



ADW GRADE 4 SCIENCE STANDARDS & INSTRUCTION GUIDE

PHYSICAL SCIENCE (PS)	Standard	Core Concepts	Scientific Terms and Scientists	EdTech Resources
SC.4.PS.1	Investigate the relationship of the speed of an object to the energy of that object and predict outcomes about the changes in energy that occur when objects collide..	<ul style="list-style-type: none">• Kinetic energy is the energy due to motion. All moving objects have kinetic energy.• An object's kinetic energy depends on its speed.• The faster a given object is moving, the more energy it possesses.• Speed is calculated by dividing distance by time.• A metric ruler/meter stick is used to make measurement observations for length or distance.	<ul style="list-style-type: none">• energy• kinetic energy• speed	<ul style="list-style-type: none">• https://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=15



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SC.4.PS.2	Ask questions and predict outcomes about the transfer and changes in energy that occur when objects collide.	<ul style="list-style-type: none">• 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; and transformed to heat and sound energy.	<ul style="list-style-type: none">• energy transfer• energy transformation• Law of Conservation of Energy	<ul style="list-style-type: none">•
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SC.4.PS.3E	Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.	<ul style="list-style-type: none">• Energy is present whenever there are moving objects, sound, light, electricity, or heat.• Energy can be transferred by moving objects or by sound, light, heat, or electric currents.• Energy is conserved as it is transferred and/or transformed from one form to another.• The expression “produce energy” typically refers to the conversion (transformation) of stored (potential) energy into a desired form for practical use.	<ul style="list-style-type: none">• kinetic energy• potential energy• light/radiant energy• sound energy• chemical energy• mechanical energy• electrical energy• thermal/heat energy	<ul style="list-style-type: none">•
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PHYSICAL SCIENCE (PS)	Standard	Core Concepts	Scientific Terms and Scientists	EdTech Resources
SC.4-PS.4	Develop a model of waves to describe patterns in terms of amplitude, wavelength, and energy.	<ul style="list-style-type: none"> • Waves carry energy from one place to another. • Waves of the same type can differ in amplitude (height of the wave above the midpoint) and wavelength (spacing between wave peaks). • Light and sound energy both travel as waves, but light energy does not require a medium (eg. light from stars traveling through space). • Light reflecting from objects and entering the eye allows the objects to be seen. • Waves can be made in water by disturbing the surface (eg. by wind). • When waves move across the surface of 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. 	<ul style="list-style-type: none"> • wave • amplitude • wavelength 	<ul style="list-style-type: none"> • https://missbupp2016-2017.weebly.com/waves-unit.html



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PHYSICAL SCIENCE (PS)	Standard	Core Concepts	Scientific Terms and Scientists	EdTech Resources
SC.4.PS.5	Investigate and recognize properties of sound that include pitch, loudness (amplitude), and vibration as determined by the physical properties of the object making the sound	<ul style="list-style-type: none"> • Vibrating matter can make sound. • Sound is the movement of energy as waves through a medium—a solid, a liquid, or a gas. • If there is no medium to vibrate, no sound is possible. • Something can be heard when sound waves from it enter the ear. • Electrical currents can be used to produce sound. • Energy is present whenever there is sound. 	<ul style="list-style-type: none"> • vibration • sound • pitch • loudness • energy • sound energy • vibration • solid • liquid • gas 	<ul style="list-style-type: none"> • http://www.e-learningforkids.org/science/grade/4/ • www.brainpop.com



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LIFE SCIENCE (LS)	Standard	Core Concepts	Scientific Terms and Scientists	EdTech Resources
SC.4.LS.1	Obtain evidence that all living organisms are made of one or more cells.	<ul style="list-style-type: none"> • All living organisms are composed of one to trillions of cells. • All cells have a cell membrane, cytoplasm, and genetic material. • Plant, animal, protist, and fungal cells have genetic material organized inside a nucleus. • Plant cells also have cell walls and chloroplasts. • These cellular structures are responsible for specific functions (eg. cell walls and cell membranes support and protect the cell; chloroplasts use energy from sunlight to produce food.) 	<ul style="list-style-type: none"> • cell membrane • cytoplasm • genetic material • nucleus • cell wall • chloroplast • unicellular • multicellular 	<ul style="list-style-type: none"> • https://www.cellsalive.com/cells/cell_model.js.htm



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SC.4.LS.2	Develop a model to describe the organization of cells into systems of tissues and organs that carry out bodily functions in multicellular organisms.	<ul style="list-style-type: none">• In multicellular organisms, the body is a system of multiple interacting subsystems.• These subsystems are groups of cells that work together to form tissues or that work together to meet the needs of the whole organism.• Some plants have roots to absorb water and minerals from the soil, stems for support, and leaves to absorb sunlight and produce food.• Animals have organ systems with specific functions.• For example, skeletal and muscular systems work together to support and facilitate movement; the digestive system breaks down food for energy and eliminates waste products from the body.	<ul style="list-style-type: none">• tissue• organ• organ systems	<ul style="list-style-type: none">• https://kidshealth.org/en/kids/eyes.html
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LIFE SCIENCE (LS)	Standard	Core Concepts	Scientific Terms and Scientists	
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<p>SC.4.LS.3</p>	<p>Use evidence to explain how animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.</p>	<ul style="list-style-type: none"> • Humans and other organisms have senses that help them detect internal and external stimuli. • The nervous system consists of nerves and the brain that processes information from our senses. • An object can be seen when light reflected from its surface enters the eyes, just as something can be heard when sound waves from it enter the ear. • The behavior of individual organisms is influenced by internal stimuli (such as hunger) and external stimuli (such as change in the environment). • Different sense receptors are specialized for particular kinds of information, which may then be processed by the animal's brain. • Animals are able to use their perceptions and memories to guide their actions. • Some responses to information are instinctive—that is, animals' brains are organized so that they do not have to think about how to respond to certain stimuli. 	<ul style="list-style-type: none"> • senses • receptors • brain • stimulus • response • nervous system • instinct 	<ul style="list-style-type: none"> •
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LIFE SCIENCE (LS)	Standard	Core Concepts	Scientific Terms and Scientists	EdTech Resources
SC.4.LS.4	Construct an explanation of characteristics that scientists use to classify organisms.	<ul style="list-style-type: none">• Scientists currently use three domains (Archaea, Bacteria, and Eukarya,) to classify organisms.• Archaea and Bacteria contain organisms that are unicellular and do not have nuclei.• Eukarya have nuclei and include the plant, animal, protist, and fungi kingdoms.• Plants can be classified as flowering or nonflowering.• Animals can be classified as vertebrates or invertebrates.	<ul style="list-style-type: none">• domain• kingdom• unicellular• multicellular• eukaryote• prokaryote• vertebrate• invertebrate	<ul style="list-style-type: none">• http://sciencenetlinks.com/interactives/class.html



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EARTH AND SPACE SCIENCE (ESS)	Standard	Core Concepts	Scientific Terms and Scientists	EdTech Resources
SC.4.ESS.1	Investigate how the moon appears to move through the sky and how the moon affects the Earth.	<ul style="list-style-type: none"> • Objects in the sky have patterns of movement. • The moon revolves around the Earth due to Earth's gravitational pull on it. • The moon's rotation and revolution take the same amount of time. • The moon looks a little different each night but looks the same again in about four weeks. • The moon can be seen sometimes at night and sometimes during the day. • It is primarily the Moon's gravity that causes Earth's oceans to rise and fall twice a day. • A solar eclipse occurs when the Moon's shadow appears on Earth's surface; a solar eclipse can only occur during the new moon phase. • A lunar eclipse occurs when the Moon moves into Earth's shadow; lunar eclipses can only occur during the full moon phase. 	<ul style="list-style-type: none"> • lunar cycle • new moon • full moon • waxing • waning • high tide • low tide • solar eclipse • lunar eclipse 	<ul style="list-style-type: none"> • https://www.nasa.gov/moon • https://www.scholastic.com/teachers/article/s/teaching-content/all-about-moon/ • www.mysteryscience.com • https://www.jpl.nasa.gov/edu/teach/activity/moon-phases/



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EARTH AND SPACE SCIENCE (ESS)	Standard	Core Concepts	Scientific Terms and Scientists	EdTech Resources
SC.4.ESS.2	Observe the detailed characteristics of rocks and minerals. Identify and classify rocks as being composed of different combinations of minerals	<ul style="list-style-type: none"> • A mineral is an inorganic, naturally occurring solid with a definite chemical composition and definite crystalline structure. • A rock is a naturally occurring solid made of one or more minerals. • Rocks are classified according to their mineral and chemical composition, particle texture, and particle size. • The rock cycle is a process in which rocks can be changed from one type of rock into another. • Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. 	<ul style="list-style-type: none"> • geology • minerals • rock • igneous rock • sedimentary rock • metamorphic rock • rock cycle • sediment 	<ul style="list-style-type: none"> • http://interactivesites.weebly.com/rocks-and-minerals.html • http://www.e-learningforkids.org/science/grade/4/



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EARTH AND SPACE SCIENCE (ESS)	Standard	Core Concepts	Scientific Terms and Scientists	EdTech Resources
<p>SC.4.ESS.3</p>	<p>Determine how fossils are formed, discovered, layered over time, and used to provide evidence of the organisms and the environments in which they lived long ago.</p>	<ul style="list-style-type: none"> • The presence and location of certain fossil types indicate the order in which rock layers were formed. • Fossils of plants and animals that lived long ago can be used to infer the characteristics of early environments. • The geologic time scale interpreted from rock strata provides a way to organize Earth's history. • Fossils of plants and animals that lived long ago resemble current living organisms and show change and development of characteristics over time. 	<ul style="list-style-type: none"> • geologic time scale • fossil • rock layers • rock formations 	<ul style="list-style-type: none"> •



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EARTH AND SPACE SCIENCE (ESS)	Standard	Core Concepts	Scientific Terms and Scientists	EdTech Resources
<p>SC.4.ESS.4</p>	<p>Describe how geological forces change the shape of the land suddenly and gradually, over time.</p>	<ul style="list-style-type: none"> • 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 areas of Earth. • Rainfall helps to shape the land and affects the types of living things found in a region. • Topographic maps are a way to visualize landforms. • Waves, wind, water, and glacial movement shape and reshape Earth's land surface by weathering and eroding rock and soil in some areas and depositing them in other areas. 	<ul style="list-style-type: none"> • earthquake • volcano • erosion • weathering (chemical and mechanical) • deposition • landform • topographic map 	<ul style="list-style-type: none"> • https://www.youtube.com/user/scishowkids • https://www.youtube.com/user/Peekaboo • https://science360.gov/obj/video/9315d1e3-971e-461c-b201-6d643a2ddff6/rocks-move



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EARTH AND SPACE SCIENCE (ESS)	Standard	Core Concepts	Scientific Terms and Scientists	EdTech Resources
SC.4.ESS.5E	Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.	<ul style="list-style-type: none"> • 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. • Strengths of earthquakes can be measured with seismometers to help anticipate future risk. • *Testing a solution involves investigating how well it performs under a range of likely conditions. 	<ul style="list-style-type: none"> • earthquake • flood • tsunami • volcanic eruption • seismometer 	<ul style="list-style-type: none"> •



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EARTH AND SPACE SCIENCE (ESS)	Standard	Core Concepts	Scientific Terms and Scientists	EdTech Resources
<p>SC.4.ESS.6</p>	<p>Obtain and combine information to describe how energy and fuels are derived from natural resources and how their uses affect the environment.</p>	<ul style="list-style-type: none"> • 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. • Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; • Examples of nonrenewable energy resources are fossil fuels formed from plants • 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. 	<ul style="list-style-type: none"> • natural resource • renewable resource • wind energy • water energy • solar energy • geothermal energy • biomass energy • nonrenewable resource • fossil fuels - coal, oil, natural gas • fuel • energy 	<ul style="list-style-type: none"> •



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Grades 3-5 Engineering Standards (E)

SC.3-5.E.1 Identify a simple problem with the design of an object that reflects a need or a want. Include criteria for success and constraints on materials, time, or cost.

SC.3-5.E.2 Construct and compare multiple plausible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

SC.3-5.E.3 Construct and perform fair investigations in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.