Gather Reason Communicate

4th Grade GRC Lessons by Standard

tCSSS Guidance Document for Investigation Beyond the Classroom

Link to GRC Professional Development

New Book - Using Science Investigation to Motivate Students to Read, Write, and Engage in Discourse

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4th Grade GRC Lessons by Discipline and Standard

Standard	Link to Lesson	State	Lesson Topic	Phenomenon	GRC/5E	Lesson Notes
Life Science (LS) - From Molecules to Organisms						
4-LS1-1 *Plants and animals have internal and external structures that function to help them survive*	Falling Seeds Gone with the Wind	UT	Structure & Function 	***Phenomenon:*** *Cottonwood trees have white, fluffy cotton-like seeds spread in the spring, maple trees have helicopter-like seed structures, locust trees have bean pod seeds, and both spread in the fall.*	GRC PIP	A good investigation for the fall when seeds are available. Some seeds will need to be collected in the spring. *Includes formative assessment*
4-LS1-1 *Plants and animals have internal and external structures that function to help them survive*	You're so Vein	HI	Structure and Function 	***Phenomenon:*** *Leaves have veins you can see and feel.*	GRC PIP	This investigation does a good job of teaching structure and function and using patterns. *Includes formative assessment*
4-LS1-1 *Plants and animals have internal and external structures that function to help them survive*	Turning a New Leaf	HI	Structure and Function 	*Phenomenon: Leaves are darker green on one side and lighter green on the other side.*	GRC Engage Explore Explain	The investigation is a bit advanced for 4th Grade. *Includes formative assessment*
4-LS1-1* *Plants and animals have internal and external structures that function to help them survive*	Sticky Suckers	HI	Structure and Function 	*Phenomenon: An Octopus can climb up the side of a glass aquarium.*	GRC Engage Explore Explain	This investigation is fun and has good readings. *Includes formative assessment*

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4-LS1-1 *Plants and animals have internal and external structures that function to help them survive.*	Blades of Grass	HI GA	Structure and Function 	*Phenomenon – A blade of grass is green on the top and white or light green at the base.*	GRC	The investigation emphasizes internal and external plant structures. *Includes formative assessment*
4-LS1-1 *Plants and animals have internal and external structures that function to help them survive.*	Grass Roots	PA	Structure and Function 	***Phenomenon –*** *Individual grassroots are intertwined with other grass plants.*	GRC PIP	The investigation can lead to adaptation and Natural Selection *Includes formative assessment*
4-LS1-1 *Plants and animals have internal and external structures that function to help them survive.*	Turtles and Tortoises Happy Together	HI	Adaptation, as well as Structure and Function 	***Phenomenon:*** *Sea turtles have fins, desert tortoises have legs, and painted turtles have webbed feet with claws.*	GRC and 5E	This investigation is a useful way to help students connect structure and function to adaptations. *Includes formative assessment*
4-LS1-1 *Plants and animals have internal and external structures that function to help them survive.*	Bird Songs	UT	Structures to support behaviors that help animals live	***Phenomenon:*** *Different types of birds sing different songs.*	GRC PIP	This investigation is a fun way to connect the birds' sounds to the structure. It can be adapted for standard 4-LS1-2 *Including formative assessment*
4-LS1-1 *Plants and animals have internal and external structures that function to help them survive.*	Cactus Spines	AZ	Structure of Cacti 	***Phenomenon:*** Cacti have sharp needles that hurt when you touch them.	GRC PIP	Good structure and function lessons. Multiple readings. *Includes formative assessment*
4-LS1-1 *Plants and animals have internal and external structures that function to help them survive.'*	Birds and Bears	AZ	Structure to Live 	***Phenomenon:*** *Birds and bears pick up things in different ways.*	GRC PIP	Good structure and function lessons. Multiple readings. *Includes formative assessment*

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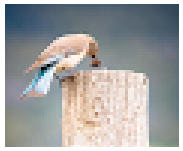
4-LS1-2 *Animals receive different types of information through their senses, process the information, and respond.*	Flying Fish	HI	Structure and Function 	***Phenomenon**: Some fish can fly over the ocean for up to 650 feet.*	GRC PIP	The investigation engages students in building models of gliding fish. *Includes formative assessment*
4-LS1-2 *Animals receive different types of information through their senses, process the information, and respond.*	Katydids	UT	 Mimicry	***Phenomenon**: Katydids have the same color and shape as leaves on a tree.*	GRC PIP	The investigation uses a simulation. *Includes formative assessment*
4-LS1-2 *Animals receive different types of information through their senses, process the information, and respond.*	Plants: Touch Me Not	UT	Plant Structure and Function	***Phenomenon:** When you touch a Mimosa plant, the leaves fold up and droop.*	GRC PIP	The lesson uses video to introduce the phenomenon. Access to a Mimosa plant improves investigation. Good Reading *Includes formative assessment*
4-LS1-2 *Animals receive different types of information through their senses, process the data, and respond.*	Sweet and Sour	HI	Structures and Processing Information	***Phenomenon:** When children taste sweet candy, their faces look different from when they taste sour candy.*	GRC PIP	This investigation engages students in models of the body systems. *Includes formative assessment*
4-LS1-2 *Animals receive different types of information through their senses, process the data, and respond.*	Which do Ants Choose?	HI	Response to Stimulus 	***Phenomenon**: When ants encounter different foods, they are attracted to the sweeter food.*	GRC PIP	This investigation is best done outside. Ants are everywhere in the fall and spring. *Includes formative assessment*
4-LS1-2 *Animals receive different types of information through their senses, process the information, and respond.*	Bird Brain	UT	Birds Behavior 	***Phenomenon:** More birds are at the bird feeder when I put birdseed there than when I put sand.*	GRC PIP	This investigation engages students in observing bird behavior. *Includes formative assessment*

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4-LS1-2 *Animals receive different types of information through their senses, process the information, and respond.*	Humpback Whale Song	HI	Response to Stimulus 	***Phenomenon**: Whales sing different songs.*	GRC	The investigation focuses on models. *Includes formative assessment*
4-LS1-2 *Animals receive different types of information through their senses, process the information, and respond.*	Where Pill Bugs Hide	HI	Structure and Function and Response to Light 	***Phenomenon:** I often find pill bugs when I look under rocks, pieces of wood, and leaves.*	GRC	The investigation needs pillbugs, so do it in the early Fall. *Includes formative assessment*
Performance Tasks Summative Assessment of Learning	**Performance Tasks for 4-LS1-1** 1. 4-LS1-1 Grass is Made for Grazing			**Performance Tasks for 4-LS2-1** 2. 4-LS1-2 My Dog and Cat		
These summative performance tasks are new. We would appreciate your feedback and suggestions about improving the ones you use. BrettDMoulding@gmail.com						
Earth and Space Science (ESS) - Earth's Place in the Universe, Earth's Systems, Earth and Human Activity						
4-ESS1-1 *Patterns in rock formations and fossils in rock layers provide evidence of changes over time.*	Ogden Canyon	UT	 Rock Layers	***Phenomenon:** In Ogden Canyon, there are different colors in the rock layers.*	GRC PIP	

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4-ESS1-1 *Patterns in rock formations and fossils in rock layers provide evidence of changes over time.*	Changing the ʻAina	HI	Evidence from lava layering and age 	***Phenomenon**: You can see layers in the lava when you drive by Makapuu.*	GRC	The investigation looks at how the age of layers of lava is determined. *Includes formative assessment* **Hawaii's culture and place**
4-ESS1-1 *Patterns in rock formations and fossils in rock layers provide evidence of changes over time.*	Rotten Apples Do Not Make Good Fossils	UT	Fossil Formation and Fossils as Evidence of Geologic Change 	***Phenomenon:** An apple core turns brown if left out for a while.* ***Phenomenon:** The types of fossils in rock layers are different and were formed in different ways.* ***Phenomenon:** We saw fossils of sea animals in rocks found in Utah.*	GRC PIP Two lessons in this link	The investigation addresses why most organisms that die do not leave fossils, and sea organism fossils can be found in deserts. *Includes formative assessment*
4-ESS1-1 *Patterns in rock formations and fossils in rock layers provide evidence of changes over time.*	Environmental Changes Lake Bonneville	UT	Rock Layers	***Phenomenon:** The rock formations at the mouth of Ogden Canyon are different than the rocks in other parts of the canyon.*	GRC PIP	The investigation is focused on the Ogden River and Lake Bonneville but could use any dry lake. *Includes formative assessment*
4-ESS2-1 *Rate of weathering and erosion* ##	Niagara Falls Rocks-On	NY		***Phenomenon:** The shape of Niagara Falls has changed over time.*	GRC	Students construct a model to show how Niagara Falls changes over time. *Includes formative assessment*
4-ESS2-1 *Rate of weathering and erosion*	Rocking in the Streets	UT	Weathering and Erosion 	***Phenomenon:** After a rainstorm in St. George, Utah, the streets have red sand on them; however, in Cedar City, Utah, the streets are a tan color.*	GRC	The lesson was designed for Cedar City and St. George but can be adapted for the local parent rocks. *Includes formative assessment*

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4-ESS2-1 *Rate of weathering and erosion*	Maine Rocks, California Rolls	UT	Weathering and Erosion 	***Phenomenon**: Some cliffs on the coast of California are washing into the ocean, while on the coast of Maine, cliffs are not washing away.*	GRC Engage Explore Explain	The investigation helps students understand weathering and erosion processes. *Includes formative assessment*
4-ESS2-1 *Rate of weathering and erosion.*	Washing Away	HI	Beach Erosion 	***Phenomenon**: Waikiki Beach keeps shrinking.*	GRC Engage Explore Explain Evaluate	A good investigation for students to learn about using variables: also aligned to waves 4-PS4-1. *Includes formative assessment*
4-ESS2-1 *Rate of weathering and erosion.*	Lava Top	UT	Landforms, Weathering, and Erosion	***Phenomenon**: Near St. George, Utah, the tops of the buttes are covered with lava, and the valleys and ravines are covered in sand and sandstone.*	GRC PIP	The investigation helps students learn how a rock's hardness affects erosion. *Includes formative assessment*
4-ESS2-1 *Rate of weathering and erosion.*	The Neighborhood is Falling Apart	UT	Weathering of Concrete 	***Phenomenon:** Old sidewalks look more worn than new sidewalks.*	GRC PIP	This investigation investigates the causes of the weathering of concrete. *Includes formative assessment*
4-ESS2-1 *Rate of weathering and erosion*	All Washed Up	AR	Large Scale Erosion	***Phenomenon**: The Ozark Mountains do not have jagged peaks.*	GRC PIP	This investigation is specific to Arkansas but could be adapted to any state. *Includes formative assessment*
4- ESS2-2 *Maps to Describe Patterns of Earth's Features*	Ring of Fire	HI	Patterns of Earth Features	***Phenomenon:** The majority of Earth's earthquakes occur along the Ring of Fire (or in the Pacific Ocean).*	GRC	*Includes formative assessment*
4-ESS2-2 *Maps to Describe Patterns*	The Power of	HI	Land Formation	***Phenomenon**: When Kilauea erupted in 2018, only part of Hawai'i Island was*	GRC	This investigation helps students use maps to trace lava-caused

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of Earth's Features	Pele			*covered in lava.*		landforms. *Includes formative assessment*
4-ESS2-2 *Maps to Describe Patterns of Earth's Features*	Traveling Arkansas	AR	Landforms	***Phenomenon: The map of Arkansas shows two very distinct regions.***	GRC PIP	This investigation is specific to Arkansas but can be adapted for other states. *Includes formative assessment*
4-ESS3-1 *Energy and fuels are derived from natural resources and affect the environment.*	Big Fan of Wind Energy	MN UT	Clean Energy 	***Phenomenon:*** *When the wind blows hard, I can open my coat and feel the wind push me.*	GRC PIP	The investigation has a hands-on and reading about clean energy *Includes formative assessment*
4-ESS3-1 *Energy and fuels are derived from natural resources and affect the environmen.t*	Renewing my Environmental Vows	HI	Human impact and energy sources	*Phenomenon: Sometimes, we lose electrical power when we have high winds.*	GRC	The investigation engages students in obtaining information to support an explanation. *Includes formative assessment*
Arizona *Natural resources and their effects on the environment*	Water is Life	AZ	Water affects where things live	*Phenomenon: In Arizona, the grass only grows where it is watered.*	GRC PIP	The investiation is for a AZ standard about water. *Includes formative assessment*
4-ESS3-2 *Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans*	Reduce the Impacts of Lava Flows	HI	Comparing solutions to reduce the Impacts of lava flows	***Phenomenon:*** *Scientists were able to warn people living in Kapoho for several days before lava flowed through their neighborhood.* ***Engineering Challenge-*** *Develop multiple solutions to reduce the impact of lava flows on people on the Big Island.*	GRC Engage Explore Explain	This investigation has an equal focus on science & engineering. *Includes formative assessment*
4-ESS3-2 *Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans*	Hurricane Irene and Naedine	HI	Hurricanes as natural disasters	***Phenomenon:*** *In Hawaii, we usually have hurricanes in August and September.* ***Engineering Challenge*** *- Design a solution to reduce hurricane damage to house structures.*	GRC Engage Explore Explain	This investigation has an equal focus on science and engineering. You need a 2-foot box fan. *Includes formative assessment*

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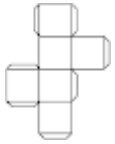
4-ESS3-2 *Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans*	Look Out Below Landslides	HI	The lesson focus is on Engineering.	***Phenomenon:*** *When I drive between Hilo and Honoka'a on the Hamakua coast, I see rocks on the road that have fallen down the hill.* ***Engineering Challenge:*** *Design a solution to reduce the danger of rocks from landslides on the road.*	GRC	This engineering challenge starts with a scientific phenomenon. Under Construction *Includes formative assessment*
4-ESS3-2 *Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.*	Shake Rattle and Roll	UT	Earthquake	***Phenomenon****: On March 18, 2020, I awoke to the house moving! Engineering Challenge - Design and build a shake-resistant Structure that meets specific criteria.*	GRC PIP	The investigation provides a chance for students to engineer solutions to improve buildings. *Includes formative assessment*
4-ESS3-2 *Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.*	Too Much Water	HI	Flooding	***Phenomenon****: When it rains 28 inches in 24 hrs the impact on the land and communities can be devastating.*	GRC PIP	
Performance Tasks Summative Assessment of Learning	1. 4-ESS1-1 Fossil Mountain 2. 4-ESS2-1 Uneven Sidewalks, Potholes Red Roads 3. 4-ESS2-2 Map Patterns			4. 4-ESS3-1 Energy Resources 5. 4-ESS3-2 Virginia Beach		
Physical Science (PS) - Energy, Waves, and Their Applications						
4-PS3-1 *Relate the speed of an object to the energy of that object*	"Ouch," Said the Cube	HI	Speed and Energy 	***Phenomenon****: A rubber band moves a paper cube further in a collision when moving faster.*	GRC PIP	The investigation focuses on how a rubber band transfers energy to an object. *Includes formative assessment*

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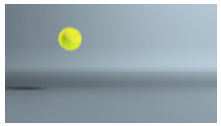
4-PS3-1 *Relate the speed of an object to the energy of that object*	Bouncing Back	HI	Speed and energy transfer 	***Phenomenon**: When I throw a tennis ball faster, it bounces back further.*	GRC PIP	This investigation focuses on how the speed of an object affects the amount of energy transfer. *Includes formative assessment*
4-PS3-1 *Relate the speed of an object to the energy of that object*	Put more Energy into that Throw	HI	Speed and Energy	***Phenomenon –** The faster a ball is moving, the further it goes.*	GRC Engage Explore Explain	This investigation is also aligned to 4-PS3-3 Students are throwing Ping-Pong balls *Includes formative assessment*
4-PS3-1 *Relate the speed of an object to the energy of that object*	Making a Splash	UT	Speed and Energy	***Phenomenon**: Throwing a rock into a puddle makes a big splash, and dropping the rock into the puddle makes a little splash.*	GRC PIP	This investigation is also aligned to 4-PS3-3 *Includes formative assessment*
4-PS3-1 *Relate the speed of an object to the energy of that object*	Mechanism to Move Marbles	AZ SRP	Transfer of Motion Energy	***Phenomenon:** The harder I shoot a marble, the further the other marbles fly when I hit them.*	GRC PIP	This investigation is also useful for 4-PS3-3. *includes formative assessment*
4-PS3-2 *Energy can be transferred from place to place by sound, light, heat, and electrical currents*	That's Electric	AZ SRP	Energy Transfer 	***Phenomenon:** When more holiday lights are in the circuit, the generator is harder to crank.*	GRC PIP	The investigation needs a small electric hand crank generator. *Includes formative assessment*

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4-PS3-2 *Energy can be transferred from place to place by sound, light, heat, and electrical currents*	Cold as Ice	UT AZ	Transfer of Heat Energy 	***Phenomenon:*** *An ice cube melts faster when placed directly on the countertop than on a towel.*	GRC PIP	This investigation provides a good way to introduce experimental design and transfer of heat between systems *Includes formative assessment*
4-PS3-2 *Energy can be transferred from place to place by sound, light, heat, and electrical currents*	Let the Sunshine In!	AZ SRP	Transfer and Transformation of Electricity 	***Phenomenon****: We have solar panels in the parking lot at our school that provide electricity.*	GRC PIP	This investigation is fun for students. It is also aligned with 4-PS3-4. *Includes formative assessment*
4-PS3-2 *Energy can be transferred from place to place by sound, light, heat, and electrical currents*	Electrifying Holidays	UT	Transfer of Energy 	***Phenomenon:*** *When one of the wires on a string of holiday lights is cut, the lights go off.*	GRC	This investigation only covers one part of PE 4-PS3-2 and focuses only on the transfer of energy, not circuits. *Includes formative assessment*
4-PS3-2 *Energy can be transferred from place to place by sound, light, heat, and electrical currents*	Little Solar Cars Needs a reading	UT	Transfer and Transformation of Energy	***Phenomenon****: A small car can use sunlight to run.*	GRC PIP	The investigation is a little beyond the standard to include both the transfer and transformation of energy. Links to 4-PS3-4 *Includes formative assessment*
4-PS3-2 *Energy can be transferred from place to place by sound, light, heat, and electrical currents*	Sounding a Transfer of Energy	UT	Sound Transferring Energy	***Phenomenon:*** *Sound can cause a crystal glass to shatter.*	GRC PIP	This investigation engages students in gathering evidence that sound can transfer energy. *Includes formative assessment*

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4-PS3-2 *Energy can be transferred from place to place by sound, light, heat, and electrical currents*	Engineering Energy Changes	AZ	Electric Energy Science and Engineering	***Phenomenon*** *– You can change the rate a solar pump moves water.* ***Engineering Challenge*** *- Increase the rate at which a pump can move water.*	GRC PIP	This investigation uses a solar water pump. *Includes formative assessment*
4-PS3-2 *Energy can be transferred from place to place by sound, light, heat, and electrical currents*	Splooting	UT AZ	Heat Transfer 	***Phenomenon:*** *I saw a squirrel lying flat on the patio.*	GRC PIP	This is an investigation we are looking to add. *Includes formative assessment*
4-PS3-3 *Changes in energy that occur when objects collide*	Where Does the Energy Go in a Collision	UT	Energy Transfer Pendulum 	***Phenomenon:*** *The longer the swing of a wrecking ball, the more damage it causes.*	GRC PIP	This investigation uses a simple pendulum to have students investigate energy transfer and conservation. *Includes formative assessment*
4-PS3-3 *Changes in energy that occur when objects collide*	Get the Ball Rolling	HI	Transfer of Energy	***Phenomenon:*** *When a ball hits a water bottle, it falls over.*	GRC	This investigation is a fun outdoor activity that helps students understand energy transfer. *Includes formative assessment*
4-PS3-3 *Changes in energy that occur when objects collide*	Marble Collisions	HI	Energy Transfer in  Collisions	***Phenomenon:*** *A fast-moving marble causes another marble it hits to move further.*	GRC PIP	This investigation is fun and starts with students playing marbles. *Includes formative assessment* **Possible** **Hawaii culture and place-**
4-PS3-3 *Changes in energy that occur when*	Crush the Can	UT	Transfer of Energy in Collision	***Phenomenon:*** *When a rock is dropped onto an aluminum can it*	GRC	This investigation is fun for students. It should be done on the playground.

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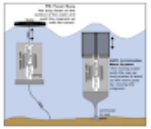
objects collide				*crushes the can.*	PIP	*Includes formative assessment*
4-PS3-3 *Changes in energy that occur when objects collide*	Fast Balloons	HI	Energy in Collision	*Phenomenon: Sometimes, when I catch a water balloon, it pops; other times, it does not.*	GRC PIP	
4-PS3-4 *Apply scientific ideas to design, test, and refine a device that converts energy from one form to another**	Heat Rub	HI	Energy Transfer and Transformation	***Phenomenon:*** *When two wooden sticks are rubbed together, they feel warmer.*	GRC PIP	This investigation is also useful for the start of an engineering lesson. *Includes formative assessment*
4-PS3-4 *Apply scientific ideas to design, test, and refine a device that converts energy from one form to another**	Catch A Wave's Energy	HI	Energy Transfer & Transformation 	***Phenomenon:*** *Surfers bob up and down in the ocean when waiting to catch a wave.* ***Engineering Challenge****: Design and engineer a device to change wave energy into another form of energy to do useful work.*	GRC PIP	This investigation is also useful for the start of an engineering lesson. *Includes formative assessment*
4-PS3-4 *Apply scientific ideas to design, test, and refine a device that converts energy from one form to another**	Power On!	HI PA	Using circuits to change electric energy into other forms	***Phenomenon:*** *Energy can be transferred by electricity to perform useful tasks.* ***Engineering Challenge****: Design, build, and test a device that transfers electrical energy into sound, heat, or light energy capable of solving a human problem in your home or school using batteries, wires, switches, motors, light bulbs, speakers, and buzzers.*	GRC	This investigation has both a scientific phenomenon and an engineering challenge. *Includes formative assessment*
4-PS3-4 *Design, test, and refine a device that converts energy from one form to another.*	Chef SUN Cooks Our Food	HI	Transform Light into Heat and Engineer a Solar Cooker	***Phenomenon:*** *I can use the sun to cook my food.* ***Engineering Challenge****: Build an oven that uses sunlight to cook food.*	GRC Engage Explore Explain	This investigation is also suitable for PS3-2 and PS3-4. *Includes formative assessment*

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4-PS3-4 *Design, test, and refine a device that converts energy from one form to another.*	A Cheesy Deal	HI	Sunlight is converted into heat energy, used in an engineered device	***Phenomenon:*** *When I sit in the sunlight on a sunny day, I get warmer even when the temperature is cool.* ***Engineering Challenge:*** *Create a device that can transfer solar energy into heat to cook a cheese sandwich.*	GRC	This investigation focuses on engineering a solar oven. Students start with science ideas about transforming energy (conversion) from light to heat. *Includes formative assessment*
4-PS3-4 *Design, test, and refine a device that converts energy from one form to another.*	All About Speed	UT	Transformation of Energy Includes Design	***Phenomenon:*** *Some toy cars move faster than others.*	GRC PIP	This investigation includes the design of an electric car. *Includes formative assessment*
4-PS3-4 *Design, test, and refine a device that converts energy from one form to another.*	Solar Pump Little Pump that Could	AZ	Sunlight to Electricity to Motion	***Phenomenon:*** *Solar pumps move more water at 1 p.m. than at 9 a.m.*	GRC PIP	This investigation is fun but requires a solar pump. They are available via Amazon. *Includes formative assessment*
4-PS4-1 *Describe patterns in waves in terms of amplitude and wavelength, and how waves can cause objects to move.*	Catch a Wave	HI	Waves and Energy	***Phenomenon:*** *Big waves move more beach sand than little waves.*	GRC PIP	This investigation focuses on the properties of waves. *Includes formative assessment*
4-PS4-1 *Describe patterns in waves in terms of amplitude and wavelength, and how waves can cause objects to move.*	Waves and Energy	UT	Waves and Energy	***Phenomenon****: I can play the ukulele to make it sound loud or soft.*	GRC PIP	This investigation focuses on the properties of waves, starting with sound and moving to water waves. *Includes formative assessment*
4-PS4-1 *Describe patterns in waves in terms of amplitude and*	Amplitude Matters	UT	Energy and Waves	***Phenomenon:*** *Dropping a big rock in water makes a bigger wave than dropping a small rock.*	GRC PIP	This investigation focuses on the transfer of energy, and higher wave amplitudes have more

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wavelength, and how waves can cause objects to move.						energy. *Includes formative assessment*
4-PS4-2 *Describe how light reflects from objects and enters the eyes, allowing objects to be seen*	Up Periscope	AR	Path of Light and Seeing	***Phenomenon:*** *I cannot read in the dark*	GRC PIP	This investigation is fun as students build a periscope. *Includes formative assessment*
4-PS4-2 *Describe how light reflects from objects and enters the eyes, allowing objects to be seen*	Looking Blue or Seeing Red	AR	Reflection of Color	***Phenomenon:*** *Our porch light is blue, and everyone who enters the door at night looks blue.*	GRC PIP	This investigation is focused on reflected color light. *Includes formative assessment*
4-PS4-2 *Describe how light reflects from objects and enters the eyes, allowing objects to be seen*	To See or Not to See	HI	Some light must reflect off an object in order to see it.	***Phenomenon:*** *I cannot see the color of your shirt in a dark room.*	GRC PIP	This investigation needs a completely dark room. *Includes formative assessment*
4-PS4-3 *Generate and compare multiple solutions that use patterns to transfer information.**	Sounds Like You are Delighted	HI	Coded Message sent over a distance	***Phenomenon****: Messages can be sent using lights or sound.* ***Engineering Challenge****: Develop code and a system for sending the code to transmit a message.*	GRC PIP	This is an engineering design challenge. *Includes formative assessment*
4-PS4-3 *Generate and compare multiple solutions that use patterns to transfer information.**	Cracking the Code	HI	Developing Codes to Send Messages	***Phenomenon:*** *When I tap a pattern, I can send a message to my friends.* ***Engineering Challenge****: Develop a Digital Code to Send a Message.*	GRC	This investigation is mostly about technological design. *Includes formative assessment*
Standard	**Link to Lesson**	**State**	**Lesson Topic**	**Phenomenon**	**GRC or 5E**	**Lesson Notes**

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Performance Tasks Summative Assessment of Learning *New for 2023-24*	**Performance Tasks** 1. 4-PS3-1 Golf Ball Drop 2. 4-PS3-2 Personal Fan, Sunlight 3. 4-PS3-3 Crushing Cans, Kicking 4. 4-PS3-4 Alarm Bell	**Performance Tasks** 5. 4-PS4-1 Surfing 6. 4-PS4-2 Path of Light 7. 4-PS4-3 Message by Light or Sound

These summative performance tasks are new. We would appreciate your feedback and suggestions about changing the ones you use.
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*The table below provides a **crosswalk** of the above lesson to the 4th Grade Utah Science and Engineering Education Standards **(SEEd Standards)*** *Salt Lake City School District Alignment of SEEd Standards Crosswalk*		
Utah SEEd	**NGSS**	**SEEd Standards Core Idea**
4.1.1	**4-LS1-1**	Plants and animals have internal and external structures that function to support survival, growth, and reproduction.
4.1.2	**4-LS1-2**	Animals receive information from the environment through the senses, process the information in their brain, and respond.
4.1.3	3-LS4-1	Fossils provide evidence about organisms and environments from long ago.
4.1.4	**4-ESS1-1**	Patterns in rock layers and fossils in those layers provide evidence of how environments have changed over time.
4.2.1	**4-PS3-1**	The relationship between the speed of an object and the energy of that object.
4.2.2	**4-PS3-3**	Predict the outcomes of the changes in energy that occur when objects collide.
4.2.3	**4-PS3-2**	Energy can be transferred from place to place by sound, light, heat, and electrical currents.
4.2.4	**4-PS3-4**	Design a device to convert energy from one form to another.
4.3.1	**4-PS4-1**	Describe waves in terms of amplitude, wavelength, and energy.
4.3.2	**4-PS4-2**	Visible light waves reflected from objects enter the eye, causing objects to be seen.
4.3.3	**4-PS4-3**	Design a solution to an information transfer problem using patterns.
4.4.1	5-ESS1-1	The relative brightness of stars and the distance from Earth
4.4.2	5-ESS1-2	Patterns in the apparent motion of the sun and stars to use as evidence of the motion of the Earth rotating and revolving

Going 3-D Phenomenal GRC Lessons- 4th Grade by Discipline and Standard

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Crosswalk for 2019 Minnesota Science Standards Benchmarks

This Crosswalk was developed for Minnesota Teachers by Next Gen Education, LLC

GRADE 4		
MN BENCHMARK	NGSS	**Minnesota Benchmarks Core Idea**
4E.1.1.1.2	**Unique**	Rainfall helps to shape the land and affects the types of living things found in a region.
4E.1.2.1.1	**4-ESS2-1**	Water, ice, wind, or living organisms break rocks, soils, and sediments into smaller particles and cause them to move.
4E.1.2.1.2	**Unique**	Design and test strategies and structures to prevent erosion.
4E.2.2.1.1	**5-ESS2-2**	Nearly all of Earth's water is in the oceans. Most freshwater is located in glaciers or underground.
4E.3.1.1.1	**5-ESS2-1**	The geosphere, hydrosphere, atmosphere, and biosphere systems interact in multiple ways to affect Earth's surface and materials.
4E.3.2.1 1	**4-ESS1-1**	The presence and location of certain fossil types indicate the order in which rock layers were formed.
4E.3.2.2.1	**4-ESS3-2**	Humans cannot eliminate the hazards but can take steps to reduce their impacts.
4E.4.2.1.1	**4-ESS3-1**	Energy and fuels are derived from natural sources, and their use affects the environment in many ways.
4E.4.2.2.1	**5-ESS3-1**	Individuals and communities are doing things to help protect Earth's resources and environments.
4L.4.1.1.1	**3-LS3-2**	The environment in which an organism lives can affect the traits of that organism.
4L.4.2.1.2	**3-LS3-1**	Many characteristics of organisms are inherited from their parents.
4P.1.1.1.1	**3-PS2-3**	Electric and magnetic forces between a pair of objects do not require that the objects be in contact but the sizes of the forces depend on the properties of the objects and the distances between the objects.
4P.1.1.2.1	**3-PS2-4**	Scientific ideas about how magnets work can be used to solve human problems.

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Arizona 4th Grade Science Standards			
AZSS	**NGSS**	**4th Grade - Physical Science**	
4.P4U1.1	**3-PS2-3**	Develop and use a model to demonstrate how a system transfers energy from one object to another even when the objects are not touching.	Energy transfer when objects are not touching - electrostatic charge
4.P4U1.2	**4-PS3-2**	Develop and use a model that explains how electric currents move energy from place to place.	Transfer of electric energy.
4.P2U1.3	**3-PS2-3**	Develop and use a model to demonstrate magnetic forces.	Interaction of magnetic forces.
4.P4U3.4	**4-ESS3-1**	Engage in an argument from evidence on the use and impact of renewable and nonrenewable resources to generate electricity.	Renewable resources for generating energy.
AZSS	**NGSS**	**4th Grade - Earth and Space Science**	
4.E1U1.5	**NA**	Use models to explain seismic waves and their effect on the Earth.	Effects of earthquakes
4.E1U1.6	**4-ESS2-1** **5-ESS2-1**	Plan and carry out an investigation to explore and explain the interactions between Earth's major systems and the impact on Earth's surface materials and processes.	Geosphere, atmosphere, biosphere, & hydrosphere interactions
4.E1U1.7	**4-ESS2-2** **4-ESS1-1**	Develop and/or revise a model using various rock types, fossil locations, and landforms to show evidence that Earth's surface has changed over time.	Evidence that Earth's surface has changed over time.
4.E1U1.8	**3-ESS2-1**	Collect, analyze, and interpret data to explain weather and climate patterns.	Weather and climate
4.E1U3.9	**5-ESS2-2**	Construct and support an evidence-based argument about water availability and its impact on life.	Availability of water on Earth
4.E1U2.10	**3-ESS3-1** **4-ESS3-2**	Define problems to design solutions to minimize the effects of natural hazards.	Minimize effects of natural hazards.
4th Grade - Life Science			
4.L4U1.11	3-LS4-3	Analyze and interpret environmental data to demonstrate that species adapt, survive, or go extinct over time.	Environmental change and species extinction and change

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GRADE 4 Pennsylvania STEELS Standards		
PA Standards	**NGSS**	**Life**
3.1.4.A.	**4-LS1-1.**	Plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
3.1.4.B.	**4-LS1-2**	Animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
PA Standards	**NGSS**	**Physical**
3.2.4.A.	**4-PS3-1.**	The speed of an object is related to the energy of that object.
3.2.4.B.	**4-PS3-2.**	Energy can be transferred from place to place by sound, light, heat, and electrical currents.
3.2.4.C.	**4-PS3-3.**	Predict outcomes about the energy changes that occur when objects collide
3.2.4.D.	**4-PS3-4.**	Design, test, and refine a device that converts energy from one form to another.*
3.2.4.E.	**4-PS4-1.**	Wave patterns can be described in terms of amplitude and wavelength and that waves can cause objects to move
3.2.4.F.	**4-PS4-2.**	The light that is reflected from objects and enters the eye allows objects to be seen.
3.2.4.G.	**4-PS4-3.**	Patterns can be used to transfer information.
PA Standards	**NGSS**	**Earth and Space Science**
3.3.4.A.	**4-ESS1-1.**	Patterns in rock formations and fossils in rock layers support an explanation for changes in a landscape over time.
3.3.4.B.	**4-ESS2-1.**	Weathering and the rate of erosion are affected by water, ice, wind, or vegetation.
3.3.4.C.	**4-ESS2-2.**	Maps can be used to describe patterns of Earth's features.
3.3.4.D.	**4-ESS3-1.**	Energy and fuels are derived from natural resources, and their uses affect the environment.
3.3.4.E.	**4-ESS3-2.**	Multiple solutions are used to reduce the impacts of natural Earth processes on humans.*

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