Physical Science - Energy 4-PS3-4
I CAN STATEMENT			
☐ **I CAN** use evidence to explain the relationship between the speed (movement) of an object and the energy of that object.	☐ **I CAN** make observations and provide evidence to explain how energy can be transferred from place to place.	☐ **I CAN** predict the outcomes of the changes in energy that occurs when objects collide.	☐ **I CAN** apply scientific ideas to design, test, and refine a device that converts energy (electric, motion, light, sound, heat) from one form to another.
Core Idea			
Definitions of Energy The faster a given object is moving, the more energy it possesses.	**Definitions of Energy** Energy can be moved from place to place by moving objects or through sound, light, or electric currents. Light also transfers energy from place to place. Energy can also be transferred from place to place by electric currents,which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy.	**Definitions of Energy** Energy can be moved from place to place by moving objects or through sound, light, or electric currents. Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced.	**Conservation of Energy and Energy Transfer** Energy can also be transferred from place to place by electric currents,which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. The expression “produce energy” typically refers to the conversion of stored energy into a desired form for practical use.
Standard			
Use evidence to construct an explanation relating the speed of an object to the energy of that object.	**Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.**	**Ask questions and predict outcomes about the changes in energy that occur when objects collide.** *Clarification Statement:* *Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.*	**Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.** *Clarification Statement: Examples of devices could include electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound; and, a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device.*
Science and Engineering Practices			
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. ► Use evidence (e.g., measurements, observations, patterns) to construct an explanation.	**Planning and Carrying Out Investigations** Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K– 2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. ► Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.	**Asking Questions and Defining Problems** Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. ► Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.	**Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. ► Apply scientific ideas to solve design problems.

Vocabulary

wave
wavelength
amplitude
sound
Morse code
patterns of motion
surfact

Crosscutting Concepts

4-PS4-1

Patterns

Similarities and differences in patterns can be used to sort and classify natural phenomena.

4-PS4-2

Cause and Effect

Cause and effect relationships are routinely identified.

4-PS4-3

Patterns

Similarities and differences in patterns can be used to sort and classify designed products.

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Fourth Grade • Third Quarter Pacing Guide

Science

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Grade 4 Science Third Quarter

Waves and Their Applications in Technologies for Information Transfer 4-PS4-1	Waves and Their Applications in Technologies for Information Transfer 4-PS4-3	Notes
I CAN STATEMENT		
☐ **I CAN** explain amplitude and wavelength as they relate to waves. ☐ **I CAN** develop a model to describe patterns in terms of amplitude and wavelength. ☐ **I CAN** explain what aves are and some things waves can do.	☐ **I CAN** generate and compare at least two differnt ways that use patterns to send information. ☐ **I CAN** determine which pattern or code is the best way to send information.	
Core Idea		
Wave Properties Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach. Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks).	**Information Technologies and Instrumentation** Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa.	
Standard		
Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. *Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.*	**Generate and compare multiple solutions that use patterns to transfer information.** *Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.*	
Science and Engineering Practices		
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. ► Develop a model using an analogy, example, or abstract representation to describe a scientific principle.	**Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. ► Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.	

Vocabulary

air	Celsius	habitat	animal adaptations
animal features	thermometer	herbivoe	pedator
color	centimeter	living organism	camouflage
plant	support	omnivore	mimicry
backbone/no backbone	movement	pollinators	protective
environment	food getting	skeleton	adaptations
minerals	protection	exoskeleton	mammal
organism	structure	crustacean	fish
plant root	function	evergreens	bird
flowers	physical characteristics	broad-leafed plants	amphibians
stem	compare	woody stems	reptile
leaf	classify	tap root	insect
survival of organisms	lense	branching root	worm
temperature	eye	plant adaptations	

Crosscutting Concepts

4-PS4-2

Cause and Effect

Cause and effect relationships are routinely identified.

4-LS1-1 and 4-LS1-2

Systems and System Models

A system can be described in terms of its components and their interactions.

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Fourth Grade • Fourth Quarter

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Grade 4 Science Fourth Quarter

Waves and their Applications in Technologies for Information Transfer 4-PS4-2	From Molecules to Organisms: Structures and Processes 4-LS1-1	From Molecules to Organisms: Structures and Processes 4-LS1-2	Notes
I CAN STATEMENT			
☐ **I CAN** develop a model to show how the eye allows objects to be seen.	☐ **I CAN** identify and describe some external and internal structures of plants that help them to survive, grow and reproduce. ☐ **I CAN** identify and describe some external and internal structures of animals that help them to survive, grow and reproduce.	☐ **I CAN** use a model to explain how animals receive information through their senses, process the information in their brains and respond to the information in different ways.	
Core Idea			
Electromagnetic Radiation An object can be seen when light reflected from its surface enters the eyes.	**Structure and Function** Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.	**Information Processing** Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions.	
Standard			
Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.	**Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.** *Clarification Statement:* *Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.*	**Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.** *Clarification Statement:* *Emphasis is on systems of information transfer.*	
Science and Engineering Practices			
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. ► Develop a model to describe phenomena.	**Engaging in Argument from Evidence** Engaging in argument from evidence in 3-5 builds on K-2 experiences and progresses to critiquing the scientificec explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world (s). ► Construct an argument with evidence, data, and and/or a model.	**Developing and Using Models** Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. ► Use a model to test interactions concerning the functioning of a natural system.	