

Grade Four

Life Science L

1 Hierarchical Organization L.4.1

Conceptual Understanding: All organisms need energy for growth and development. Animals have specialized structures and systems for obtaining and processing energy. These structures and systems cannot function properly without adequate nourishment. Living organisms can be adversely affected by environmental conditions or disease.

- A** Students will demonstrate an understanding of the organization, functions, and interconnections of the major human body systems. L.4.1A
- 1** Use technology or other resources to research and discover general system function (e.g., machines, water cycle) as they relate to human organ systems and identify organs that work together to create organ systems. L.4.1A.1
 - 2** Obtain and communicate data to describe patterns that indicate the nature of relationships between human organ systems, which interact with one another to control digestion, respiration, circulation, excretion, movement, coordination, and protection from infection. L.4.1A.2
 - 3** Construct models of organ systems (e.g., circulatory, digestive, respiratory, muscular, skeletal, nervous) to demonstrate both the unique function of the system and how multiple organs and organ systems work together to accomplish more complex functions. L.4.1A.3
 - 4** Research and communicate how noninfectious diseases (e.g., diabetes, heart disease) and infectious diseases (e.g., cold, flu) serve to disrupt the function of the body system. L.4.1A.4
 - 5** Using informational text, investigate how scientific fields, medical specialties, and research methods help us find new ways to maintain a healthy body and lifestyle (e.g., diet, exercise, vaccines, and mental health). L.4.1A.5

2 Reproduction and Heredity L.4.2

Conceptual Understanding: Scientists have identified and classified many types of plants and animals. Each plant or animal has a unique pattern of growth and development called a life cycle. All of Earth's cycles are driven by energy which can be traced back to the sun.

- A** Students will demonstrate an understanding of life cycles, including familiar plants and animals (e.g., reptiles, amphibians, or birds). **L.4.2A**
- 1** Compare and contrast life cycles of familiar plants and animals. **L.4.2A.1**
 - 2** Develop and use models to explain the unique and diverse life cycles of organisms other than humans (e.g., flowering plants, frogs, or butterflies) including commonalities (e.g., birth, growth, reproduction, or death). **L.4.2A.2**

Physical Science **P**

6 Motion, Forces, and Energy **P.4.6**

Conceptual Understanding: As different forms of energy, heat and electricity can be produced in different ways and are transferred and conducted from one form or object to another. Some materials can be conductors or insulators of heat energy. Electricity can be transferred from place to place by electric currents to produce motion, sound, heat, or light.

- A** Students will demonstrate an understanding of the common sources and uses of heat and electric energy and the materials used to transfer heat and electricity. **P.4.6A**
- 1** Obtain and communicate information to compare how different processes (including burning, friction, and electricity) serve as sources of heat energy. **P.4.6A.1**
 - 2** Plan and conduct scientific investigations to classify different materials as either an insulator or conductor of electricity. **P.4.6A.2**
 - 3** Develop models demonstrating how heat and electrical energy can be transformed into other forms of energy (e.g., motion, sound, heat, or light). **P.4.6A.3**
 - 4** Develop models that demonstrate the path of an electric current in a complete, simple circuit (e.g., lighting a light bulb or making a sound). **P.4.6A.4**
 - 5** Use informational text and technology resources to communicate technological breakthroughs made by historical figures in electricity (e.g., Alessandro Volta, Michael Faraday, Nicola Tesla, Thomas Edison, incandescent light bulbs, batteries, Light Emitting Diodes). **P.4.6A.5**
 - 6** Design a device that converts any form of energy from one form to another form (e.g., construct a musical instrument that will convert vibrations to sound by controlling varying pitches, a solar oven that will convert energy from the sun to heat energy, or a simple circuit that can be used to complete a task). Use an engineering design process to define the problem, design, construct, evaluate, and improve the device. * **P.4.6A.6**

Conceptual Understanding: Light, as a form of energy, has specific properties, including brightness. Light travels in a straight line until it strikes an object. The way light behaves when it strikes an object depends on the object's properties.

B Students will demonstrate an understanding of the properties of light as forms of energy. **P.4.6B**

- 1 Construct scientific evidence to support the claim that white light is made up of different colors. Include the work of Sir Isaac Newton to communicate results. **P.4.6B.1**
- 2 Obtain and communicate information to explain how the visibility of an object is related to light. **P.4.6B.2**
- 3 Develop and use models to communicate how light travels and behaves when it strikes an object, including reflection, refraction, and absorption. **P.4.6B.3**
- 4 Plan and conduct scientific investigations to explain how light behaves when it strikes transparent, translucent, and opaque materials. **P.4.6B.4**

Conceptual Understanding: Sound, as a form of energy, is produced by vibrating objects (matter) and has specific properties, including pitch and volume. Sound travels through air and other materials and is used to communicate information in various forms of technology.

C Students will demonstrate an understanding of the properties of sound as a form of energy. **P.4.6C**

- 1 Plan and conduct scientific investigations to test how different variables affect the properties of sound (i.e., pitch and volume). **P.4.6C.1**
- 2 In relation to how sound is perceived by humans, analyze and interpret data from observations and measurements to report how changes in vibration affect the pitch and volume of sound. **P.4.6C.2**
- 3 Obtain and communicate information about scientists who pioneered in the science of sound, (e.g., Alexander Graham Bell, Robert Boyle, Daniel Bernoulli, and Guglielmo Marconi). **P.4.6C.3**

Earth and Space Science **E**

9 Earth's Systems and Cycles **E.4.9**

Conceptual Understanding: Earth's atmosphere is a mixture of gases, including water vapor and oxygen. Water, which is found almost everywhere on Earth, including the atmosphere, changes form and cycles between Earth's surface to the air and back again. This cycling of water is driven by energy from the sun. The movement of water in the water cycle is a major process that influences weather conditions. Clouds form during this cycle and various types of precipitation result.

A Students will demonstrate an understanding of how the water cycle is propelled by the sun's energy. **E.4.9A**

- 1 Develop and use models to explain how the sun's energy drives the water cycle. (e.g., evaporation, condensation, precipitation, transpiration, runoff, and groundwater). **E.4.9A.1**

Conceptual Understanding: Scientists record patterns in weather conditions over time and across the globe to make predictions about what kind of weather might occur next. Climate describes the range of an area's typical weather conditions and the extent to which those conditions vary over long periods of time.

B Students will demonstrate an understanding of weather and climate patterns. **E.4.9B**

- 1** Analyze and interpret data (e.g., temperature, precipitation, wind speed/direction, relative humidity, or cloud types) to predict changes in weather over time. **E.4.9B.1**
- 2** Construct explanations about regional climate differences using maps and longterm data from various regions. **E.4.9B.2**
- 3** Design weather instruments utilized to measure weather conditions (e.g., barometer, hygrometer, rain gauge, anemometer, or wind vane). Use an engineering design process to define the problem, design, construct, evaluate, and improve the weather instrument. * **E.4.9B.3**

Conceptual Understanding: Earth's oceans and landforms can be affected in various ways by natural processes in one or more of Earth's spheres (i.e., atmosphere, biosphere, geosphere, and hydrosphere). Humans cannot eliminate natural hazards caused by these processes but can take steps to reduce their impact. Human activities can affect the land and oceans in positive and negative ways.

C Students will demonstrate an understanding of how natural processes and human activities affect the features of Earth's landforms and oceans. **E.4.9C**

- 1** Analyze and interpret data to describe (i.e., NASA, NOAA, USGS) and predict how natural processes (e.g., weathering, erosion, deposition, earthquakes, tsunamis, hurricanes, or storms) affect Earth's surface. **E.4.9C.1**
- 2** Develop and use models of natural processes to explain the effect of the movement of water on the ocean shore zone, including beaches, barrier islands, estuaries, and inlets (e.g., marshes, bays, lagoons, fjords, or sound). **E.4.9C.2**
- 3** Construct scientific arguments from evidence to support claims that human activities, such as conservation efforts or pollution, affect the land, oceans, and atmosphere of Earth. **E.4.9C.3**
- 4** Research and explain how systems (i.e., the atmosphere, geosphere, and/or hydrosphere) interact and support life in the biosphere. **E.4.9C.4**
- 5** Obtain and communicate information about severe weather phenomena (e.g., thunderstorms, hurricanes, or tornadoes) to explain steps humans can take to reduce the impact of severe weather events. **E.4.9C.5**

Conceptual Understanding: Energy and fuels are derived from natural sources and human use of these materials affects the environment in multiple ways. Due to limited natural resources, humans are exploring the use of abundant solar, water, wind, and geothermal energy resources to develop innovative, high-tech renewable energy systems.

A Students will demonstrate an understanding of the various sources of energy used for human needs along with their effectiveness and possible impacts. **E.4.10A**

- 1** Organize simple data sets to compare energy and pollution output of various traditional, non-renewable resources (e.g., coal, crude oil, wood). **E.4.10A.1**
- 2** Use technology or informational text to investigate, evaluate, and communicate various forms of clean energy generation. **E.4.10A.2**