

# Next Generation Science Standards

## 4<sup>th</sup> Grade

<p style="text-align: center;"><b>EARTH SCIENCE</b></p> <p style="text-align: center;"><b><u>Earth's Systems: Processes that Shape the Earth</u></b></p> <p style="text-align: center;">4-ESS1 Earth's Place in the Universe 4-ESS2 Earth's Systems 4-ESS3 Earth and Human Activity</p>	<p style="text-align: center;"><b>LIFE SCIENCE</b></p> <p style="text-align: center;"><b><u>Structure, Function and Information Processing</u></b></p> <p style="text-align: center;">4-PS4 Waves and their Applications in Technologies for Information Transfer 4-LS1 From Molecules to Organisms: Structures and Processes</p>	<p style="text-align: center;"><b>PHYSICAL SCIENCE</b></p> <p style="text-align: center;"><b><u>Energy</u></b></p> <p style="text-align: center;">4-PS3 Energy 4-ESS3 Earth and Human Activity</p>
<p><b>4-ESS1-1.</b> Identify evidence from <b>patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.</b> <i>[i.e. Rock layers with marine shells above rock layers without shells shows change from land to water over time. Or a canyon with different layers in walls and river at the bottom shows that the river cut through rock over time. Does not include specific knowledge of mechanism of rock formation or names of specific rock formations and layers.]</i></p> <p><b>4-ESS2-1.</b> Make observations and/or measurements to provide evidence of <b>the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.</b> <i>[i.e. Test erosion/weathering effect of variables like: angle of slope, amount of vegetative cover, wind speed, cycles of freezing and thawing. Test effect of speed and volume of water flow on deposition. Assess variables one at a time.]</i></p> <p><b>4-ESS2-2.</b> Analyze and interpret data from <b>maps to describe patterns of Earth's features.</b> <i>[i.e. Study topographic maps of Earth's land and ocean floor to observe patterns of mountains, continents, volcanoes, and earthquakes.]</i></p> <p><i>Continued Next Page</i></p>	<p><b>4-PS4-2.</b> Develop a model to describe that <b>light reflecting from objects and entering the eye allows objects to be seen.</b> <i>[Does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works. Note: could study how light bounces off mirrored surface in straight lines, various optical illusions like upside-down reflections in concave surface]</i></p> <p><b>4-LS1-1.</b> Construct an argument <b>that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.</b> <i>[i.e. Study of thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin. Focus on macroscopic structures with specific functions in associated systems.]</i></p> <p><b>4-LS1-2.</b> Use a model to describe that <b>animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.</b> <i>[i.e. Focus on systems of information transfer like eye to optical nerves to spinal cord to brain; ear structures or bone conduction to nerves to spinal cord/ brain; touch and heat/cold receptors in skin/nerves/spinal cord/brain. Includes structures that allow animals to respond to information.]</i></p> <p><i>Continued Next Page</i></p>	<p><b>4-PS3-1.</b> Use evidence to construct an explanation <b>relating the speed of an object to the energy of that object.</b> <i>[i.e. Observe change of shape on impact or other collision results. Does not include quantitative measures of speed. Note: notice energy used to start, stop, change movement of slow and fast objects.]</i></p> <p><b>4-PS3-2.</b> Make observations to provide evidence that <b>energy can be transferred from place to place by sound, light, heat, and electric currents.</b> <i>[Note: Related to sound wave and hearing in LS unit. Can also observe sun energy transfer by sunlight warming surface of earth, conduction or convection, and working circuits.]</i></p> <p><b>4-PS3-3.</b> Ask questions and predict outcomes about the <b>changes in energy that occur when objects collide.</b> <i>[Focus is on change in energy, not on the forces, as objects interact. Note: idea of energy transfer can be related to first standard in unit by predicting whether fast or slow object can knock over more weight.]</i></p> <p><i>Continued Next Page</i></p>

<p><b>4-ESS3-2.</b> Generate and compare <b>multiple solutions to reduce the impacts of natural Earth processes on humans.</b>  <i>[i.e. Design an earthquake resistant building, or a device to monitor volcanic activity or a system to provide warning or protection from potential floods or tsunamis.]</i></p>	<p style="text-align: center;"><b><u>Waves and Information</u></b>  <i>[Related to Life and Physical Strands]</i></p> <p><b>4-PS4</b> <i>Waves and their Applications in Technologies for Information Transfer</i></p> <p><b>4-PS4-1.</b> Develop a model of <b>waves</b> to describe <b>patterns in terms of amplitude and wavelength</b> and that <b>waves can cause objects to move.</b>  <i>[i.e. Create diagrams or physical models that show how waves vary in terms of amplitude and wavelength. Does not include quantitative models or interference effects. Note: Can be related to hearing and waves in air moving eardrum]</i></p> <p><b>4-PS4-3.</b> Generate and compare multiple <b>solutions that use patterns to transfer information.</b>  <i>[i.e. drums sending coded messages through sound waves, using grid of 0's and 1's representing black and white to send information about a picture, using Morse code to send text]</i></p>	<p><b>4-PS3-4.</b> Apply scientific ideas to design, test, and refine a <b>device that converts energy from one form to another.</b>  <i>[i.e. Electric circuits that convert electrical energy into motion energy of a vehicle, or light, or sound; or a passive solar heater that converts light into heat; or a device to convert motion into electric energy. Use design constraints like materials, cost, or time.]</i></p> <p><b>4-ESS3-1.</b> Obtain and combine information to describe that <b>energy and fuels are derived from natural resources and their uses affect the environment.</b>  <i>[i.e. Wind energy, water behind dams, sunlight, and non-renewable fuels like coal, oil and wood that store sun's energy in chemical compounds, and fissile materials that can produce nuclear energy. Environmental impacts include loss of habitat from mining/logging or power plant construction or reservoirs, release of chemicals or radioactive materials to air, water, or soils.]</i></p>
<p><b>NGSS Engineering - 3-5-ETS1 Engineering Design</b></p>		
<p><b>3-5-ETS1-1.</b> Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.  <b>3-5-ETS1-2.</b> Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.  <b>3-5-ETS1-3.</b> Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.</p>		