Glendale Elementary School District

Science Pacing Guide

2020-2021

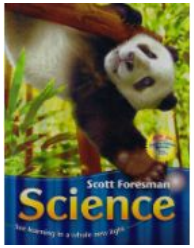
4th Grade

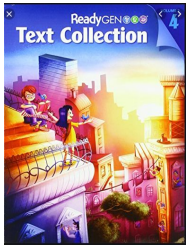
Systems and System Models; Energy and Matter; Stability and Change

By the end of fourth grade, students expand on the idea that energy from the Sun interacts with Earth systems and explores other forms of energy we use in everyday life. Students apply their understanding of the various Earth systems (geosphere, hydrosphere, atmosphere, biosphere) and how they interact with each other and heat from the Sun. Students understand how geological systems change and shape the planet and provide resources. Students also develop an understanding of how Earth processes and human interactions positively and negatively that can change environments impacting the ability for organisms to survive. Student investigations focus on collecting and making sense of observational data and simple measurements using the science and engineering practices: ask questions and define problems, develop and use models, plan and carry out investigations, analyze and interpret data, use mathematics and computational thinking, construct explanations and design solutions, engage in argument from evidence, and obtain, evaluate, and communicate information. While individual lessons may include connections to any of the crosscutting concepts, the standards in fourth grade focus on helping students understand phenomena through systems and system models, energy and matter, and stability and change.

Text Resources:

Scott Foresman Ready Gen





Digital Resources:

World Book

Mystery Science

Core Ideas for Knowing Science:

Physical Science

- P1: All matter in the Universe is made of very small particles.
- P2: Objects can affect other objects at a distance.
- P3: Changing the movement of an object requires a net force to be acting on it.
- P4: The total amount of energy in a closed system is always the same but can be transferred from one energy store to another during an event.

Earth and Space Science

- E1: The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and its climate.
- E2: The Earth and our solar system are a very small part of one of many galaxies within the Universe.

Life Science

- L1: Organisms are organized on a cellular basis and have a finite life span.
- L2: Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms.
- L3: Genetic information is passed down from one generation of organisms to another.
- L4: The unity and diversity of organisms, living and extinct, is the result of evolution

Core Ideas for using Science:

- U1: Scientists explain phenomena using evidence obtained from observations and or scientific investigations. Evidence may lead to developing models and or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised.
- U2: The knowledge produced by science is used in engineering and technologies to solve problems and/or create products.
- U3: Applications of science often have both positive and negative ethical, social, economic, and/or political implications.

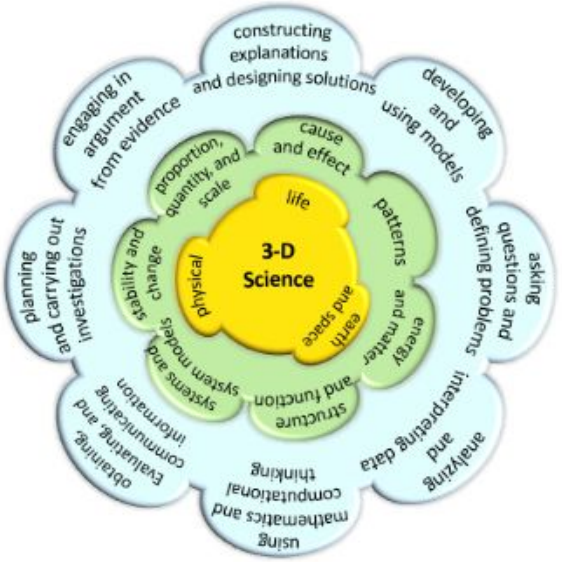
Science and Engineering Practices:

- ask questions and define problems
- develop and use models
- plan and carry out investigations
- analyze and interpret data
- use mathematics and computational thinking
- construct explanations and design solutions
- engage in argument for evidence
- obtain, evaluate, and communicate information

Crosscutting Concepts:

- Patterns
- Cause and Effect
- Scale, Proportion, and Quantity
- Systems and System Models
- Energy and Matter
- Structure and Function
- Stability and Change

Bold concepts are a focus for this grade level. Go to http://bit.ly/CrossCutk8 for detailed information about crosscutting concepts.



Year Snapshot -Units by Quarters			
QUARTER 1 **Species & Adaptations** 4.L4U1.11 4.S3C1.PO 1 **Earth's Systems** 4.E1U1.6 4.S4C1.PO 2	**QUARTER 2** **Landforms & Water** 4.E1U1.5 4.E1U1.7 4.E1U1.8	**QUARTER 3** **Weather, Waves, & Natural Disasters** 4.E1U3.9 4.E1U2.10	**QUARTER 4** **Energy & Magnets** 4.P4U1.1 4.P4U1.2 **Electricity** 4.P2U1.3 4.P4U3.4
Black Standards – grade level standards Blue Standards – 2004 standards to be taught during 2020-2021 school year for the last year of AIMS testing			

Disciplinary Literacy in Science

Disciplinary literacy in science focuses on how reading, writing, speaking, and listening are used to develop sense-making in science. It emphasizes content knowledge, experiences and skills, and the ability to acquire new knowledge that experts within science disciplines use to apply and generate new knowledge.

Standard	ELA	Rationale
These ELA standards help students gather and analyze sources and information (evidence from text) that can be used to support their reasoning as they develop conceptual understanding of science phenomena. Being able to read and interpret scientific and technical text is a fundamental practice of science and engineering.	RI.1 RI.2 RI.3	Key Ideas and Details standards can be applied to help students: • Find answers to relevant science questions or problems. • Understand and follow a written lab protocol, scientific process, or procedure. • Connect new understandings with background knowledge. • Determine which information is important to answering scientific questions. • Pay attention to details, accuracy, and precision when reading/collecting data from scientific instruments. • Interpret diagrams, pictures, charts, graphs, and data to gather information. • Interpret and evaluate quality and quantity of data, evidence, and scientific reasoning. • Determine the credibility of information, including sample size and visual representations of data and findings.
These ELA standards help students navigate the norms and conventions of science text. Scientific and technical text often contains a variety of text structures, visual representations, and vocabulary that has a very specific meaning. Reading text structures that embed bullets, graphs, data, images, captions, and non-linguistic representations of information is a fundamental practice of science and engineering.	RI.4 RI.5 RI.6	Craft and Structure standards can be applied to help students: • Use strategies (context clues, restatement, examples, contrast, glossary, etc.) to determine the meaning of words and phrases in the text. • Use context to determine meanings of words and compare how vocabulary may be used differently in a science context compared to non-science contexts. • Identify structures within a text (headings, sub-headings, bold words, pictures, graphs, data tables, and paragraphs) and explain how they build on information in the paragraph text. • Explain how key terms relate to each other or to broader science concepts and general understanding. • Use information to answer questions and support reasoning and conclusions. • Make meaning out of mathematical symbols and equations; diagrams, or other visual representations and explain why the author used them instead of paragraph text.
These ELA standards help students integrate scientific knowledge and ideas when obtaining, evaluating, and communicating information. Students integrate information to evaluate the validity and reliability of ideas, methods, claims, and designs. They use this knowledge to generate	RI.7 RI.8 RI.9	Integration of Knowledge and Ideas standards can be applied to help students: • Use data and information from multiple sources, including lab investigations, to support a scientific explanation or solve a scientific problem. • Use multiple sources or formats of information related to the same science concept and explain whether these sources provide similar levels of detail or whether the information supports or contradicts each other. • Locate the claim, evidence, and reasoning in scientific explanations and arguments.

their own questions about scientific phenomena or to identify solutions to design problems.		• Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation • Convert visual representations (graph, chart, picture, etc.) of information into words; convert words into visual representations. • Evaluate whether an author's claim is supported by the evidence provided and whether that evidence is relevant to the reasoning of the claim or argument.
This ELA standard requires that students engage with different lengths, structures, types, and complexities of science text, appropriate for their grade level. Reading science texts requires a set of discipline-specific skills and strategies. Science texts use scientific vocabulary and present information in multiple formats.	RI.10	Implementation strategies for this standard are embedded in the previous reading examples. Students in science classrooms often read at different levels of proficiency, and even the same student may read at different levels based on text structures or format. Teachers should understand the complexity of the text provided to students and implement appropriate strategies to support student conceptual understanding of science phenomena.
These ELA standards help students write in formats that are typically found in science contexts or may be specific for their content area. Typically, only formal science writing is written in third person voice. In science, focus is shifted from stating personal opinions to using evidence to support an explanation or scientific argument. Students use evidence and reasoning to defend scientific claims and explanations, or methods for collecting data and evidence. It is critical that students know how to incorporate appropriate visual representations to support the scientific explanations and arguments they write.	W.1 W.2 W.3	Text Types and Purposes standards can be applied to help students: • Record thoughts, ideas, sketches, or collected data in science notebooks to be used as evidence or to support reasoning. • Write a claim, evidence-based argument, or explanation that includes logical reasoning, accurate science content, and relevant and sufficient evidence to support the claim. Claims are created with effective word choice, appropriate use of science vocabulary, and writing style. • Write formal or informal texts. The product may include notebook entries, research papers, laboratory notes or reports, functional text, or visual displays of data. • Produce science writing in a voice appropriate for the type of writing and the audience. Objective or academic voice in science is used when a writer wants to deliver information in a neutral, factual, and unbiased way. • Write step-by-step procedures for experiments that are detailed enough that others would be able to repeat the procedure and achieve the same results. • Produce texts that include charts, graphs, timelines, photographs, videos, maps, flowcharts, diagrams, models, or tables to supplement or support the text.
These ELA standards help students develop scientific writing appropriate for task, purpose and audience.	W.4 W.5 W.6	Production and Distribution of Writing standards can be applied to help students: • Develop and strengthen writing; focus on purpose and audience. • Incorporate peer or adult feedback of drafts into writing; the writing process and review of drafts can be used for any writing assignments within the science classroom. • Use technology (Internet, keyboarding skills, formatting, storing) to create a published piece where information and ideas are connected and presented clearly and efficiently. • Use technology (blogs, wikis, smartboards, apps) to support collaborative brainstorming and writing. • Integrate graphs, data tables, drawings or illustrations, or other visual representations of information to support text.
These ELA standards help students synthesize multiple texts, observations, or experiments to answer questions, gather information, reason about the evidence, and communicate findings or conclusions. Final communication products typically follow a formal writing style (documenting or publishing procedures, investigation designs, explanations of models, and research) and are written in academic or third person voice.	W.7 W.8	Research to Build and Present Knowledge standards can be applied to help students: • Conduct research projects or experimental investigations of differing lengths to provide enough information to construct claims, evidence, and explanations that answer scientific questions or solve a problem. • Integrate information from a variety of credible print and digital sources, taking care to use a consistent voice and avoid plagiarism. • Use evidence from informational texts (e.g., encyclopedias, credible websites, experts, news articles, textbooks, trade books) to support claims, analyses, reflections, and/or research. • Convert informal writing in drafts while still making sense of information and developing claims, to a formal academic voice when publishing formal writing of claims.
This ELA standard requires that students produce informal, formal, and persuasive scientific writing across multiple delivery formats and topics, for different purposes and audiences.	W.10	Implementation strategies for this standard are embedded in the previous writing examples. • Writing assignments should be of varying lengths (field or research notes, one paragraph responses, multiple paragraph essays, lab reports or presentations, extended research). • Scientific writing often includes pictures, diagrams, charts, thinking maps, data, or statistics; these can be integrated with text or presented with minimal text.

These ELA standards help students engage in scientific discourse to gather and evaluate information. Engaging in scientific discourse communities to collaborate and build comprehension is a fundamental practice of science and engineering.	SL.1 SL.2 SL.3	Comprehension and Collaboration standards can be applied to help students: • Initiate and participate effectively in a range of collaborative discussions (one-on-one, small groups, teacher-led, digitally) to express their own ideas clearly and build on others' ideas. • Integrate multiple sources of information presented in diverse media or formats (visually, quantitatively, orally), and explain how the information supports a claim, data analysis, reasoning, or conclusion. • Collaboratively plan or conduct investigations; determine whether the data is collected with appropriate tools, in a safe and ethical manner, and is consistent with other groups' findings. • Respectfully provide and receive criticism from peers about a proposed procedure, explanation, or model by citing relevant evidence and posing specific questions. • Refine explanations, arguments, or other science ideas based on feedback.
These ELA standards help students engage in scientific discourse to informally share ideas and develop understanding of scientific phenomena and provide a formal way to present information appropriate to the audience and task. Engaging in scientific discourse communities to communicate understanding and findings is a fundamental practice of science and engineering.	SL.4 SL.5 SL.6	Presentation of Knowledge and Ideas standards can be applied to help students: • Engage in science discourse with a partner or small group by discussing questions, information, results, and supporting evidence. Speak clearly and in a sequence so listeners can follow the line of thinking and reasoning. • Engage in formal presentations to small or large groups of students to share findings and supporting evidence. Presentation should be clear, concise, and logically organized; content and presentation style are appropriate to purpose, audience, and task. • Use digital media (graphics, images, music, sound, visual displays, or interactive elements) in presentations to clarify science content and to add interest. • Communicate scientific information orally, using various forms of media, tables, diagrams, and charts.

Quarter 1			
AZ State Standards	**Background Information and Learning Targets**	**Vocabulary**	**Curricular Resources**
Unit Title: Species & Adaptations *Life Sciences: Students develop an understanding of the diversity of past and present organisms, factors impacting organism diversity, and evidence of change of organisms over time.*			
4.L4U1.11 Analyze and interpret environmental data to demonstrate that species either adapt and survive, or go extinct over time. 4.S4C1. PO 2. Classify animals by identifiable group characteristics: · vertebrates – mammals, birds, fish,	Background Information: When the **environment changes** in ways that affect a place's physical characteristics, **temperature**, or availability of **resources**, some **organisms survive** and **reproduce**, others move to new locations, yet others move into the transformed environment, and some die. 4 (p. 155) **Fossils** provide evidence about the types of organisms (both visible and microscopic) that lived long ago and also about the nature of their environments. Fossils can be compared with one another and to living organisms according to their similarities and differences. 4 (p. 162) Changes in an organism's **habitat** are sometimes **beneficial** to it and sometimes **harmful**. For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. 4 (p. 165) GESD Context Application of Standards ● I can describe and list the adaptations that allowed a particular species to survive over time.	environmental changes temperature resources organisms survive reproduce fossils habitat beneficial harmful ecosystem adaptations camouflage mimicry physical mutation	*Scott Foresman Science:* ● Chapter 1: Classifying plants and animals ● Chapter2: Energy of plants ● Chapter 3: Ecosystems ● Chapter 4: Changes in Ecosystem *ReadyGEN:* ● Unit 1 ● Porpoises in Peril *Text collection:* ● Fragile Frogs *Sleuth:* ● Nosing Around ● "A 'coat' of many colors" ● "What did you say?"

reptiles, amphibians · invertebrates – insects, arachnids Crosscutting Concepts: Patterns, Cause and Effect, Scale, Proportion and Quantity; **Systems and System Models; Energy and Matter**; Structure and Function; **Stability and Change**	• I can identify evidence to support that inheritable traits which increase the survival rate of a species in an environment become more common. • I can differentiate between invertebrates and vertebrates. • I can categorize vertebrates like amphibians, reptiles, birds, mammals, etc. • I can categorize invertebrates like insects, arachnids, crustaceans, etc.		• "Adapting to survive" *World Book:* • Scientific Classification • Extinction • Vertebrate • Invertebrate • Galapagos Islands • Fossil • Video - How is a Fossil Made • Photos - Fossils • eBooks ○ Mollusks and Sea Creatures ○ Dig Up a Fossil ○ Animals Surviving in Extreme Environments *Mystery Science:* • Animals Through Time Unit ○ M1 - Where can you find whales in a desert? ○ M2 - How do we know what dinosaurs looked like? ○ M3 - Can you outrun a dinosaur? • Mini-Lessons ○ Where do bugs go in winter? ○ Were dragons ever real? 4.S4C1. PO 2. • *Plant Adaptations* • *Plant & Animal Structures And Survival* • *Camouflage and Animal Survival* • *Butterfly Adaptations* *Website: Who Wants to Live a Million Years?* *Do you have a recommendation for curriculum materials that support teaching these concepts? Please email them to jmoritz@gesd40.org*

Unit Title: Earth's Systems

Earth and Space Sciences: Students develop an understanding of the different Earth systems and how they interact with each other. They understand how geological systems change and shape Earth and the evidence that is used to understand these changes. They also understand how weather, climate, and human interactions can impact the environment.

4.E1U1.6 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. 4.S4C1. PO 1. Compare structures in plants (e.g., roots, stems, leaves, flowers) and animals (e.g., muscles, bones, nerves) that serve different functions in growth and survival. Crosscutting Concepts: Patterns, Cause and Effect, Scale, Proportion and Quantity; **Systems and System Models; Energy and Matter**; Structure and Function; **Stability and Change**	Background Information *(for both the Earth's System Unit and Land and Water Unit)*: **Waves** of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). Waves can add or cancel one another as they cross, depending on their relative phase (i.e., relative position of peaks and troughs of the waves), but they emerge unaffected by each other. (Boundary: The discussion at this grade level is qualitative only; it can be based on the fact that two different sounds can pass a location in different directions without getting mixed up.) Earthquakes cause **seismic** waves, which are waves of motion in Earth's crust. Earth's major systems are the **geosphere** (solid and molten rock, soil, and sediments), the **hydrosphere** (water and ice), the **atmosphere** (air), and the **biosphere** (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The **ocean** supports a variety of ecosystems and organisms, **shapes landforms**, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. **Rainfall** helps 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. Human activities affect Earth's systems and their interactions at its surface. [4 (p. 181)] Earth has changed over time. Understanding how landforms develop, are **weathered** (broken down into smaller pieces), and **erode** (get transported elsewhere) can help infer the history of the current landscape. Local, regional, and global patterns of **rock formations** reveal changes over time due to Earth forces, such as **earthquakes**. The presence and location of certain **fossil** types indicate the order in which rock layers were formed. [4 (p. 178)] **Weather** is the minute-by-minute to day-by-day variation of the atmosphere's condition on a local scale. Scientists record the patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. **Climate** describes the ranges of an area's typical weather conditions and the extent to which those conditions vary over years to centuries. [4 (p. 188)] • I can identify what a geosphere is and that the components include solid and molten rock, soil, and sediments. • I can identify what a hydrosphere is and that the components include water and ice.	geosphere molten rock soil sediments hydrosphere liquid water groundwater water vapor frozen water atmosphere troposphere stratosphere mesosphere thermosphere exosphere biosphere biomes taiga tundra desert deciduous forest tropical forest grasslands roots stems leaves	*Scott Foresman Science:* • Chapter 2 Energy of plants • Chapter 3 Ecosystems *Mystery Science:* • The Birth of Rocks Unit ○ M1 - Could a volcano pop up where you live? ○ M2 - Why do some volcanoes explode? ○ M3 - Will a mountain last forever? ○ M4 - How could you survive a landslide? • Mini-Lessons ○ How old is the Earth? *World Book:* • Timeline - History of Geology • Atlas - Maps by Country ○ Climate ○ Terrain • Science Power 4.E1U1.6 ○ Changes in Ecosystems ○ Extreme Weather ○ Gradual Changes ○ How Ecosystems Change ○ Landforms: Earth's Changing Features ○ Movement in the Sky ○ Moving the Land ○ Rapid Changes ○ Shaping the Land ○ The Ocean Floor ○ The Rock Cycle ○ Weather and the Water Cycle

	• I can identify what an atmosphere is and that the primary component is air. • Given a specific biome, I can identify the components there, including living things (animals, humans, plants) • I can identify the 6 biomes taiga, tundra, desert, deciduous forest, tropical forest and grassland and the Earth's major system included in each. • I can plan an investigation to determine the impact of humans within a selected biome. • I can carry out an investigation to explore and/or explain the how major systems interact and impact the use of surface materials and processes. • I can identify the structure of a plant (e.g., roots, stems, leaves flowers) • I can compare plants and animal structures for their different functions.		*Other:* • Atmosphere Layers *Do you have a recommendation for curriculum materials that support teaching these concepts? Please email them to jmoritz@gesd40.org*
Quarter 2			
AZ State Standards	**Background Information and Learning Targets**	**Vocabulary**	**Curricular Resources**
Unit Title: Land and Water *Earth and Space Sciences: Students develop an understanding of the different Earth systems and how they interact with each other. They understand how geological systems change and shape Earth and the evidence that is used to understand these changes. They also understand how weather, climate, and human interactions can impact the environment..*			
4.E1U1.5 Use models to explain seismic waves and their effect on the Earth 4.E1U1.7 Develop and/or revise a model using various rock types, fossil location, and landforms to show evidence that Earth's surface has changed over time.	Background Information (*continued*): **Waves** of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). Waves can add or cancel one another as they cross, depending on their relative phase (i.e., relative position of peaks and troughs of the waves), but they emerge unaffected by each other. (Boundary: The discussion at this grade level is qualitative only; it can be based on the fact that two different sounds can pass a location in different directions without getting mixed up.) Earthquakes cause seismic waves, which are waves of motion in Earth's crust. Earth's major systems are the **geosphere** (solid and molten rock, soil, and sediments), the **hydrosphere** (water and ice), the **atmosphere** (air), and the **biosphere** (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, **shapes landforms**, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. **Rainfall** helps 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	waves seismic fault earthquake epicenter cause Effect rainfall water ice wind climate weather fronts map key temperature precipitation	*Scott Foresman Science:* • Chapter 6 Water Cycle and Weather Lesson 3&4 • Chapter 8: Minerals and Rocks • Chapter 9 Changes to earth's surface *ReadyGEN:* • Revisit • Unit 1 • Mary Anning: The Girl who cracked open the world • Earthquake • A Tsunami Unfolds Sleuth • Crater lake • The Layering Effect Text Collection

4.E1U1.8 Collect, analyze and interpret data to explain weather and climate patterns Crosscutting Concepts: Patterns, Cause and Effect, Scale, Proportion and Quantity; **Systems and System Models; Energy and Matter**; Structure and Function; **Stability and Change**	particles and move them around. Human activities affect Earth's systems and their interactions at its surface. 4 (p. 181) Earth has changed over time. Understanding how landforms develop, are **weathered** (broken down into smaller pieces), and **erode** (get transported elsewhere) can help infer the history of the current landscape. Local, regional, and global patterns of **rock formations** reveal changes over time due to Earth forces, such as **earthquakes**. The presence and location of certain fossil types indicate the order in which rock layers were formed. 4 (p. 178) **Weather** is the minute-by-minute to day-by-day variation of the atmosphere's condition on a local scale. Scientists record the patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. **Climate** describes the ranges of an area's typical weather conditions and the extent to which those conditions vary over years to centuries. 4 (p. 188) GESD Context Application of Standards ● I can identify the causes of an earthquake. ● I can explain some of the effects of an earthquake and how it affects the earth surface. ● I can identify the causes of a Tsunami and earthquakes ● I can explain the effects of Tsunamis on the earth surface. ● I can differentiate between weather and climate. ● I can measure changes in weather (e.g., precipitation, wind speed, barometric pressure) ● I can compare weather conditions in various locations (e.g., the United States vs other continents/ countries) ● I can interpret the symbols on a weather map or chart. ● I can explain what causes weathering. ● I can explain the earth's processes that cause erosion. ● I can describe how currents and wind cause erosion and land changes. ● I can describe the role that water places in the following processes that alter the Earth's surface features: erosion, deposition, and weathering. ● I can demonstrate how landforms are altered. ● I can explain how fossil location is used to date rock layers. ● I can develop or revise a model to show evidence of changes on the Earth's surface over time.	wind speed barometric pressure ocean shapes landforms weathering erosion rock formations earthquakes fossil deposition current wind	● Quake ● Earthshaker's Bad *Mystery Science:* ● Stormy Skies Unit ○ M3 - Why are some places always hot? ● Mini Lesson ○ How Do Earthquakes Happen? *World Book:* ● eBooks ○ Learning About Weather ○ Worlds Beneath our Feet ○ Nature's Skyscrapers ○ Breathtaking Chasms ● Science Power 4.E1U1.5 ○ Moving the Land ○ Rapid Changes 4.E1U1.7 ○ Gradual Changes ○ Landforms: Earth's Changing Features ○ Structure and Movement 4.E1U1.8 ○ Biomes ○ Climate ○ Extreme Weather *Do you have a recommendation for curriculum materials that support teaching these concepts? Please email them to jmoritz@gesd40.org*

Quarter 3			
AZ State Standards	**Background Information and Learning Targets**	**Vocabulary**	**Curricular Resources**
Unit Title: Weather, Waves and Natural Disasters *Earth and Space Sciences: Students develop an understanding of the different Earth systems and how they interact with each other. They understand how geological systems change and shape Earth and the evidence that is used to understand these changes. They also understand how weather, climate, and human interactions can impact the environment.*			
4.E1U3.9 Construct and support an evidence-based argument about the availability of water and its impact on life. 4.E1U2.10 Define problems(s) and design solutions to minimize the effects of natural hazards. Crosscutting Concepts: Patterns, Cause and Effect, Scale, Proportion and Quantity; **Systems and System Models; Energy and Matter**; Structure and Function; **Stability and Change**	Background Information: Water is found almost everywhere on Earth: as **vapor**; as **fog** or **clouds** in the **atmosphere**; as **rain** or **snow** falling from clouds; as ice, snow, and running water on land and in the ocean; and as groundwater beneath the surface. The downhill movement of water as it flows to the ocean shapes the appearance of the land. Nearly all of Earth's available water is in the ocean. Most **freshwater** is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. [4.(p. 185)] A variety of **hazards** result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions, severe weather, floods, coastal erosion). Humans cannot eliminate natural hazards but can take steps to reduce their impacts. [4.(p. 193)] ● I can identify the sources of water within an environment (e.g., groundwater, surface water, atmospheric water, glaciers). ● I can describe the distribution of water on the Earth's surface. ● I can construct an evidence-based argument about the availability of water in an area and the impact on life there. ● I can identify problems associated with natural disasters. ● I can compare rapid and slow processes that change the Earth's surface, including: ○ rapid - earthquakes, volcanoes, floods ○ slow - wind, weathering ● Identify the Earth events that cause changes in atmospheric conditions (e.g., volcanic eruptions, forest fires). ● I can design solutions to help reduce the impact of a natural disaster.	vapor fog clouds rain snow running water groundwater freshwater glaciers streams lakes wetlands surface water atmospheric water Glaciers hazards earthquakes tsunamis volcanic eruptions severe weather floods coastal erosion volcanic eruption forest fires	*Scott Foresman Science:* ● Chapter 6: Water Cycle and Weather Lesson 1 &2 ● Chapter 7 Hurricanes and Tornadoes ● Chapter 9 Changes to Earth's surface Lesson 3 *ReadyGEN:* ● Unit 1 Mary Anning: The Girl who cracked open the world ● Unit 3 "Anatomy of Volcanic Eruption" ● *Text Collection* ● "Escape from Pompeii" ● *Sleuth* ● "An amazing discovery" *World Book:* ● Timeline - History of Geology ● Atlas - Maps by Country ○ Climate ○ Terrain ● eBooks ○ Learning About Weather ● Science Power 4.E1U3.9 ○ Earth Materials and Their Uses ○ Earth, the Sun, and the Moon 4.E1U2.10 ○ Extreme Weather *Mystery Science:* ● Watery Planet Unit

			○ M1 - How much water is in the world? ○ M2-When you turn on the faucet, where does the water come from? ○ M3-Can we make it rain? ○ M4-How can you save a town from a hurricane? ● Mini-Lessons ○ Why is it so hard to put out wildfires? ○ What makes hurricanes so dangerous? ○ Why are tornadoes so hard to predict? *Do you have a recommendation for curriculum materials that support teaching these concepts? Please email them to jmoritz@gesd40.org*
Quarter 4			
AZ State Standards	**Background Information and Learning Targets**	**Vocabulary**	**Curricular Resources**
Unit Title: Energy and Magnets *Physical Sciences: Students develop an understanding of how Earth's resources can be transformed into different forms of energy. Students develop a better understanding of electricity and magnetism.*			
4.P4U1.1 Develop and use a model to demonstrate how a system transfers energy from one object to another even when the objects are not touching. 4.P4U1.2 Develop and use a model that explains how energy is moved from place to place	Background Information: **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. Light also transfers energy from place to place. For example, energy **radiated** from the sun is transferred to Earth by light. When this light is absorbed, it warms Earth's land, air, and water and facilitates plant growth. Energy can also be transferred from place to place 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 (e.g., moving water driving a spinning turbine which generates electric currents). The faster a given object is moving, the more energy it possesses. Energy can be moved from place to place by moving objects or through sound or light. (Boundary: At this grade level, no attempt is made to	energy collide transferred radiated electric current batteries storage produce energy conversion of stored electricity concentrated energy parallel circuit series circuit electromagnet	*Scott Foresman Science:* ● Chapter 12: Heat ● Chapter 13 Electricity and Magnetism ● Lesson 1&2 *ReadyGEN:* *Text Collection Volume 2* ● The boy who invented the machine *World Book:* ● Science Power 4.P4U1.1 ○ Sound is Vibration 4.P4U1.2 ○ Electric Circuits

through electric currents. <u>Crosscutting Concepts:</u> Patterns, Cause and Effect, Scale, Proportion and Quantity; **Systems and System Models; Energy and Matter**; Structure and Function; **Stability and Change**	give a precise or complete definition of energy.) For example, energy radiated from the sun is transferred to Earth by light. When this light is absorbed, it warms Earth's land, air, and water and facilitates plant growth. The expression "produce energy" typically refers to the **conversion of stored energy** into a desired form for practical use—for example, the stored energy of water behind a dam is released so that it flows downhill and drives a turbine generator to produce **electricity**. Food and fuel also release energy when they are digested or burned. When machines or animals "use" energy (e.g., to move around), most often the energy is transferred to heat the surrounding environment. The energy released by burning fuel or digesting food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (Boundary: The fact that plants capture energy from sunlight is introduced at this grade level, but details of photosynthesis are not.) It is important to be able to **concentrate energy** so that it is available for use where and when it is needed. For example, **batteries** are physically transportable energy **storage** devices, whereas electricity generated by power plants is transferred from place to place through distribution systems. 4 (p. 129) GESD Context Application of Standards: ● I can identify how energy is transferred. ● I can identify types of energy. ● I can explain the difference between stored and produced energy, including how a battery works. ● I can describe the difference between kinetic and potential energy. ● I can explain how energy is transferred by and to living organisms. ● I can demonstrate how a system transfers energy from one object to another when objects are not touching. ● I can create a model to demonstrate how energy is moved from place to place, using electric currents.	conductors insulators resistors	○ Electricity ○ Electricity and Magnetism ○ Electricity at Work ○ Generating Electricity *Mystery Science:* ● Energize Everything Unit ○ M6 -What if there was no electricity? ○ M7 - How long did it take to travel across the country before cars and planes? ● Mini-Lessons ○ How do batteries work? Other: ● Magnetism and Electricity Resource *have a recommendation for curriculum materials that support teaching these concepts? Please email them to jmoritz@gesd40.org*
Unit Title: Magnetism *Physical Sciences: Students develop an understanding of how Earth's resources can be transformed into different forms of energy. Students develop a better understanding of electricity and magnetism.*			
4.P2U1.3 Develop and use a model to demonstrate magnetic forces	● I can investigate characteristics of a magnet (e.g., opposite poles attract, like poles repel, the force between two magnet poles, depends on the distance between them). ● I can state cause and effect relationships between magnets and circuitry and scientific notation.	poles attract repel force circuit Magnet	*Scott Foresman Science:* ● Chapter 10 Using Natural Resources ● Chapter 13 Electricity and Magnetism Lesson 3,4 &5 *World Book:* ● Science Power

4.P4U3.4 Engage in argument from evidence on the use and impact of renewable and nonrenewable resources to generate electricity.	● I can differentiate renewable resources from nonrenewable resources. ● I can describe various ways resources can be used to make electricity. (i.e. solar energy, wind energy, and wate) ● I can analyze the effect that limited resources (e.g., natural gas, minerals) may have an environment. ● I can describe ways in which resources can be conserved (e.g., by reducing, reusing, recycling, and finding substitutes.) ● I can construct an argument from evidence on the use of renewable and nonrenewable resources to generate electricity and the resulting impact.	renewable nonrenewable reducing reusing recycling conservation coal natural gas fossil fuel minerals	4.P4U1.3 ○ Electricity and Magnetism ○ Magnetic Fields ○ Magnets ○ The Nature of Light ○ Work and Power 4.P4U3.4 ○ Earth Materials and Their Uses ○ Natural Resources ○ Resources and Conservation *Mystery Science:* ● Invisible Forces Unit ○ M4 - What can magnets do? ○ M5 - How can you unlock a door using a magnet? ● Energize Everything Unit ○ M8 - Where does energy come from? *Do you have a recommendation for curriculum materials that support teaching these concepts? Please email them to jmoritz@gesd40.org*