Grade 4 Curriculum Map – Science

2019-2020

TOPIC & MONTH	CONTENT	SKILLS	ASSESSMENT	Essential Question
Engineering Design September	 Asking Questions and Defining Problems Planning and Carrying Out Investigations Constructing Explanations and Designing Solutions ETS1.A: Defining and Delimiting Engineering Problems ETS1.B: Developing Possible Solutions ETS1.C: Optimizing the Design Solution readings 	 Possible solutions to a problem are limited by the 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. Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints, solution, problem 	 Presentations Check for understanding Journal Responses Self Evaluations 	 What is the problem? How have others approached it? What are your constraints? What are some solutions? What works? What doesn't? What could work better?
	 3-5-ETS1-1. Define a simp materials, time, or cost. 3-5-ETS1-2. Generate and constraints of the problet 3-5-ETS1-3. Plan and carr prototype that can be im 	ble design problem reflecting a need or a want that included compare multiple possible solutions to a problem base m. y out fair tests in which variables are controlled and fai proved.	udes specified criteria for suc ed on how well each is likely t lure points are considered to	cess and constraints on to meet the criteria and identify aspects of a model or

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Energy October- December	 Asking Questions and Defining Problems Planning and Carrying Out Investigations Constructing Explanations and Designing Solutions Obtaining, Evaluating, and Communicating Information PS3.A: Definitions of Energy PS3.B: Conservation of Energy and Energy Transfer PS3.C: Relationship Between Energy and Forces PS3.D: Energy in Chemical Processes and Everyday Life ESS3.A: Natural Resources ETS1.A: Defining Engineering Problems Readings: What is Energy? 'Potential and Kinetic Energy? Welcome to the science lab 'Where does energy come from?' "" 	 (NYSED) A given object possesses more energy of motion when it is moving faster. (NYSED) Energy can be transferred by moving objects or by sound, light, heat, 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. (NYSED) Energy can also be transferred 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. When objects collide, the contact forces transfer energy so as to change the objects' motions The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use 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. Possible solutions to a problem are limited by the available materials and resources of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each neergy, heat, motion, work, matter, force, variables, mass, insulating, filament, conductors, insulators, circuit, series, parallel, switch, natural resource, non-renewable, renewable, constants, potential energy, kinetic, elastic, transfer 	 Check for understanding Journal entries End of unit assessment Project: build machine to complete everyday task Crazy Chain reaction machine Blueprints 	 What is energy? How can you increase energy? How can energy be transferred? Can we increase energy? How can energy be transferred? What forms of energy exsit? How does energy move? How can we transform electrical energy? Where does energy come from? How can we use energy responsibly?

STANDARDS:

- 4-PS3-1. Use evidence to construct an explanation relating the speed of an object to the energy of that object. •
- 4-PS3-2. Make observations to provide evidence that energy is conserved as it is transferred and/or converted from one form to another. •
- 4-PS3-3. Ask guestions and predict outcomes about the changes in energy that occur when objects collide. ٠
- 4-PS3-4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
- 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

Grade 4 Curriculum Map – Science 2019-2020 **TOPIC & MONTH** CONTENT SKILLS ASSESSMENT **Essential Question** Developing and Using Waves, which are regular patterns of Discussion with What are waves? ٠ motion, can be made in water by How do waves • Models check for disturbing the surface. When waves travel? Constructing understanding move across the surface of deep water, What do waves look Explanations and • Journal the water goes up and down in place; like? How can we **Designing Solutions** entries/reflections there is no net motion in the direction of describe a wave? Scientific Knowledge is Presentation What is sound? How the wave except when the water meets a • Based on Empirical End of unit • beach. is sound produced? Evidence assessment Waves of the same type can differ in How does sound • • PS4.A: Wave Properties • amplitude (height of the wave) and travel? What are PS4.C: Information sound waves? wavelength (spacing between wave Technologies and peaks). What makes a sound • Digitized information can be transmitted loud? How does the Instrumentation over long distances without significant rate of vibration of ETS1.C: Optimizing The • degradation. High-tech devices, such as sound waves related Waves: Waves **Design Solution** computers or cell phones, can receive to pitch? How do we and decode information-convert it from and distinguish between readings • digitized form to voice-and vice versa. pitch and loudness or Information -". "What are waves?" Different solutions need to be tested in volume? • -"Mechanical and • How do humans hear order to determine which of them best Electromagnetic sound? How do solves the problem, given the criteria and January-February Waves" the constraints. people and animals -'Pitch and Volume' hear sound Vocab: waves, matter, distribunce, differently? -Read the introduction What is light? How energy, medium, mechanical, about binary code and electromagnetic, transverse, does light travel? watch the video that longitudinal.crest, trough, frequency, • What is a shadow? explains how morse amplitude, line of origin, wavelength, How does light code was created. sound, vibrate, hear, ear, noise, solid, travel? Can light liquid, gases, pitch, volume, amplitude, travel through a solid?

wavelength, loud, soft, hearing, impairment, light, electromagnetic,

waves, shadow, transparent, translucent, opaque, electromagnetic, spectrum

•	What color is light?
	Why do we see light
	as white?

STANDARDS:
• 4-PS4-1. Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.
 4-PS4-3. Generate and compare multiple solutions that use patterns to transfer information.

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TOPIC & MONTH	CONTENT	SKILLS	ASSESSMENT	Essential Question
Structure, Function, and Information Processing March-May	 Developing and Using Models Engaging in Argument from Evidence PS4.B: Electromagnetic Radiation LS1.A: Structure and Function LS1.D: Information Processing readings "What is a science journal?" "Are you alive?" on page 6 "How do the structures of plants help them to grow, behave, survive and reproduce?" Read 'Plants are Sensitive' 'Animals structure and functions' "Bite, Chew, Swallow!" "Battle of the Beaks" "Read the six fun facts about animals in their journals. 	 An object can be seen when light reflected from its surface enters the eyes. Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. 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. Vocab: organism, movement, respiration, sensitivity, growth, reproduction, excretion, nutrition, grow, behave, survive, reproduce, roots, stems, leaves, flowers, buds, seeds, phototropism, thigmotropism, heliotropism, germination, incisors, canines, premolars, molars, vertebrates, invertebrates, exoskeleton, lens, iris, cornea, pupil, tetina, sclera, optic nerve, 	 Discussions Check for understanding Journal entries/Reflection Project: build and design product based on plant or animal of their choice Informative Report Research Project End of unit assessment 	 How do we know if something is alive? What is the structure and function of plants? How do plants internal structures help them transport water and nutrients? How do plants respond to their environment? What is a life cycle? What is the structure and function of animals? What is the structre and function of teeth? Why are birds beaks structured differently? What is the structure and function of bones? What is the structure and function of animals?

STANDARDS:
 4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
 4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
• 4-LS1-2. 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.

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TOPIC MONTH	CONTENT	SKILLS	ASSESSMENT	Essential Question

Earth's Systems: Processes that Shape the Earth May-June	 Analyzing and Interpreting Data Constructing Explanations and Designing Solutions ESS1.C: The History of Planet Earth ESS2.A: Earth Materials and Systems ESS2.B: Plate Tectonics and Large- Scale System Interactions ESS2.E: Biogeology ESS3.B: Natural Hazards ETS1.B: Designing Solutions to Engineering Problems Readings: -"'the Geosphere Rocks' on page 1 -'Volcanoes -' Lesson 6 - Weathering -Types of Rock - "Earth's history" 	 Notation of certain lossifypes indicate the order in which rock layers were formed. 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 SS2.B: 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. Living things affect the physical characteristics of their regions. 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. Testing a solution involves investigating how well it performs under a range of likely conditions. Vocab: system, hydrosphere, geosphere, atmosphere, biosphere, man made, natural, crust, mantle, outer core, inner core, tectonic plates, continental drift, sea floor spreading, rapid process, landslide, volcano, tsunami, mudslide, lava, magma, ring of fire, hot spot, active dormant, weathering, mechanical, chemical, erosion, glaciers, landforms, sedimentary, igneous, metamorphic, classify, cycle, fossils, trace, mold, resin, body,climate, geography, topographic 	understanding with discussions (individual, groups, whole group post-it check) Build your prototype Presentations End of Unit Project End of unit assessment	 What is rock and why do we use it? How do plate tectonics create and destroy features causing the continual changing of Earth's surface? How do natural hazards continually change the way the earth looks? What processes contribute to the formation of volcanoes? How do natural actions such as weathering change the earth's surface? How do weathering and erosion shape the land? How does the rock cycle show the continual change from one rock type and group to a different rock type and group? How do fossils provide evidence about plants and animals that lived long ago? Why are there so many different types of maps and how does geography imp act our lives?
	 4-ESS1-1. Identify evid time. 	ence from patterns in rock formations and fossils in rock layers to s	support an explanation for o	changes in a landscape over

• 4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or
vegetation.
 4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth's features.
 4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.