

Glendale Elementary School District
Science Pacing Guide
2020-2021



5th Grade

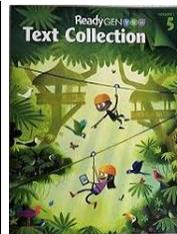
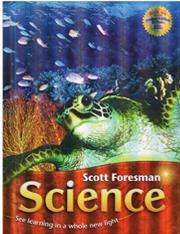
Fifth Grade: Patterns; Scale, Proportion, and Quantity

By the end of fifth grade, students apply their understanding of scale at macro (time and space) and micro (particles of matter) levels to understand patterns and scale across life, earth and space, and physical sciences. Students will develop an understanding of forces, conservation of matter, and that genetic information can be passed down from parent to offspring. Student investigations focus on collecting and making sense of observational data and 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 fifth grade focus on helping students understand phenomena through patterns and scale, proportion and quantity.

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.

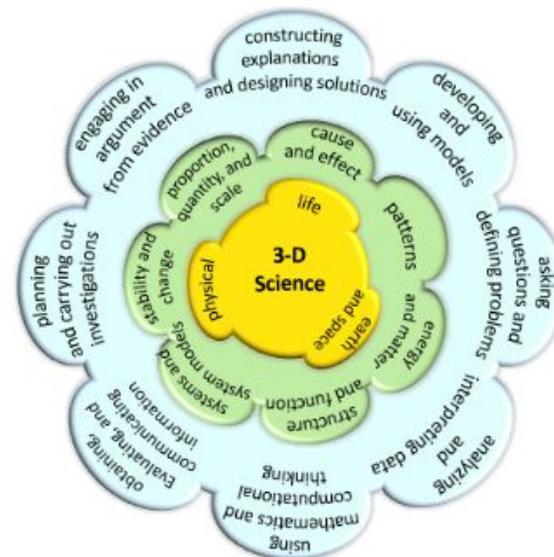
Science and Engineering Practices:

- 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	QUARTER 2	QUARTER 3	QUARTER 4
<p>Genetics 5.L3U1.9 5.L3U1.10</p> <p>Habitats 5.L4U3.11 5.L4U3.12</p>	<p>Matter & Its Interactions 5.P1U1.1 5.P1U1.2</p> <p>Forces 5.P2U1.3 5.P3U1.4 5.P3U2.5 5.P4U1.6</p>	<p>Earth & Moon 5.E2U1.7 5.E2U1.8</p>	<p>Earth & Moon <i>Continued</i> 5.E2U1.7 5.E2U1.8</p>

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 ability to acquire new knowledge that experts within science disciplines use to apply and generate new knowledge.

Standard	ELA	Rationale
<p>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.</p>	<p>RI.1 RI.2 RI.3</p>	<p>Key Ideas and Details standards can be applied to help students:</p> <ul style="list-style-type: none"> • 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.
<p>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.</p>	<p>RI.4 RI.5 RI.6</p>	<p>Craft and Structure standards can be applied to help students:</p> <ul style="list-style-type: none"> • 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.
<p>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 their own questions about scientific phenomena</p>	<p>RI.7 RI.8 RI.9</p>	<p>Integration of Knowledge and Ideas standards can be applied to help students:</p> <ul style="list-style-type: none"> • 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. • Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation

<p>or to identify solutions to design problems.</p>		<ul style="list-style-type: none"> • 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.
<p>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.</p>	<p>RI.10</p>	<p>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.</p>
<p>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.</p>	<p>W.1 W.2 W.3</p>	<p>Text Types and Purposes standards can be applied to help students:</p> <ul style="list-style-type: none"> • 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.
<p>These ELA standards help students develop scientific writing appropriate for task, purpose and audience.</p>	<p>W.4 W.5 W.6</p>	<p>Production and Distribution of Writing standards can be applied to help students:</p> <ul style="list-style-type: none"> • 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.
<p>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.</p>	<p>W.7 W.8</p>	<p>Research to Build and Present Knowledge standards can be applied to help students:</p> <ul style="list-style-type: none"> • 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.
<p>This ELA standard requires that students produce informal, formal, and persuasive scientific writing across multiple delivery formats and topics, for different purposes and audiences.</p>	<p>W.10</p>	<p>Implementation strategies for this standard are embedded in the previous writing examples.</p> <ul style="list-style-type: none"> • 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.

<p>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.</p>	<p>SL.1 SL.2 SL.3</p>	<p>Comprehension and Collaboration standards can be applied to help students:</p> <ul style="list-style-type: none"> • 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.
<p>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.</p>	<p>SL.4 SL.5 SL.6</p>	<p>Presentation of Knowledge and Ideas standards can be applied to help students:</p> <ul style="list-style-type: none"> • 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
<p>Unit Title: Genetics</p> <p><i>Life Sciences: Students develop an understanding of patterns and how genetic information is passed from generation to generation. They also develop the understanding of how genetic information and environmental features impact the survival of an organism.</i></p>			
<p>5.L3U1.9 Obtain, evaluate, and communicate information about patterns between the offspring of plants, and the offspring of animals (including humans); construct an explanation of how genetic information is passed from one generation to the next.</p> <p>5.L3U1.10 Construct an explanation based on</p>	<p>Background Information: Many characteristics of organisms are inherited from their parents. Other characteristics result from individuals’ interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. ^{4.(p. 158)} The environment also affects the traits that an organism develops—differences in where they grow or in the food they consume may cause organisms that are related to end up looking or behaving differently. ^{4.(p. 158)} 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)} Offspring acquire a mix of traits from their biological parents. Different organisms vary in how they look and function because they have different inherited information. In each kind of organism there is variation in the traits themselves, and different kinds of organisms may have different versions of the trait. The environment also affects the traits that an organism develops—differences in</p>	<p>traits characteristics reproduction life cycle inherited organisms mutations adaptations environmental fitness</p>	<p><i>Scott Foresman:</i></p> <ul style="list-style-type: none"> • Chapter 4 - Comparing plant Growth, pg. 116 • Chapter 6 <ul style="list-style-type: none"> ○ Lesson 2 - How do species change? ○ Lesson 3 - How do changes cause more changes? <p><i>ReadyGen:</i></p> <ul style="list-style-type: none"> • Unit 1 <p><i>World Book</i></p> <ul style="list-style-type: none"> • Heredity

<p>evidence that the changes in an environment can affect the development of the traits in a population of organisms.</p> <p>Crosscutting Concepts: Patterns, Cause and Effect, Scale, Proportion and Quantity; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change</p>	<p>where they grow or in the food they consume may cause organisms that are related to end up looking or behaving differently. ^{4 (p. 160)}</p> <ul style="list-style-type: none"> ● I can obtain patterns between the offspring of plants, or between the offspring of animals (including humans). ● I can evaluate patterns between the offspring of plants, and between the offspring of animals (including humans). ● I can communicate patterns observed between the offspring of plants and animals (including humans) ● I can construct an explanation of how genetic information is passed from one generation to the next. ● I can construct an explanation that changes in the environment can affect the development of the traits in a population of organisms. 		<ul style="list-style-type: none"> ● Animals (Adaptations) ● Science Power <ul style="list-style-type: none"> ○ Heredity: Inherited and Learned Characteristics ○ Reproduction and Inheritance <p><i>Mystery Science</i></p> <ul style="list-style-type: none"> ● Animals Through Time Unit <ul style="list-style-type: none"> ○ M4 - What kinds of animals might there be in the future? ○ M5 - Can selection happen without people? ○ M6 - Why do dogs wag their tails? ○ M7 - What's the best way to get rid of mosquitos? ○ M8 - How long can people (an animals) survive in outer space? <p><i>Do you have a recommendation for curriculum materials that support teaching these concepts? Please email them to jmoritz@gesd40.org</i></p>
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Unit Title: Habitats

Life Sciences: Students develop an understanding of patterns and how genetic information is passed from generation to generation. They also develop the understanding of how genetic information and environmental features impact the survival of an organism.

<p>5.L4U3.11 Obtain, evaluate, and communicate evidence about how natural and human-caused changes to habitats or climate can impact populations.</p> <p>Crosscutting Concepts: Patterns, Cause and Effect, Scale, Proportion and Quantity; Systems and</p>	<p>Background Information: 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)} Scientists have identified and classified many plants and animals. Populations of organisms live in a variety of habitats and change in those habitats affects the organisms living there. Humans, like all other organisms, obtain living and nonliving resources from their environments. ^{4 (p. 165)}</p> <ul style="list-style-type: none"> ● I can obtain evidence of the impact on populations resulting from natural and human-caused changes to habitats or climates. ● I can evaluate evidence of impact on populations as a result of natural and human-caused changes to habitats or climates. 	<p>habitat beneficial harmful survive natural disasters drought pollution selective breeding mates species reproducing environment</p>	<p><i>Scott Foresman:</i></p> <ul style="list-style-type: none"> ● Chapter 6 - Changes in Ecosystems <p><i>ReadyGen:</i></p> <ul style="list-style-type: none"> ● Unit 1 The Night of the Spadefoot Toads <p><i>World Book</i></p> <ul style="list-style-type: none"> ● Heredity ● Global Warming ● Water Pollution
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<p>System Models; Energy and Matter; Structure and Function; Stability and Change</p>	<ul style="list-style-type: none"> I can communicate evidence of impact on populations resulting from natural and human-caused changes to habitats or climates. 		<ul style="list-style-type: none"> Rain Forest (Threats to RainForests) Endangered Species Radiation (Effects of Radiation) Science Power <ul style="list-style-type: none"> Animals Behavior and Survival Changes in Ecosystem Earth Materials and Their Uses Environment and Behavior Extreme Weather How Ecosystems Change Natural Resources Resources and Conservation <p><i>Mystery Science</i></p> <ul style="list-style-type: none"> Natural Disasters & Engineering How can you save a town from a hurricane?
<p>5.L4U3.12 Construct an argument based on evidence that inherited characteristics can be affected by behavior and/or environmental conditions.</p> <p>Crosscutting Concepts: Patterns, Cause and Effect, Scale, Proportion and Quantity; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change</p>	<p>Background Information: Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. Many characteristics of organisms are inherited from their parents. Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. ^{4 (p. 158)}</p> <ul style="list-style-type: none"> I can identify behavioral conditions that might affect inheritable characteristics. I can identify ways that environmental conditions might affect inherited characteristics. I can construct an evidence based argument that inherited characteristics can be affected by behavior and/or environmental conditions. 		<p><i>Scott Foresman:</i></p> <ul style="list-style-type: none"> Chapter 6 <ul style="list-style-type: none"> Lesson 2 - How do species change? Lesson 3 - How do changes cause more changes? <p><i>World Book</i></p> <ul style="list-style-type: none"> Heredity Science Power <ul style="list-style-type: none"> Heredity: Inherited and Learned Characteristics <p><i>Do you have a recommendation for curriculum materials that support teaching these concepts? Please email them to jmoritz@gesd40.org</i></p>

Quarter 2

AZ State Standards	Background Information and Learning Targets	Vocabulary	Curricular Resources
<p>Unit Title: Matter and its Interactions</p> <p><i>Physical Sciences: Students develop an understanding that changes can occur to matter/objects on Earth or in space, but both energy and matter follow the pattern of being conserved during those changes.</i></p>			
<p>5.P1U1.1 Analyze and interpret data to explain that matter of any type can be subdivided into particles too small to see and, in a closed system, if properties change or chemical reactions occur, the amount of matter stays the same.</p> <p>5.P1U1.2 Plan and carry out investigations to demonstrate that some substances combine to form new substances with different properties and others can be mixed without taking on new properties.</p> <p>Crosscutting Concepts: Patterns, Cause and Effect, Scale, Proportion and Quantity; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change</p>	<p>Background Information: Matter of any type can be subdivided into particles that are too small to see, but even then, the matter still exists and can be detected by other means (e.g., by weighing or by its effects on other objects). For example, a model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon; the effects of air on larger particles or objects (e.g., leaves in wind, dust suspended in air); and the appearance of visible scale water droplets in condensation, fog, and, by extension, also in clouds or the contrails of a jet. The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish (e.g., sugar in solution, evaporation in a closed container). Measurements of a variety of properties (e.g., hardness, reflectivity) can be used to identify particular materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) ^{4.(p. 108)} When two or more different substances are mixed, a new substance with different properties may be formed; such occurrences depend on the substances and the temperature. No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) ^{4.(pp. 110-111)} Other substances simply mix without changing permanently and can often be separated again. At room temperature, some substances are in the solid state, some in the liquid state and some in the gas state. The state of many substances can be changed by heating or cooling them. The amount of matter does not change when a solid melts or a liquid evaporates. ^{2.(p. 20)}</p> <ul style="list-style-type: none"> ● I can obtain and evaluate scientific information to describe basic physical qualities of atoms and molecules. ● I can collect, analyze, and interpret data from measurements of the physical properties of matter including solid, liquid, and gas (volume, shape, movement, and spacing of particles). ● I can develop a model to describe that matter is made of particles too small to be seen. 	<p>mass volume density atomic structure elements periodic table matter Particles</p> <p>solutions suspensions mixtures molecules compounds chemical changes reactions physical change</p>	<p><i>Scott Foresman:</i></p> <ul style="list-style-type: none"> ● Chapter 11 - Matter and Its Properties ● Chapter 12 - Changes in Matter <p><i>Mystery Science</i></p> <ul style="list-style-type: none"> ● Chemical Magic Unit <ul style="list-style-type: none"> ○ M1 - Are magic potions real? ○ M2 - Could you transform something worthless into gold? ○ M3 - What would happen if you drank a glass of acid? ○ M4 - What do fireworks, rubber, and silly putty have in common? ○ M5 - Why do some things explode? ● Mni-Lessons <ul style="list-style-type: none"> ○ How is plastic made? ○ How do things glow in the dark? ○ How do they turn wood into paper? <p><i>World Book</i></p> <ul style="list-style-type: none"> ● Sound ● Waves ● Atom ● Matter ● Element, Chemical ● Science Power <ul style="list-style-type: none"> ○ Sound is Vibration

	<ul style="list-style-type: none"> ● I can obtain and evaluate scientific information to describe what happens to the properties of substances in mixtures and solutions. ● I can obtain and evaluate scientific information to describe what happens to the properties of substances in mixtures and solutions. ● I can analyze and interpret data to communicate that the concentration of a solution is determined by the relative amount of solute versus solvent in various mixtures. ● I can investigate how different variables (e.g., temperature change, stirring, particle size, or surface area) affect the rate at which a solute will dissolve. ● I can analyze and communicate the results of chemical changes that result in the formation of new materials (e.g., decaying, burning, rusting, or cooking). ● I can analyze and communicate the results of physical changes to a substance that results in a reversible change (e.g., changes in states of matter with the addition or removal of energy, changes in size or shape, or combining/separating mixtures or solutions). ● I can analyze and interpret data to support claims that when two substances are mixed, the total weight of matter is conserved. ● I can conduct an investigation to determine whether the mixing of two or more substances results in new substances. 		<ul style="list-style-type: none"> ○ The Chemical Elements ○ States of Matter ○ The Structure of Matter <p><i>Do you have a recommendation for curriculum materials that support teaching these concepts? Please email them to jmoritz@gesd40.org</i></p>
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Unit Title: Forces

Physical Sciences: Students develop an understanding that changes can occur to matter/objects on Earth or in space, but both energy and matter follow the pattern of being conserved during those changes.

<p>5.P2U1.3 Construct an explanation using evidence to demonstrate that objects can affect other objects even when they are not touching.</p> <p>Crosscutting Concepts: Patterns, Cause and Effect, Scale, Proportion and Quantity; Systems and System Models; Energy and Matter; Structure</p>	<p>Background Information: Gravity is the universal attraction between all objects, however large or small, although it is only apparent when one of the objects is very large. This gravitational attraction keeps the planets in orbit around the Sun, the Moon round the Earth and their moons round other planets. On the Earth it results in everything being pulled down towards the center of the Earth. We call this downward attraction the weight of an object. ^{2,(p. 21)} Objects in contact exert forces on each other (friction, elastic pushes and pulls). Electric, magnetic, and gravitational forces between a pair of objects do not require that the objects be in contact-for example, magnets push pull at a distance. ^{4,(117)}</p> <ul style="list-style-type: none"> ● I can demonstrate that objects can affect others even when they are not touching. (ex. magnets, gravity, and electricity) ● I can construct an evidence based explanation to demonstrate that fields exist between objects exerting forces on each other even though the objects are not in contact. 	<p>chemical bonds forces gravity friction elastic pushes & pulls electric forces magnetic forces gravitational forces</p>	<p><i>Scott Foresman:</i></p> <ul style="list-style-type: none"> ● Chapter 13 - Forces in Motion <p><i>World Book</i></p> <ul style="list-style-type: none"> ● Motion ● Lever ● Rockets (section on How Rockets Work) ● Magnetism ● Electricity ● Gravitation ● Science Power <ul style="list-style-type: none"> ○ Electricity ○ Electricity and Magnetism ○ Magnetic Fields ○ Magnets ○ Work and Power
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<p>and Function; Stability and Change</p>	<ul style="list-style-type: none"> I can create and explain a model showing non-touching objects affecting each other. 		<p><i>Mystery Science</i></p> <ul style="list-style-type: none"> Invisible Forces Unit <ul style="list-style-type: none"> M1 - Can you win a tug of war against a bunch of adults? M2 - What makes bridges so strong? M3 - How can you go faster down a slide? <p><i>Do you have a recommendation for curriculum materials that support teaching these concepts? Please email them to jmoritz@gesd40.org</i></p>
<p>5.P3U1.4 Obtain, analyze, and communicate evidence of the effects that balanced and unbalanced forces have on the motion of objects.</p> <p>5.P3U2.5 Define problems and design solutions pertaining to force and motion.</p> <p>Crosscutting Concepts: Patterns, Cause and Effect, Scale, Proportion and Quantity; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change</p>	<p>Background Information: Each force acts on one particular object and has both a strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative addition of forces are used at this level.) The patterns of an object's motion in various situations can be observed and measured; when past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.)^{4 (p. 115)} How quickly an object's motion is changed depends on the force acting and the object's mass. The greater the mass of an object, the longer it takes to speed it up or slow it down, a property of mass described as inertia.^{2 (p. 22)}</p> <ul style="list-style-type: none"> I can obtain and communicate the information describing gravity's effect on an object. I can predict the future motion of various objects based on past observation and measurement of position, direction, and speed. I can develop and use models to explain how the amount or type of force, both contact and non-contact, affects the motion of an object. I can plan and conduct scientific investigations to test the effects of balanced and unbalanced forces on the speed and/or direction of objects in motion. I can predict how a change of force, mass, and/or friction affects the motion of an object to convert potential energy into kinetic energy. 	<p>gravity magnetic forces normal force potential energy friction velocity kinetic energy magnitude direction of force momentum</p>	<p><i>World Book</i></p> <ul style="list-style-type: none"> Energy Science Power <ul style="list-style-type: none"> Forces and Motion Motion and Velocity Motion: Inertia & Newton's Law Work and Power <p><i>Mystery Science</i></p> <ul style="list-style-type: none"> Energizing Everything Unit <ul style="list-style-type: none"> M1 - How is your body similar to a car? M2 - What makes roller coasters go so fast? M3 - Why is the first hill of a roller coaster always the highest? M4 - Could you knock down a building using only dominoes? M5 - Can you build a chain reaction machine? <p><i>Other</i></p> <ul style="list-style-type: none"> Amusement Park Rides and Physics

<p>5.P4U1.6 Analyze and interpret data to determine how and where energy is transferred when objects move.</p> <p>Crosscutting Concepts: Patterns, Cause and Effect, Scale, Proportion and Quantity; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change</p>	<p>Background Information: 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, light, or electric currents. (Boundary: At this grade level, no attempt is made to give a precise or complete definition of energy.)4 (p. 122) 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). 4 (p. 125)</p> <ul style="list-style-type: none"> • I can design a system to increase the effects of friction on the motion of an object (e.g., non-slip surfaces or vehicle braking systems or flaps aircraft wings). • I can use an engineering design process to define the problem, design, construct, evaluate, and improve the system. • I can analyze data to determine where and how energy is being transferred when an object is moving. 	<p>transferred energy</p>	<p><i>Scott Foresman:</i></p> <ul style="list-style-type: none"> • Chapter 14 - Changing forms of Energy • Chapter 10 <ul style="list-style-type: none"> ○ Lesson 1 - What are nonrenewable energy sources? ○ Lesson 2 - What are other energy resources? <p><i>World Book</i></p> <ul style="list-style-type: none"> • Energy • Science Power <ul style="list-style-type: none"> ○ Chemical Changes ○ Forms of Energy ○ Simple Machines and Energy ○ What is Energy? <p><i>Other</i></p> <ul style="list-style-type: none"> • Amusement Park Rides and Physics <p><i>Do you have a recommendation for curriculum materials that support teaching these concepts? Please email them to jmoritz@gesd40.org</i></p>
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Quarter 3 and 4

AZ State Standards	Background Information and Learning Targets	Vocabulary	Curricular Resources
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Unit Title: Earth & Moon

Earth and Space Sciences: Students develop an understanding of how gravitational forces in space cause observable patterns due to the position of Earth, Sun, Moon, and stars.

<p>5.E2U1.7 Develop, revise, and use models based on evidence to construct explanations</p>	<p>Background Information: The Earth moves round the Sun taking about a year for one orbit. The Moon orbits the Earth taking about four weeks to complete an orbit. The Sun, at the center of the solar system, is the only object in the solar system that is a source of visible light. The</p>	<p>revolve rotate orbit axis</p>	<p><i>Scott Foresman:</i></p> <ul style="list-style-type: none"> • Chapter 16 - Stars and Galaxies • Chapter 17 - Earth in Space
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<p>about the movement of the Earth and Moon within our solar system.</p> <p>Crosscutting Concepts: Patterns, Cause and Effect, Scale, Proportion and Quantity; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change</p>	<p>Moon reflects light from the Sun and as it moves round the Earth only those parts illuminated by the Sun are seen. The Earth rotates about an axis lying north to south and this motion makes it appear that the Sun, Moon and stars are moving round the Earth.</p> <p>The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. Some objects in the solar system can be seen with the naked eye. Planets in the night sky change positions and are not always visible from Earth as they orbit the sun. Stars appear in patterns called constellations, which can be used for navigation and appear to move together across the sky because of Earth’s rotation. ^{4(p. 176)}</p> <ul style="list-style-type: none"> ● I can analyze and interpret data from observations and research (e.g., from NASA, NOAA, or the USGS) to explain patterns in the location, movement, and appearance of the moon throughout a month and over the course of a year. ● I can develop and use a model of the Earth-Sun-Moon system to analyze the cyclic patterns of lunar phases, solar and lunar eclipses, and seasons. ● I can develop models of Earth’s solar system to demonstrate the size, composition (i.e., rock or gas), location, and order of the planets as they orbit the Sun. ● I can revise models of Earth’s solar system to demonstrate the size, composition (i.e., rock or gas), location, and order of the planets as they orbit the Sun. ● I can use models of Earth’s solar system to construct explanations about the apparent brightness of the sun and stars due to relative distances from the Earth. ● I can use evidence to argue why the sun appears brighter than other stars ● I can use models to explain the factors (e.g., tilt, revolution, and angle of sunlight) that result in Earth’s seasonal changes. ● I can use models to explain the apparent brightness of the sun and stars as due to their relative distances from the Earth. ● I can represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows. ● I can represent data in graphical displays to reveal patterns of daily changes in length of day and night. ● I can represent data in graphical displays to reveal patterns of daily changes in the seasonal appearance of some stars in the night sky. ● I can use data to describe how constellations appear to move from Earth’s perspective throughout the seasons (e.g., Ursa Major, Ursa Minor, and Orion). 	<p>observable patterns constellations eclipse lunar eclipse solar eclipse reflect illuminated</p>	<p><i>ReadyGen</i></p> <ul style="list-style-type: none"> ● Unit 3 George’s Secret Key to the Universe <p><i>World Book</i></p> <ul style="list-style-type: none"> ● Earth ● Moon ● Seasons ● Time ● Wind ● Gravitation ● Science Power <ul style="list-style-type: none"> ○ Air and Weather ○ Earth and the Moon ○ Earth’s Water ○ Movement in the Sky ○ The Seasons ○ The Solar System ○ The Sun and Planets ○ Weather Patterns ○ Weather and the Water Cycle <p><i>Mystery Science</i></p> <ul style="list-style-type: none"> ● Spaceship Earth <ul style="list-style-type: none"> ○ M1 - How fast does the Earth spin? ○ M2 - Who set the first clock? ○ M3 - How can the sun tell you the season? ○ M4 - Why do stars change with the seasons? ○ M5 - Why does the moon change shape? ○ M6 - What are the wandering stars? ○ M7 - Why is gravity different on other planets?
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<p>5.E2U1.8 Obtain, analyze, and communicate evidence to support an explanation that the gravitational force of Earth on objects is directed toward the planet’s center.</p>	<p>Background Information: Gravity is the universal attraction between all objects, however large or small, although it is only apparent when one of the objects is very large. On the Earth it results in everything being pulled down towards the center of the Earth. We call this downward attraction the weight of an object. 2 (p. 21) The gravitational force of Earth acting on an object near Earth’s surface pulls that object toward the planet’s center. 4 (p. 117)</p> <ul style="list-style-type: none"> ● I can obtain evidence to support an explanation that the gravitational force of Earth on objects is directed toward the planet’s center. ● I can analyze evidence to support an explanation that the gravitational force of Earth on objects is directed toward the planet’s center ● I can communicate evidence to support an explanation that the gravitational force of Earth on objects is directed toward the planet’s center. 	<p>gravity weight of object gravitational force</p>	<p><i>Scott Foresman:</i></p> <ul style="list-style-type: none"> ● Chapter 13 - Lesson 3 - What are Newton’s laws of motion? ● Math in Science - Gravity, Work, Power pg. 434 <p><i>World Book</i></p> <ul style="list-style-type: none"> ● Gravitation ● Science Power ○ Exploring Space ○ Stars and Galaxies <p><i>Do you have a recommendation for curriculum materials that support teaching these concepts? Please email them to jmoritz@gesd40.org</i></p>