Fourth Grade Science

Essential Standards Extended Guide

FOURTH GRADE SCIENCE

Background information about this document:

In response to requests from schools and districts for guidance on essential standards, committees of educators from around Idaho collaborated in the summer of 2024 to categorize science standards into three groups:

- **Essential standards** are explicitly taught, assessed multiple times, and receive targeted interventions for students who have not yet reached proficiency.
- **Supporting standards** are taught to reinforce essential standards and may or may not be formally assessed.
- **Additional standards** extend learning and are incorporated as time allows within course units, with assessment being optional.

This guidance helps LEAs prioritize the most critical standards, recognizing that not all standards are of equal importance. This document serves as a resource—not a mandate—to assist local efforts. Importantly, this work did not remove or revise any of the adopted Idaho Content Standards and is intended to refocus time and effort.

Physical Science

Essential Standards **Standards are to be explicitly taught, assessed more than once, and intervened upon in this cluster of standards.**	Supporting Standards and Content **Taught to support the learning of essential standards and may or may not be formally assessed.**
4-PS-1.2 Make observations to provide evidence that energy can be transferred by heat, sound, light, and electric currents.	The faster a given object is moving, the more energy it possesses. (4-PS-1.1)
4-PS-1.3 Ask questions and predict outcomes about the changes in energy that occur when objects collide.	Energy can be moved from place to place by moving objects or through heat, sound, light, or electric currents. (4-PS-1.2, 4-PS-1.3) 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. (4-PS-1.2, 4-PS-1.3) When objects collide, the contact forces transfer energy so as to change the objects' motions. (4-PS-1.3)
4-PS-1.4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.	Energy can 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 by transforming the energy of motion into electrical energy. (4-PS-1.2, 4-PS-1.4) The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS-1.4) Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (4-PS-1.4)
4-PS-2.1 Develop a model of a simple mechanical wave to describe patterns of amplitude and wavelength and that waves can cause objects to move.	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;

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	there is no net motion in the direction of the wave except when the water meets a beach. (4- PS-2.1) Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS-2.1)
4-PS-2.2 Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.	An object can be seen when light reflected from its surface enters the eyes. (4-PS-2.2)
	Supporting Standard: 4-PS-1.1 Use evidence to construct an explanation relating the speed of an object to the energy of that object.

Additional standard Extend learning and are incorporated as time allows within course units, with assessment being optional.
4-PS-2.3 Generate and compare multiple solutions that use patterns to transfer information.

Further explanation:

1. Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.
2. 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.
3. Examples of models could include diagrams, analogies, and physical models using wire to illustrate wavelength and amplitude of waves.

Assessment limits:

1. Assessment does not include quantitative measurements of energy.
2. Devices should be limited to those that convert motion energy to electric energy or use stored energy to cause motion or produce light or sound.
3. Assessment does not include interference effects, electromagnetic waves, nonperiodic waves, or quantitative models of amplitude and wavelength.
4. Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.

Life Science

Essential Standards **Standards are to be explicitly taught, assessed more than once, and intervened upon in this cluster of standards.**	Supporting Standards and Content **Taught to support the learning of essential standards and may or may not be formally assessed.**
4-LS-1.2 Use a model to describe how animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.	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. (4-LS-1.2)
	Supporting Standards: 4-LS-1.1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Further explanation:

1. Emphasis is on systems of information transfer.

Assessment Limit:

1. Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.

Earth and Space Science

Essential Standards Standards are to be explicitly taught, assessed more than once, and intervened upon in this cluster of standards.	Supporting Standards and Content Taught to support the learning of essential standards and may or may not be formally assessed.
4-ESS-1.1 Identify evidence from patterns in rock formations and fossils in rock layers for changes in a landscape over time to support an explanation for changes in a landscape over time.	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. (4-ESS-1.1) There are three classifications of rocks produced within the rock cycle: sedimentary, metamorphic, and igneous. (4-ESS-1.1)
4-ESS-2.1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.	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. (4-ESS-2.1) Living things affect the physical characteristics of their regions. Examples could include a beaver constructing a dam to create a pond or tree roots breaking a rock. (4-ESS-2.1)
4-ESS-2.2 Analyze and interpret data from maps to describe patterns of Earth's features.	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 in different areas of Earth. (4-ESS-2.2)
4-ESS-3.1 Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.	Energy and fuels that are modified from natural sources affect the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS-3.1)

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4-ESS-3.2 Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.	A variety of hazards result from natural processes (e.g., earthquakes, floods, tsunamis, volcanic eruptions). Hazards cannot be eliminated, but their impacts can be reduced. (4-ESS3.2) Testing a solution involves investigating how well it performs under a range of likely conditions. (4-ESS-3.2)

Further explanation:

1. 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.
2. 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.
3. 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.
4. Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable energy resources are fossil fuels and atomic energy. Examples of environmental effects could include biological effects from moving parts, erosion, change of habitat, and pollution.
5. Examples of solutions could include designing an earthquake-resistant building and improving monitoring of volcanic activity.

Assessment Limit:

1. Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.
2. Assessment is limited to a single form of weathering or erosion
3. Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.

For Questions Contact
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