Science TEKS Review Work Group E Draft Recommendations

Draft Recommendations
Texas Essential Knowledge and Skills (TEKS) Science, Elementary

The document reflects draft recommendations to the science Texas Essential Knowledge and Skills (TEKS) that have been recommended by the State Board of Education's TEKS review work group for kindergarten-grade 5, Work Group E. Proposed additions are shown in green font with underline (additions). Proposed deletions are shown in red font with strikethroughs (~~deletions~~). Text proposed to be moved from its current student expectation is shown in purple italicized font with strikethrough (~~*moved text*~~) and is shown in the proposed new location in purple italicized font with underlines (*new text location*). Proposed additions that were developed by earlier work groups are shown in black font with underline (text drafted by earlier work groups). Numbering for the knowledge and skills statements in the document will be finalized when the proposal is prepared to file with the *Texas Register*.

Comments in the right-hand column provide explanations for the proposed changes.

CCRS: refers to the College and Career Readiness Standards

Framework: refers to *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*

SCIENCE, ELEMENTARY

§112.2.~~11~~. Science, Kindergarten~~, Adopted 2017~~.		
	TEKS with edits	Work Group Comments/Rationale
(a)	**Introduction.**	
(1)	In Kindergarten–Grade 5, content is organized into recurring strands. The concepts within each grade level build on prior knowledge and prepare students for the next grade level and establish a foundation in science. In Kindergarten, the following concepts will be addressed in each strand:	Work Group E drafted paragraph (1).
(A)	Scientific and engineering practices. ~~Scientific inquiry.~~ *Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the* grade level and *question being asked. Student learning for different types of investigations include descriptive investigations* (Kindergarten-Grade 5), *which involve collecting data and recording observations without making comparisons; comparative investigations* (Grades 6-12), *which involve collecting data with variables that are manipulated to compare results; and experimental investigations* (Grades 5-12), *which involve processes similar to comparative investigations but in which a control is identified.*	
(i)	*Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.*	
(ii)	*Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.*	
(iii)	To support instruction in the content standards, it is recommended that ~~D~~districts ~~are encouraged to~~ integrate ~~facilitate~~ *scientific and engineering practices through classroom and outdoor investigations for at least 80% of instructional time.*	This sentence appears in the current TEKS and has been added to the draft recommendations and revised.
(B)	Matter and energy. Students will build their knowledge of the natural world using their senses. In Kindergarten, the students will focus on observable properties and patterns of objects including bigger or smaller, heavier or lighter, shape, color, texture, and material.	
(C)	Force, motion, and energy. Students will explore the location, motion, and position of objects and will investigate the importance of light, thermal, and sound energy as it relates to the students' everyday life. Students will focus on demonstrating light energy sources and its effect on objects.	
(D)	Earth and space. Patterns are recognizable in the natural world and among objects in the sky. Students will understand that weather and seasons of the year including day and night are repeated patterns. Materials found on Earth can be used, classified, and conserved.	

(E)	Organisms and environments. All living organisms have basic needs that can be satisfied through interactions with nonliving things and living organisms that have structures and functions that help them survive within their environments. Students will investigate the life cycle of plants and identify likenesses between parents and young.	
(2)	Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not currently scientifically testable.	An introduction subcommittee developed recommendations for paragraphs (2)–(6), which have been incorporated into the Work Group E recommendations chart.
(3)	Scientific hypotheses and theories. Students are expected to know that:	
(A)	hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; and	
(B)	scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well established and highly reliable explanations, but they may be subject to change as new areas of science and new technologies are developed.	
~~(4)~~	~~*Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.*~~	For Kindergarten through Grade 5, paragraph (4) of the introduction appears in paragraph (1) with a description of the strands.
~~(A)~~	~~*Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.*~~	
~~(B)~~	~~*Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.*~~	
(4) ~~(5)~~	Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carried out. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information).	

(5) ~~(6)~~	Science consists of recurring themes and making connections between overarching concepts. Recurring themes include systems, models, and patterns. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested, while models allow for boundary specification and provide a tool for understanding the ideas presented. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.	
(6) ~~(7)~~	Statements containing the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	
(b)	**Knowledge and skills.**	
(1)	**Scientific and engineering practices. The student asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:**	A separate Scientific and Engineering Practices Work Group developed recommendations for revisions to the current process skills for K-12, which have been incorporated into the Work Group E recommendations chart.
(A)	ask questions and define problems based on observations or information from text, phenomena, models, or investigations;	
(B)	use scientific practices to plan and conduct simple descriptive investigations and use engineering practices to design solutions to problems;	
(C)	identify, describe, and demonstrate safe practices during classroom and field investigations as outlined in Texas Education Agency-approved safety standards	
(D)	use tools to observe, measure, test, and compare, including hand lenses, goggles, trays, cups, bowls, sieves/sifters, notebooks, terrariums, aquariums, samples (rocks, sand, soil, loam, sand, gravel, clay, seeds, plants), windsock, demonstration thermometer, rain gauge, straws, ribbons, non-standard measuring items, blocks or cubes, tuning fork, various flashlights, small paper cups, items that roll, noise makers, hot plate, opaque objects, transparent objects, foil pie pans, foil muffin cups, wax paper, technology, Sun-Moon-Earth model, and plant life cycle model;	
(E)	collect observations and measurements as evidence;	
(F)	record and organize data using pictures, numbers, words, symbols, and simple graphs; and	
(G)	develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.	The work group considered the proposed amendment and decided no changes were necessary.

(2)	**Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:**	
(A)	identify basic advantages and limitations of models such as their size~~, scale,~~ properties, and materials;	The work group considered the proposed amendment and decided no changes were necessary. The work group determined that "scale" is a little abstract and more developmentally appropriate for 3-5.
(B)	analyze data by identifying significant features and patterns;	
(C)	use mathematical concepts to compare two objects with common attributes; and	
(D)	evaluate a design or object using criteria to determine if it works as intended.	The proposed amendment would change the intention of the SE; the work group has determined that this SE is developmentally appropriate
(3)	**Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:**	
(A)	develop explanations and propose solutions supported by data and models;	
(B)	communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and	SE must begin with a verb; "descriptive investigations" limit student response and eliminating engineering skills. As written, the SE provides additional breadth for collaboration and mediums of communication.
(C)	listen actively to others' explanations to identify important evidence and engage respectfully in scientific discussion.	
(4)	**Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:**	
~~(A)~~	~~make informed decisions when reviewing promotional materials for products and services~~	The work group considered and agreed with the recommendation to eliminate this SE.
(A)	explain how science or an innovation can help others; and	
(B)	identify what a scientist or engineer is and explore what different scientists and engineers do.	

~~(1)~~	**~~Scientific investigation and reasoning. The student conducts classroom and outdoor investigations following home and school safety procedures and uses environmentally appropriate and responsible practices. The student is expected to:~~**	Replaced with scientific and engineering practices
~~(A)~~	~~identify, discuss, and demonstrate safe and healthy practices as outlined in Texas Education Agency-approved safety standards during classroom and outdoor investigations, including wearing safety goggles or chemical splash goggles, as appropriate, washing hands, and using materials appropriately; and~~	
~~(B)~~	~~demonstrate how to use, conserve, and dispose of natural resources and materials such as conserving water and reusing or recycling paper, plastic, and metal.~~	
~~(2)~~	**~~Scientific investigation and reasoning. The student develops abilities to ask questions and seek answers in classroom and outdoor investigations. The student is expected to:~~**	
~~(A)~~	~~ask questions about organisms, objects, and events observed in the natural world;~~	
~~(B)~~	~~plan and conduct simple descriptive investigations;~~	
~~(C)~~	~~collect data and make observations using simple tools;~~	
~~(D)~~	~~record and organize data and observations using pictures, numbers, and words; and~~	
~~(E)~~	~~communicate observations about simple descriptive investigations.~~	
~~(3)~~	**~~Scientific investigation and reasoning. The student knows that information and critical thinking are used in scientific problem solving. The student is expected to:~~**	
~~(A)~~	~~identify and explain a problem such as the impact of littering and propose a solution;~~	
~~(B)~~	~~make predictions based on observable patterns in nature; and~~	
~~(C)~~	~~explore that scientists investigate different things in the natural world and use tools to help in their investigations.~~	
~~(4)~~	**~~Scientific investigation and reasoning. The student uses age-appropriate tools and models to investigate the natural world. The student is expected to:~~**	
~~(A)~~	~~collect information using tools, including computing devices, hand lenses, primary balances, cups, bowls, magnets, collecting nets, and notebooks; timing devices; non-standard measuring items; weather instruments such as demonstration thermometers; and materials to support observations of habitats of organisms such as terrariums and aquariums; and~~	
~~(B)~~	~~use the senses as a tool of observation to identify properties and patterns of organisms, objects, and events in the environment.~~	

(5)	**Matter and its interactions ~~energy~~. The student knows that objects have observable properties that determine how it is described and classified. ~~The student knows that objects have properties and patterns.~~ The student is expected to:**	Possible strand title change to "and its interactions." more detail in KS here and in 1 Mass discussion: examine math K.7.A "measurable attribute"
(A)	identify ~~observe~~ and record observable properties of objects, including ~~bigger or smaller, heavier or lighter,~~ shape, color, ~~and~~ texture, and material, and generate additional ways to classify objects; and	
(B)	~~*observe, record, and discuss how materials can be changed by heating or cooling.*~~	The workgroup chose to emphasize heating and cooling in grade 1
(6)	**Force and~~,~~ motion~~, and energy~~. The student knows that ~~energy,~~ force, ~~and~~ motion, and position ~~are related and~~ are a part of their everyday life. The student is expected to:**	
~~*(A)*~~	~~*use the senses to explore different forms of energy such as light, thermal, and sound;*~~	Moved to (7)
~~(B)~~	~~explore interactions between magnets and various materials;~~	The group felt that students should have more time to investigate push-pull with magnets in grade 1
(A)~~(C)~~	~~observe and~~ describe the location of an object in relation to another such as above, below, behind, in front of, and beside; and	
(B)~~(D)~~	~~observe and~~ describe and demonstrate the ways that objects can move such as in a straight line, zigzag, up and down, back and forth, round and round, and fast and slow.	
(7)	**Energy. The student knows that energy exists in many forms and is a part of their everyday life. The student is expected to:**	New KS. The work group wanted to separate force and motion from energy to provide additional clarity for teachers.
(A)	~~***use the senses***~~ identify and describe ~~to explore~~ different forms of energy including ~~such as~~ light, thermal, and sound us~~e~~ing *the senses*;	Was originally (6)(A).
(B)	demonstrate that objects can only be seen when a light source is present and compare the effects of *different amounts of light* on the appearance of objects; and	The group chose to take a deep dive into one form of energy in each grade level K-2 while still touching on each form for vertical alignment.
(C)	identify and demonstrate that light travels through some objects and is blocked by other objects, creating shadows.	The group chose to take a deep dive into one form of energy in each grade level K-2 while still touching on each form for vertical alignment. Added to align to K-12 framework; supports vertical alignment with grade 4.

(8)~~(7)~~	**Earth and Space.** ***The student knows that there are recognizable patterns in the natural world and among objects in the sky.*** ~~***The student knows that the natural world includes earth materials.***~~ **The student is expected to:**	Moved KS from (8)
(A)	*identify,* describe, and predict the ~~*events that have repeating*~~ *patterns*~~*s*~~*,* ~~*including seasons*~~ *of* ~~the year and~~ *day and night* and their observable characteristics*; and*	Was originally (8)(B); deeper dive into day/night patterns
(B)	*observe, describe, and illustrate the Sun* and other *objects in the sky such as the clouds, Moon, and stars*~~, including the Sun~~.	Was originally (8)(C)
(C)	*observe and describe weather changes from day to day and over seasons;*	Was originally (8)(A)
~~(A)~~	~~*observe, describe, and sort rocks by size, shape, color, and texture;*~~	Was originally (7)(A)
~~(B)~~	~~observe and describe physical properties of natural sources of water, including color and clarity; and~~	The WG felt that a deeper dive into water was more appropriate at grade 1
~~(C)~~	~~*give examples of ways rocks, soil, and water are useful.*~~	Moved to new (10)
(9)~~(8)~~	**Earth and Space.** ***The student knows that the natural world includes earth materials.*** ~~***The student knows that there are recognizable patterns in the natural world and among objects in the sky.***~~ **The student is expected to:**	Framework: connection to life science
(A)	~~*observe,*~~ describe, and classify ~~*sort*~~ *rocks by* the observable properties of *size, shape, color, and texture;*	Was originally (7)(A)
~~*(A)*~~	~~*observe and describe weather changes from day to day and over seasons;*~~	Moved to new (8)
~~*(B)*~~	~~*identify events that have repeating patterns, including seasons of the year and day and night; and*~~	Moved to Grade 1, new (7)(C)
~~*(C)*~~	~~*observe, describe, and illustrate objects in the sky such as the clouds, Moon, and stars, including the Sun.*~~	Moved to Grade 1, new (7)(C)
(10)	**Earth and Space. The student knows that earth materials, and products made from these materials, are important to everyday life. The student is expected to:**	
(A)	describe how plants, animals, and humans use ~~give examples of ways~~ *rocks, soil, and water* ~~are useful~~.	Was originally (7)(C)
(11)~~(9)~~	**Organisms and environments. The student knows that plants and animals have basic needs** ~~**and depend on the living and nonliving things around them**~~ **for survival. The student is expected to:**	Work group deleted language to improve alignment with SEs.
(A)	*identify that air, sunlight, water, nutrients,* ~~*sunlight*~~*, and space are basic needs of plants;*	Moved from Grade 2 (9)(A); combined with (1)(B) group reordered list to reflect importance for both plants and animals in (A) and (B) Nutrients were changed to minerals to align with the K-12 framework. TEKS guide – define "nutrients" to include minerals and other substances

(B)	*identify that* air, ~~*food,*~~ *water*, *food,* space, *and shelter are basic needs of animals;*	Moved from Grade 2 (9)(A); combined with (1)(B)
~~(A)~~	~~differentiate between living and nonliving things based upon whether they have basic needs and produce offspring; and~~	SE deleted from K because it is addressed in G1
~~(B)~~	~~examine evidence that living organisms have basic needs such as~~ *food, water, and shelter for animals and air, water, nutrients, sunlight, and space for plants*.	Moved to new (11)(A)
(12)~~(10)~~	**Organisms and environments. The student knows that organisms resemble their parents and have structures and processes that help them interact with ~~survive within~~ their environments. The student is expected to:**	parts of plants and animals
~~*(4)*~~	~~*sort plants and animals into groups based on physical characteristics such as color, size, body covering, or leaf shape;*~~	Potentially move to 2nd grade.
(A)	identify the different parts of plants including roots, stems, leaves, flowers, fruits;	New standard created to better align with the K-12 framework and make clear the parts of plants students need to know.
(B)	identify that animal have different parts that allow them to interact with their environment such as seeing, hearing, moving, and grasping objects; ~~identify basic parts of plants and animals~~	New standard created to separate and clarify information about plant and animals more closely aligned to the K-12 framework (In first do a deeper dive of how these parts help the animals to protect themselves, move from place to place, seek, find, and take in food, water and air).
(C)~~(D)~~	identify and record the changes from seed, seedling, plant, flower, and fruit in a simple plant life cycle; and ~~observe changes that are part of a simple life cycle of a plant: seed, seedling, plant, flower, and fruit.~~	Verbs were changed to make standard more measurable.
(D)~~(C)~~	identify ways that young plants resemble the parent plant.~~; and~~	Order of 10C and 10D reversed to improve instructional progression.

§112.3~~12.~~ Science, Grade 1~~, Adopted 2017~~.		
	TEKS with edits	Work Group Comments/Rationale
(a)	**Introduction.**	
(1)	In Kindergarten–Grade 5, content is organized into recurring strands. The concepts within each grade level build on prior knowledge and prepare students for the next grade level and establish a foundation in science. In Grade 1, the following concepts will be addressed in each strand:	Work Group E drafted paragraph (1).
(A)	Scientific and engineering practices. ~~Scientific inquiry.~~ *Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the* grade level and *question being asked. Student learning for different types of investigations include descriptive investigations* (Kindergarten-Grade 5), *which involve collecting data and recording observations without making comparisons; comparative investigations* (Grades 6-12), *which involve collecting data with variables that are manipulated to compare results; and experimental investigations* (Grades 5-12), *which involve processes similar to comparative investigations but in which a control is identified*.	
(i)	*Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.*	
(ii)	*Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.*	
(iii)	To support instruction in the content standards, it is recommended that ~~D~~*districts* ~~are encouraged to~~ integrate ~~facilitate~~ scientific and engineering practices through *classroom and outdoor investigations for at least 80% of instructional time.*	This sentence appears in the current TEKS and has been added to the draft recommendations and revised.
(B)	Matter and Energy. Students will build their knowledge of the natural world using their senses. In Grade 1, students will focus on observable properties and patterns of objects including larger and smaller, heavier and lighter, shape, color, and texture. The students will understand changes in materials caused by heating and cooling.	
(C)	Force, motion, and energy. Students know that force and motion are related and that energy exists in many forms as a part of everyday life. Magnetism interacts with various materials and can be used as a push and pull. The students will investigate the importance of light, thermal, and sound energy and will focus on demonstrating thermal energy sources and its effect on objects.	

(D)	Earth and space. Patterns, cycles, and systems are recognizable in the natural world including air and among objects in the sky. Students will make informed choices by understanding weather and seasonal patterns. Natural resources on Earth including saltwater and freshwater move materials from one location to another and can be conserved.	
(E)	Organisms and environments. All living organisms interact with living and nonliving things within their environments using their structures and functions to meet their basic needs. Students know that interdependence among organisms are part of a food chain. The students will investigate the life cycle of animals and identify likenesses between parents and young.	
(2)	Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not currently scientifically testable.	An introduction subcommittee developed recommendations for paragraphs (2)–(6), which have been incorporated into the Work Group E recommendations chart.
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(A)	hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; and	
(B)	scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well established and highly reliable explanations, but they may be subject to change as new areas of science and new technologies are developed.	
~~(4)~~	~~*Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.*~~	For Kindergarten through Grade 5, paragraph (4) of the introduction appears in paragraph (1) with a description of the strands.
~~(A)~~	~~*Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.*~~	

~~(B)~~	~~*Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.*~~	
(4) ~~(5)~~	Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carried out. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information).	
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(6) ~~(7)~~	Statements containing the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	
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(1)	**Scientific and engineering practices. The student asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:**	A separate Scientific and Engineering Practices Work Group developed recommendations for revisions to the current process skills for K-12, which have been incorporated into the Work Group E recommendations chart.
(A)	ask questions and define problems based on observations or information from text, phenomena, models, or investigations;	
(B)	use scientific practices to plan and conduct simple descriptive investigations and use engineering practices to design solutions to problems;	
(C)	identify, describe, and demonstrate safe practices during classroom and field investigations as outlined in Texas Education Agency-approved safety standards;	
(D)	use tools to observe, measure, test, and compare, including hand lenses, goggles, heat-resistance gloves, trays, cups, bowls, beakers, sieves/sifters, tweezers, primary balance, notebooks, terrariums, aquariums, stream tables, soil samples (loam, sand, gravel, rocks, clay), seeds, plants, windsock, pinwheel, student thermometer, demonstration thermometer, rain gauge, straws, ribbons, non-standard measuring items, flashlights, sandpaper, wax paper, items that are magnetic, non-magnetic items, a variety of magnets, hot plate, aluminum foil, technology, Sun-Moon-Earth model, plant and animal life cycle models;	
(E)	collect observations and measurements as evidence;	

(F)	record and organize data using pictures, numbers, words, symbols, and simple graphs; and	
(G)	develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.	
(2)	**Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:**	
(A)	identify basic advantages and limitations of models such as their size, scale, properties, and materials;	
(B)	analyze data by identifying significant features and patterns;	
(C)	use mathematical concepts to compare two objects with common attributes; and	
(D)	evaluate a design or object using criteria to determine if it works as intended.	
(3)	**Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:**	
(A)	develop explanations and propose solutions supported by data and models;	
(B)	communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and	
(C)	listen actively to others' explanations to identify important evidence and engage respectfully in scientific discussion.	
(4)	**Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:**	
~~(A)~~	~~make informed decisions when reviewing promotional materials for products and services~~	The work group considered and agreed with the recommendation to eliminate this SE.
(A)	explain how science or an innovation can help others; and	
(B)	identify what a scientist or engineer is and explore what different scientists and engineers do.	
~~(1)~~	~~**Scientific investigation and reasoning. The student conducts classroom and outdoor investigations following home and school safety procedures and uses environmentally appropriate and responsible practices. The student is expected to:**~~	Replaced with scientific and engineering practices

(A)	identify, discuss, and demonstrate safe and healthy practices as outlined in Texas Education Agency-approved safety standards during classroom and outdoor investigations, including wearing safety goggles or chemical splash goggles, as appropriate, washing hands, and using materials appropriately; and	
(B)	demonstrate how to use, conserve, and dispose of natural resources and materials such as conserving water and reusing or recycling paper, plastic, and metal.	
(2)	**Scientific investigation and reasoning. The student develops abilities to ask questions and seek answers in classroom and outdoor investigations. The student is expected to:**	
(A)	ask questions about organisms, objects, and events observed in the natural world;	
(B)	plan and conduct simple descriptive investigations;	
(C)	collect data and make observations using simple tools;	
(D)	record and organize data and observations using pictures, numbers, and words; and	
(E)	communicate observations about simple descriptive investigations.	
(3)	**Scientific investigation and reasoning. The student knows that information and critical thinking are used in scientific problem solving. The student is expected to:**	
(A)	identify and explain a problem such as the impact of littering and propose a solution;	
(B)	make predictions based on observable patterns in nature; and	
(C)	explore that scientists investigate different things in the natural world and use tools to help in their investigations.	
(4)	**Scientific investigation and reasoning. The student uses age-appropriate tools and models to investigate the natural world. The student is expected to:**	
(A)	collect information using tools, including computing devices, hand lenses, primary balances, cups, bowls, magnets, collecting nets, and notebooks; timing devices; non-standard measuring items; weather instruments such as demonstration thermometers; and materials to support observations of habitats of organisms such as terrariums and aquariums; and	
(B)	use the senses as a tool of observation to identify properties and patterns of organisms, objects, and events in the environment.	

(5)	Matter and **its interactions** ~~**energy**~~. The student knows that objects have properties and **that objects can be understood by their properties and their interactions** ~~**patterns**~~. The student is expected to:	man-made v. natural added to this KS? more detail in KS here and in K Mass discussion: examine math K.7.A "measurable attribute"
(A)	classify objects by observable properties, including ~~such as~~ *~~larger and smaller, heavier and lighter,~~* shape, color, and texture and attributes such as *larger and smaller and heavier and lighter*; and	
(B)	compare *~~predict~~* ~~and~~ ~~identify,~~ and *predict* changes in materials caused by heating and cooling~~:~~. ~~and~~	
~~*(C)*~~	~~*classify objects by the materials from which they are made.*~~	Moved topic of materials into Kindergarten
(6)	**Force and~~,~~ motion~~, and energy~~. The student knows that force and~~,~~ motion~~, and energy~~ are related and are a part of everyday life. The student is expected to:**	
~~(A)~~	~~*identify and discuss how different forms of energy such as light, thermal, and sound are important to everyday life;*~~	Moved to new (7)
(A) ~~(B)~~	*describe and* predict ~~*and describe*~~ how a magnet interacts with ~~*can be used to push or pull*~~ ~~an~~ various ~~object~~ materials and how they *can be used to push or pull*; and	The group thought that students should have the opportunity to take a deeper dive into magnets in grade 1.
~~*(C)*~~	~~*demonstrate and record the ways that objects can move such as in a straight line, zig zag, up and down, back and forth, round and round, and fast and slow.*~~	The group felt that this was a better fit in K.
(7)	**Energy. The student knows that energy exists in many forms and is a part of everyday life. The student is expected to:**	New KS. The work group wanted to separate force and motion from energy to provide additional clarity for teachers.
(A)	*identify and* explain ~~discuss~~ *how different forms of energy*, including ~~such as~~ *light, thermal, and sound, are important to everyday life;*	Was originally (6)(A).
(B)	investigate and describe applications of thermal energy in everyday life such as cooking food or using a hair dryer; and	The group chose to take a deep dive into one form of energy in each grade level K-2 while still touching on each form for vertical alignment.
(C)	describe how some changes caused by thermal energy may be reversed, such as *melting butter* and other changes cannot be reversed, such as baking a cake.	The group chose to take a deep dive into one form of energy in each grade level K-2 while still touching on each form for vertical alignment. Melting butter example moved from grade 2.

(8)~~(7)~~	**Earth and space.** ***The student knows that the natural world has recognizable patterns.*** ~~***The student knows that the natural world includes rocks, soil, and water that can be observed in cycles, patterns, and systems.***~~ **The student is expected to:**	The work group wanted to take a deeper dive into concept surrounding water. deeper dive into seasons
(A)	describe ~~*demonstrate*~~ *that air is all around us and demonstrate* ~~*observe*~~ *that wind is moving air* using items such as a windsock, pinwheel, or ribbon .	Was originally (8)(D)
(B)	*record weather information, including relative temperature such as hot or cold, clear or cloudy, calm or windy, and rainy or icy* using the senses;	Was originally (8)(A)
(C)	identify and describe characteristics of seasonal weather patterns and *seasonal choices in clothing and~~,~~ activities* ; and	modified from Kinder (8)(B) and (8)(C) and Grade 2 (8)(C)
(D)	predict the patterns of seasons of the year such as order of occurrence and changes in nature.	modified from Kinder (8)(B) and (8)(C)
~~(A)~~	~~observe,~~ *components of different types of soils* ~~components of soil by size, texture, and color~~;	
~~(B)~~	~~*identify and describe a variety of natural sources of water, including streams, lakes, and oceans; and*~~	
~~(C)~~	~~*identify how rocks, soil, and water are used to make products.*~~	Moved to (10)(A)
(9)~~(8)~~	**Earth and space.** ~~***The student knows that the natural world includes the air around us and objects in the sky.***~~ ***The student knows that the natural world includes*** **earth materials** ***that can be observed in*** ~~**cycles, patterns, and**~~ ***systems*** **and processes.** **The student is expected to:**	
~~*(A)*~~	~~*record weather information, including relative temperature such as hot or cold, clear or cloudy, calm or windy, and rainy or icy;*~~	
~~(B)~~	~~observe and record changes in the appearance of objects in the sky such as the Moon and stars, including the Sun;~~	Work group felt this was developmentally inappropriate; teachers were interpreting this to include moon phases and changes in constellations
~~*(C)*~~	~~*identify characteristics of the seasons of the year and day and night; and*~~	Moved (7)(A) and Kinder (7)(A)
~~*(D)*~~	~~*demonstrate that air is all around us and observe that wind is moving air.*~~	
(A)	investigate and document characteristics and ~~observe,~~ *components of different types of soils* ~~components of soil by size, texture, and color~~;	Was originally (7)(A)
(B)	identify and compare ~~describe~~ a variety of natural sources of freshwater and saltwater, including streams, lakes, and oceans;	Was originally (7)(B) Moved from grade 2 (7)(B)
(C)	investigate and describe how water can move rocks and soil from one place to another;	

(10)	**Earth and space. The student knows that earth materials are important to everyday life. The student is expected to:**	
(A) ~~(C)~~	generate examples of practical uses for ~~identify how~~ *rocks, soil, and water* ~~are used to make products~~; and~~.~~	Was originally (7)(C)
(B)	describe ways to conserve and protect natural sources of water such as turning off the faucet when brushing teeth and keeping trash out of bodies of water.	
(11)~~(9)~~	**Organisms and environments. The student knows that the ~~living~~ environment is composed of relationships between living organisms and nonliving components ~~organisms and the life cycles that occur~~. The student is expected to:**	food chains
(A)	describe ~~sort~~ and classify living and nonliving things based upon whether they have basic needs and produce young ~~offspring~~;	Language changed to make more developmentally appropriate and align with the K-12 framework.
(B)	analyze and record examples of interactions among living and nonliving components ~~interdependence found~~ in ~~various situations such as~~ terrariums or ~~and~~ aquariums ~~or pet and caregiver;~~ and	Aquariums or terrariums were included as a part of the SE because they are good models of interdependence and should be used.
(C)	identify and illustrate ways that living organisms depend on each other through food chains. ~~gather evidence of interdependence among living organisms such as energy transfer through food chains or animals using plants for shelter.~~	New standard created to clarify focus of expectation centered on food chains as an example of dependence and to lay a foundation for energy transfer in later grades.
(12)~~(10)~~	**Organisms and environments. The student knows that organisms resemble their parents and have structures and processes that help them survive within their environments. The student is expected to:**	
(A)	Identify and compare ~~investigate~~ how the external characteristics of an animal are related to where it lives, how it moves, and what it eats;	Examples can be added to the TEKS guide – general environment (land/water), specific environment (desert/forest/lake/ocean), animals can be chosen based on student's experience
~~(B)~~	~~identify and compare the parts of plants;~~	content moved to kindergarten new SE 10.A.
(C)	compare ways that young animals resemble their parents~~; and~~	C & D were reversed for a more natural flow
(B)~~(D)~~	record observations of and describe ~~observe and record~~ basic life cycles of animals including a bird, a mammal, and a fish; and ~~such as a chicken, frog, or fish~~;	Example of the frog was moved to 2nd grade to align with similar cycles displayed by insects and replaced with dog as an illustrative example of a mammal.

§112.413. Science, Grade 2, Adopted 2017.		
	TEKS with edits	Work Group Comments/Rationale
(a)	**Introduction.**	
(1)	In Kindergarten–Grade 5, content is organized into recurring strands. The concepts within each grade level build on prior knowledge and prepare students for the next grade level and establish a foundation in science. In Grade 2, the following concepts will be addressed in each strand:	Work Group E drafted paragraph (1).
(A)	Scientific and engineering practices. ~~Scientific inquiry.~~ *Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the* grade level and *question being asked. Student learning for different types of investigations include descriptive investigations* (Kindergarten-Grade 5), *which involve collecting data and recording observations without making comparisons; comparative investigations* (Grades 6-12), *which involve collecting data with variables that are manipulated to compare results; and experimental investigations* (Grades 5-12), *which involve processes similar to comparative investigations but in which a control is identified.*	
(i)	*Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.*	
(ii)	*Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.*	
(iii)	To support instruction in the content standards, it is recommended that ~~D~~*districts* ~~are encouraged to~~ integrate ~~facilitate~~ *scientific and engineering practices through classroom and outdoor investigations for at least 60% of instructional time.*	This sentence appears in the current TEKS and has been added to the draft recommendations and revised.
(B)	Matter and energy. Students will build upon their knowledge of the natural world using their senses. In Grade 2, the students will focus on physical properties of matter and determine how observable properties can be changed through various processes. Students will use these processes to combine and form mixtures.	
(C)	Force, motion, and energy. Students know that force and motion are related and that energy exists in many forms as a part of everyday life. Magnetism interacts with various materials and can be used as a push and pull. The students will investigate the importance of light, thermal, and sound energy and will focus on demonstrating thermal energy sources and its effect on objects.	

(D)	Earth and space. Patterns, cycles, and systems are recognizable in the natural world including air and among objects in the sky. Students will make informed choices by understanding weather and seasonal patterns. Natural resources on Earth including saltwater and freshwater move materials from one location to another and can be conserved.	
(E)	Organisms and environments. All living organisms interact with living and nonliving things within their environments using their structures and functions to meet their basic needs. Students know that interdependence among organisms are part of a food chain. The students will investigate the life cycle of animals and identify likenesses between parents and young.	
(2)	Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not currently scientifically testable.	An introduction subcommittee developed recommendations for paragraphs (2)–(6), which have been incorporated into the Work Group E recommendations chart.
(3)	Scientific hypotheses and theories. Students are expected to know that:	
(A)	hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; and	
(B)	scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well established and highly reliable explanations, but they may be subject to change as new areas of science and new technologies are developed.	
~~(4)~~	~~*Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.*~~	For Kindergarten through Grade 5, paragraph (4) of the introduction appears in paragraph (1) with a description of the strands.
~~(A)~~	~~*Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.*~~	
~~(B)~~	~~*Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.*~~	

(4) ~~(5)~~	Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carried out. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information).	
(5) ~~(6)~~	Science consists of recurring themes and making connections between overarching concepts. Recurring themes include systems, models, and patterns. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested, while models allow for boundary specification and provide a tool for understanding the ideas presented. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.	
(6) ~~(7)~~	Statements containing the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	
(b)	**Knowledge and skills.**	
(1)	**Scientific and engineering practices. The student asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:**	A separate Scientific and Engineering Practices Work Group developed recommendations for revisions to the current process skills for K-12, which have been incorporated into the Work Group E recommendations chart.
(A)	ask questions and define problems based on observations or information from text, phenomena, models, or investigations; and	
(B)	use scientific practices to plan and conduct simple descriptive investigations and use engineering practices to design solutions to problems.	TEKS guide - definitions and comparisons of what precisely is meant by “scientific practices” and “engineering practices” and how engineering practices are meant to be used in support of science content, not on their own; see pg. 42 of framework
(C)	identify, describe, and demonstrate safe practices during classroom and field investigations as outlined in Texas Education Agency-approved safety standards;	
(D)	use tools to observe, measure, test, and compare, including hand lenses, goggles, heat-resistance gloves, trays, cups, bowls, beakers, notebooks, stream tables, soil, sand, gravel, flowering plants, student thermometer, demonstration thermometer, rain gauge, flashlights, ramps, balls, spinning tops, drums, tuning forks, sandpaper, wax paper, items that are flexible, non-flexible items, magnets, hot plate, aluminum foil, technology, Sun-Moon-Earth model, frog and butterfly life cycle models;	
(E)	collect observations and measurements as evidence;	

(F)	record and organize data using pictures, numbers, words, symbols, and simple graphs; and	
(G)	develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.	
(2)	**Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:**	
(A)	identify basic advantages and limitations of models such as their size, scale, properties, and materials;	
(B)	analyze data by identifying significant features and patterns;	
(C)	use mathematical concepts to compare two objects with common attributes; and	
(D)	evaluate a design or object using criteria to determine if it works as intended.	
(3)	**Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:**	
(A)	develop explanations and propose solutions supported by data and models;	
(B)	communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and	
(C)	listen actively to others' explanations to identify important evidence and engage respectfully in scientific discussion.	
(4)	**Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:**	
~~(A)~~	~~make informed decisions when reviewing promotional materials for products and services;~~	The WG considered and agreed with the recommendation to eliminate this SE.
(A)	explain how science or an innovation can help others	
(B)	identify what a scientist and ~~or~~ engineer is and explore what different scientists and engineers do	Work group felt the conjunction should be "and" in both instances in the SE
~~(1)~~	~~**Scientific investigation and reasoning. The student conducts classroom and outdoor investigations following home and school safety procedures and uses environmentally appropriate and responsible practices. The student is expected to:**~~	Replaced with scientific and engineering practices

(A)	identify, discuss, and demonstrate safe and healthy practices as outlined in Texas Education Agency-approved safety standards during classroom and outdoor investigations, including wearing safety goggles or chemical splash goggles, as appropriate, washing hands, and using materials appropriately; and	
(B)	demonstrate how to use, conserve, and dispose of natural resources and materials such as conserving water and reusing or recycling paper, plastic, and metal.	
(2)	**Scientific investigation and reasoning. The student develops abilities to ask questions and seek answers in classroom and outdoor investigations. The student is expected to:**	
(A)	ask questions about organisms, objects, and events observed in the natural world;	
(B)	plan and conduct simple descriptive investigations;	
(C)	collect data and make observations using simple tools;	
(D)	record and organize data and observations using pictures, numbers, and words; and	
(E)	communicate observations about simple descriptive investigations.	
(3)	**Scientific investigation and reasoning. The student knows that information and critical thinking are used in scientific problem solving. The student is expected to:**	
(A)	identify and explain a problem such as the impact of littering and propose a solution;	
(B)	make predictions based on observable patterns in nature; and	
(C)	explore that scientists investigate different things in the natural world and use tools to help in their investigations.	
(4)	**Scientific investigation and reasoning. The student uses age-appropriate tools and models to investigate the natural world. The student is expected to:**	
(A)	collect information using tools, including computing devices, hand lenses, primary balances, cups, bowls, magnets, collecting nets, and notebooks; timing devices; non-standard measuring items; weather instruments such as demonstration thermometers; and materials to support observations of habitats of organisms such as terrariums and aquariums; and	
(B)	use the senses as a tool of observation to identify properties and patterns of organisms, objects, and events in the environment.	

(5)	**Matter and its interactions ~~energy~~. The student knows that matter has physical properties and those properties determine how it is described, classified, changed, and used. The student is expected to:**	
(A)	classify matter by observable ~~physical~~ properties, including ~~relative temperature,~~ texture, flexibility, and relative temperature and identify whether a material is a solid or liquid;	Work group wanted to reorder the list so that it was clear that "relative" referred only to temperature.
~~(B)~~	~~compare changes in materials caused by heating and cooling;~~	Work group felt this should be covered more in depth in grade 1.
(B)~~(C)~~	demonstrate that physical properties can be changed through processes ~~things can be done to materials~~ such as cutting, folding, sanding, and melting ~~*to change their physical properties*~~; and	
(C)~~(D)~~	create a mixture by combining two or more substances and identify the physical properties of the substances and the mixture. ~~combine materials that when put together can do things that they cannot do by themselves such as building a tower or a bridge and justify the selection of those materials based on their physical properties.~~	
(6)	**Force and~~,~~ motion~~, and energy~~. The student knows that forces cause change in everyday life ~~and energy exists in many forms~~. The student is expected to:**	To avoid creating teacher misconceptions, this strand was split into two: force & motion and energy. This allows these KS to be more accurately interpreted by the teachers. As grade level increases, students can better understand the connections between force, motion, and energy, so this strand is re-merged.
~~(A)~~	~~*investigate the effects on objects by increasing or decreasing amounts of light, heat, and sound energy such as how the color of an object appears different in dimmer light or how heat melts butter;*~~	Moved to new (7)
(A)~~(B)~~	plan and conduct an investigation that uses pushes and pulls to identify patterns of movement *such as sliding, rolling, and spinning* ~~observe and identify how magnets are used in everyday life;~~ and	The group thought this was an opportunity to bring SEP into the standard and expand pull-pull beyond magnets.
~~(C)~~	~~trace and compare *patterns of movement* of objects *such as sliding, rolling, and spinning* over time.~~	Moved into new (6)(A).

(7)	**Energy. The student knows that energy exists in many forms and is a part of everyday life. The student is expected to:**	New KS. The work group wanted to separate force and motion from energy to provide additional clarity for teachers.
(A)	compare different forms of energy including ~~investigate the effects on objects by increasing or decreasing amounts of~~ *light,* thermal, ~~heat,~~ *and sound energy* ~~such as how the color of an object appears different in dimmer light or how heat melts butter;~~	Was originally (6)(A). Effects of light has been moved to Kindergarten and melting butter has been moved to grade 1.
(B)	demonstrate and explain that sound energy is made by vibrating matter and that sound energy can make matter vibrate; and	TEKS guide: not about pitch or frequency The group chose to take a deep dive into one form of energy in each grade level K-2 while still touching on each form for vertical alignment.
(C)	explain how different levels of sound energy are used in everyday life such as a whisper in a classroom or a fire alarm.	The group chose to take a deep dive into one form of energy in each grade level K-2 while still touching on each form for vertical alignment. Added to align to K-12 framework.
(8)~~(7)~~	**Earth and space.** ***The student knows that there are recognizable patterns in the natural world and among objects in the sky.*** ~~***The student knows that the natural world includes earth materials.***~~ **The student is expected to:**	
(A)	illustrate and describe the Sun as a star composed of gases that provides light and thermal energy;	Requested and agreed by work group members to be moved from 3rd grade
(B)	explain that the Sun produces its own light energy and that the Moon reflects the Sun's light energy;	The directly addresses a common misconception, making sure students know that stats create their own light and Moon does not. TEKS guide: to observe this, observe the Moon during the day compared to the location of the sun
(C)	*measure, record, and graph weather information, including temperature* and~~, wind conditions,~~ *precipitation*~~, and cloud coverage, in order to identify patterns in the data;~~	Moved from current (8)(A)
~~(A)~~	~~observe, describe, and compare rocks by size, texture, and color;~~	duplicative of content addressed in grade 1
~~(B)~~	~~identify and *compare* the properties of natural sources of *freshwater and saltwater;*~~ and	Somewhat duplicative of grade 1 (7)(B); some content moved to that grade
~~*(C)*~~	~~*distinguish between natural and manmade resources.*~~	Originally (7)(C); possible move to new (10)

(9)~~(8)~~	**Earth and space.** ***The student knows that the natural world includes earth materials.*** ~~***The student knows that there are recognizable patterns in the natural world and among objects in the sky.***~~ **The student is expected to:**	
(A)	investigate and describe how wind and water can carry soil and rocks across the earth's surface such as wind blowing sand on a beach or a river carrying rocks as it flows;	
~~*(A)*~~	~~*measure, record, and graph weather information, including temperature, wind conditions, precipitation, and cloud coverage, in order to identify patterns in the data;*~~	moved to new (8)(C)
~~*(B)*~~	~~*identify the importance of weather and seasonal information to make choices in clothing and activities, and transportation; and*~~	moved to grade 1
~~(C)~~	~~observe, describe, and record patterns of objects in the sky, including the appearance of the Moon.~~	Removed because Grade 3 addresses the relationship between Sun, Earth, and Moon - deeper dive into celestial pattern.
(10)	**Earth and space. The student knows that earth materials are important to everyday life. The student is expected to:**	
(A)	*distinguish between natural and manmade resources.*	Originally (7)(C);
(B)	*demonstrate how to use, conserve, and dispose of* ~~*natural resources and*~~ *materials such as* reusing ~~*conserving water and reuse*~~ *or recycling* ~~*of*~~ *paper, plastic, and metal*.	Moved from current 1.B
(11)~~(9)~~	**Organisms and environments. The student knows that living organisms have basic needs that must be met through interactions** ~~**for them to survive**~~ **within their environment. The student is expected to:**	environment
~~*(A)*~~	~~*identify the basic needs of plants and animals;*~~	moved to Kinder (9)(A)
(A)~~(B)~~	explain how temperature and precipitation affect growth and behavior of animals through migration and hibernation, and plants responses through dormancy. ~~identify factors in the environment, including temperature and precipitation, that affect growth and behavior such as migration, hibernation, and dormancy of living things; and~~	
~~(C)~~	~~compare the ways living organisms depend on each other and on their environments such as through food chains.~~	
(B)	design and create a model to demonstrate the ways animals depend on other living things using food chains that include producers and consumers;	
(C)	explain and demonstrate how plants depend on other living things for pollination and to move their seeds around.	

(12)~~(10)~~	**Organisms and environments. The student knows that organisms ~~resemble their parents and~~ have structures and processes that help them survive within their environments. The student is expected to:**	physical char and behaviors
(B)~~(A)~~	record and compare how the physical characteristics and behaviors of animals help them to find and take in food, water, and air; and ~~observe, record, and compare how the physical characteristics and behaviors of animals help them meet their basic needs;~~	
(A)~~(B)~~	identify and compare how plants have roots, stems, leaves, flowers, fruits, and seeds that help them meet their basic needs to survive, grow, and produce more plants; ~~observe, record, and compare how the physical characteristics of plants help them meet their basic needs such as stems carry water throughout the plant; and~~	
(C)	investigate and describe some of the unique life cycles of animals where young animals do not resemble their parents, including butterflies and frogs. ~~investigate and record some of the unique stages that insects such as grasshoppers and butterflies undergo during their life cycle.~~	

§112.514. Science, Grade 3, Adopted 2017.		
TEKS with edits		Work Group Comments/Rationale
(a)	**Introduction.**	
(1)	In Kindergarten–Grade 5, content is organized into recurring strands. The concepts within each grade level build on prior knowledge and prepare students for the next grade level and establish a foundation in science. In Grade 3, the following concepts will be addressed in each strand:	Work Group E drafted paragraph (1).
(A)	Scientific and engineering practices. ~~Scientific inquiry.~~ *Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the* grade level and *question being asked. Student learning for different types of investigations include descriptive investigations* (Kindergarten-Grade 5), *which involve collecting data and recording observations without making comparisons; comparative investigations* (Grades 6-12), *which involve collecting data with variables that are manipulated to compare results; and experimental investigations* (Grades 5-12), *which involve processes similar to comparative investigations but in which a control is identified.*	
(i)	*Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.*	
(ii)	*Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.*	
(iii)	To support instruction in the content standards, it is recommended that ~~D~~d*istrict*s ~~are encouraged to~~ integrate ~~facilitate~~ scientific and engineering practices through *classroom and outdoor investigations for at least 60% of instructional time.*	This sentence appears in the current TEKS and has been added to the draft recommendations and revised.
(B)	Matter and energy. In Grade 3, students will build upon the knowledge learned in Kindergarten–Grade 2 by investigating the physical properties of matter. Students will explore states of matter and observe that changes can occur to matter through heating and cooling. They will explore using substances by combining them to create or modify objects based on their physical properties.	
(C)	Force, motion, and energy. In Grade 3, this strand is divided into two knowledge and skills statements. Students will manipulate objects by pushing and pulling to demonstrate changes in motion and position. Students will also identify forces that such as magnetism and gravity. Students will understand that energy exists in many forms including mechanical, thermal and sound. They will identify forms of energy in everyday life.	

(D)	Earth and space. In Grade 3, this strand is divided into two knowledge and skills statements. Students will learn that there are recognizable processes that change the Earth over time. Students will compare day-to-day changes in weather. They will also investigate how soil is formed through the processes of weathering and decomposition. Students will model rapid changes to the Earth's surface as well as, explore was to conserve Earth's resources. Students will recognize that there are identifiable objects and patterns in the Earth's solar system. Students will model the orbits of the Sun, Earth, and Moon, as well as describe their relationship to each other. This will set the foundation for Grade 4 when they look at the moon cycle. Students will also identify the sequence of the planets in Earth's solar system.	
(E)	Organisms and environments. In Grade 3, this strand is divided into two knowledge and skills statements. Students explore patterns, systems, and cycles within environments by investigating characteristics of organisms, life cycles, and interactions among all components of the natural environment. Students examine how environment and the structures and functions of animals play a key role in survival. Students know that when changes in the environment occur organisms may thrive, become ill, or perish. Students will also examine fossils as evidence of past living organisms.	
(2)	Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not currently scientifically testable.	An introduction subcommittee developed recommendations for paragraphs (2)–(6), which have been incorporated into the Work Group E recommendations chart.
(3)	Scientific hypotheses and theories. Students are expected to know that:	
(A)	hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; and	
(B)	scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well established and highly reliable explanations, but they may be subject to change as new areas of science and new technologies are developed.	

~~(4)~~	~~*Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.*~~	For Kindergarten through Grade 5, paragraph (4) of the introduction appears in paragraph (1) with a description of the strands.
~~(A)~~	~~*Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.*~~	
~~(B)~~	~~*Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.*~~	
(4) ~~(5)~~	Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carried out. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information).	
(5) ~~(6)~~	Science consists of recurring themes and making connections between overarching concepts. Recurring themes include systems, models, and patterns. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested, while models allow for boundary specification and provide a tool for understanding the ideas presented. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.	
(6) ~~(7)~~	Statements containing the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	

(b)	**Knowledge and skills.**	A separate Scientific and Engineering Practices Work Group developed recommendations for revisions to the current process skills for K-12, which have been incorporated into the Work Group E recommendations chart.
(1)	**Scientific and engineering practices. The student asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:**	
(A)	ask questions and define problems based on observations or information from text, phenomena, models, or investigations;	
(B)	use scientific practices to plan and conduct descriptive investigations and use engineering practices to design solutions to problems;	
(C)	demonstrate safe practices and the use of safety equipment during classroom and field investigations as outlined in Texas Education Agency-approved safety standards;	
(D)	use tools to observe, measure, test, and analyze information, including hand lenses, metric rulers, Celsius thermometers, wind vanes, rain gauges, graduated cylinders, beakers, digital scales, hot plates, meter sticks, magnets, notebooks, and Sun, Earth, Moon system models; timing devices; materials to support observation of habitats of organisms such as terrariums, aquariums, and collecting nets; and materials to support digital data collection such as computers, tablets, and cameras;	TEKS guide: add information about Sun, Earth, Moon system model, specifically that it doesn't necessary have to be commercially bought.
(E)	collect observations and measurements as evidence;	
(F)	construct appropriate graphic organizers used to collect data, including tables, bar graph, line graph, tree map, concept map, Venn diagram, flow chart or sequence map, an input-output table that shows cause and effect; and	
(G)	develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.	
(2)	**Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:**	
(A)	identify advantages and limitations of models such as their size, scale, properties, and materials;	
(B)	analyze data by identifying any significant features, patterns, or sources of error;	
(C)	use mathematical calculations to compare patterns and relationships; and	

(D)	evaluate a design or object using criteria.	
(3)	**Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:**	
(A)	develop explanations and propose solutions supported by data and models;	
(B)	communicate individually and collaboratively valid conclusions to determine explanations from both direct and indirect evidence; and	Work group agrees with SBOE amendments at September 2020 SBOE meeting.
(C)	listen actively to others' explanations to identify relevant evidence and engage respectfully in scientific discussion.	
(4)	**Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:**	
~~(A)~~	~~make informed decisions when reviewing informational resources and promotional materials for products and services;~~	Work group agrees with SBOE amendments at September 2020 SBOE meeting.
(A)	explain how scientific discoveries and innovative solutions to problems impact science and society; and	
(B)	research and explore connections (connect) between grade-level appropriate science concepts and STEM careers.	
~~(1)~~	~~**Scientific investigation and reasoning. The student conducts classroom and outdoor investigations following home and school safety procedures and environmentally appropriate practices. The student is expected to:**~~	
~~(A)~~	~~demonstrate safe practices as described in Texas Education Agency-approved safety standards during classroom and outdoor investigations using safety equipment as appropriate, including safety goggles or chemical splash goggles, as appropriate, and gloves; and~~	
~~(B)~~	~~make informed choices in the use and conservation of natural resources by recycling or reusing materials such as paper, aluminum cans, and plastics.~~	
~~(2)~~	~~**Scientific investigation and reasoning. The student uses scientific practices during laboratory and outdoor investigations. The student is expected to:**~~	
~~(A)~~	~~plan and implement descriptive investigations, including asking and answering questions, making inferences, and selecting and using equipment or technology needed, to solve a specific problem in the natural world;~~	
~~(B)~~	~~collect and record data by observing and measuring using the metric system and recognize differences between observed and measured data;~~	

~~(C)~~	~~construct maps, graphic organizers, simple tables, charts, and bar graphs using tools and current technology to organize, examine, and evaluate measured data;~~	
~~(D)~~	~~analyze and interpret patterns in data to construct reasonable explanations based on evidence from investigations;~~	
~~(E)~~	~~demonstrate that repeated investigations may increase the reliability of results; and~~	
~~(F)~~	~~communicate valid conclusions supported by data in writing, by drawing pictures, and through verbal discussion.~~	
~~(3)~~	~~**Scientific investigation and reasoning. The student knows that information, critical thinking, scientific problem solving, and the contributions of scientists are used in making decisions. The student is expected to:**~~	
~~(A)~~	~~analyze, evaluate, and critique scientific explanations by using evidence, logical reasoning, and experimental and observational testing;~~	
~~(B)~~	~~represent the natural world using models such as volcanoes or the Sun, Earth, and Moon system and identify their limitations, including size, properties, and materials; and~~	
~~(C)~~	~~connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists.~~	
~~(4)~~	~~**Scientific investigation and reasoning. The student knows how to use a variety of tools and methods to conduct science inquiry. The student is expected to:**~~	
~~(A)~~	~~collect, record, and analyze information using tools, including cameras, computers, hand lenses, metric rulers, Celsius thermometers, wind vanes, rain gauges, pan balances, graduated cylinders, beakers, spring scales, hot plates, meter sticks, magnets, collecting nets, notebooks, and Sun, Earth, and Moon system models; timing devices; and materials to support observation of habitats of organisms such as terrariums and aquariums.~~	
(5)	**Matter and energy. The student knows that matter has measurable physical properties and those properties determine how matter is classified, changed, and used. The student is expected to:**	
(A)	measure, test, and record physical properties of matter, including temperature, mass, magnetism, and the ability to sink or float (relative density);	Added relative density because of content advisor recommendation to add proper scientific terminology. CCRS alignment: XII.A.1
(B)	describe and classify samples of matter as solids, liquids, and gases and demonstrate that solids have a definite shape and that liquids and gases take the shape of their container;	Clarify in the TEKS guide the concept of "taking the shape of a container" and must not include movement of particles determines the state of the matter.

(C)	predict, observe, and record changes in the state of matter caused by heating or cooling in a variety of substances such as ice becoming liquid water, condensation forming on the outside of a glass ~~of ice water~~, or liquid water being heated to the point of becoming water vapor (gas); and	TEKS guide: add other examples, go forward and backward (i.e., going from a gas to a liquid)
(D)	demonstrate that *materials* can be *combined* ~~*materials*~~ based on their physical properties to create or modify objects ~~that when put together can do things that they cannot do by themselves~~ *such as building a tower* or adding clay to sand to make a stronger brick ~~or a bridge~~ *and justify the selection of* ~~those~~ *materials based on their physical properties*. ~~*explore and recognize that a mixture is created when two materials are combined such as gravel and sand or metal and plastic paper clips.*~~	Switched this student expectation with Grade 2. TEKS guide: exploring should include creating and separating. At this grade level, clarify that mixtures could be a solid and a solid. Do not introduce the word "solution." Verb change was made so this student expectation is more measurable. Added rigor to the student expectation. Added clarity to this student expectation so that the illustrative examples could delete.
(6)	**Force, motion, and energy. The student knows the nature of forces and their interactions. The student is expected to:** ~~***Force, motion, and energy. The student knows that forces cause change and that energy exists in many forms. The student is expected to:***~~	The work group split the forces, motion, and energy knowledge and skills statement into two knowledge and skills statements to align with middle school and show the progression of the skills.
~~(A)~~	~~*explore different forms of energy, including mechanical, light, sound, and thermal in everyday life;*~~	Moved to new 3.7.
(B)	demonstrate and explain ~~observe~~ how position and motion can be changed by pushing and pulling objects such as swings, balls, and wagons; and	Changed verb "observe" to "explain" so that the student expectation is more measurable.
(A) ~~(C)~~	observe and identify forces such as magnetism, ~~and~~ gravity, and pushes and pulls acting on objects.	Added "pushes and pulls" to vertically align with K-2 grade levels. Added "and identify" to make the skill more measurable.
(7)	***Force, motion, and energy. The student knows that forces cause change and that energy exists in many forms. The student is expected to:***	The work group split the forces, motion, and energy knowledge and skills statement into two knowledge and skills statements to align with middle school and show the progression from elementary to middle school.
(A)	identify examples of ~~explore different forms of energy, including~~ *mechanical, light,* thermal, and *sound* energy~~, and thermal~~ *in everyday life* and explain how each type of energy can be identified*;*	Added more specific language to make the student expectation measurable. TEKS guide: sound is a type of mechanical energy. Please do not go into sound waves.

(B)	describe how the forces of push and pull relate to mechanical energy.	Added student expectation to relate force to mechanical energy and to VA to K-2. Going into a deeper dive into mechanical energy.
(9) ~~(7)~~	**Earth and space. The student knows that there are recognizable processes that change the Earth over time ~~that Earth consists of natural resources and its surface is constantly changing~~. The student is expected to:**	Earth and Space has been divided into 3 knowledge and skills statements to match the 6-8 TEKS.
(A)	~~*observe, measure, record,* and~~ *compare* and describe *day-to-day weather ~~changes~~ in different locations at the same time that include air temperature, wind direction, and precipitation;*	Moved predict from grade 4.
(B) ~~(A)~~	investigate ~~explore~~ and explain ~~record~~ how soils are formed by weathering of rock such as sand and clay and the decomposition of plant and animal remains;	Changed verbs to add specificity and make the student expectation more measurable. "Such as" statement was added to clarify the student expectation.
(C) ~~(B)~~	model and describe ~~investigate~~ rapid changes in Earth's surface such as volcanic eruptions, earthquakes, and landslides; and	TEKS guide: connect this student expectation to the regions where the students live.
~~(C)~~	~~*explore the characteristics of natural resources that make them useful in products and materials such as clothing and furniture and how resources may be conserved.*~~	
(8)	**Earth and space. The student knows there are recognizable objects and patterns in Earth's solar system ~~patterns in the natural world and among objects in the sky~~. The student is expected to:**	
~~(A)~~	~~*observe, measure, record, and compare day-to-day weather changes in different locations at the same time that include air temperature, wind direction, and precipitation;*~~	
~~(B)~~	~~*describe and illustrate the Sun as a star composed of gases that provides light and thermal energy;*~~	Moved this student expectation to grade 2.
(A) ~~(C)~~	construct models and explain ~~that demonstrate~~ the *orbits* ~~relationship~~ of the Sun, Earth, and Moon in relation to each other~~, including *orbits* and positions~~; and	Clarified language in the student expectation.
(B) ~~(D)~~	identify the sequence of the planets in Earth's solar system ~~and their position~~ in relation to the Sun.	Clarified language and added specificity.
(10)	**Earth and Space. The student understands how natural resources are important and can be managed. The student is expected to:**	New knowledge and skills statement to focus on natural resources and to align with 6-8.
(A)	explore and explain how natural resources are used to make products for human use; and ~~*explore the characteristics of natural resources that make them useful in products and materials such as clothing and furniture and how resources may be conserved.*~~	Clarified language and changed verb to make it measurable.

(B)	identify ways to conserve natural resources through reducing, reusing, or recycling.	New student expectation was added to focus on conservation, which was in the original student expectation.
(11) ~~(9)~~	**Organisms and environments. The student knows and can describe patterns, cycles, systems, and relationships within the environments. The student is expected to:**	
(A)	~~observe and~~ describe how the physical characteristics of environments ~~and how they~~ support ~~populations and communities of~~ plants and animals within an ecosystem;	Changes were made to reduce the breakouts.
(B)	identify and describe the flow of energy in a food chain and predict how changes in a food chain affect the ecosystem such as removal of frogs from a pond or bees from a field; and	
(C)	describe how natural ~~environmental~~ changes to the environment such as floods and droughts cause ~~where~~ some organisms to thrive and others to perish or move to new locations.	Change was made to clarify the student expectation and make it more specific. Adding cause and effect integrates cross-cutting concepts and aligns with other content areas.
(D)	*identify fossils as evidence of past living organisms*	Student expectation was moved from Grade 5 to introduce the concept at an earlier grade level.
(12) ~~(10)~~	**Organisms and environments. The student knows that organisms undergo similar life processes and have structures that help them survive within their environments. The student is expected to:**	
(A)	explore and explain how structures and functions of animals enable ~~of plants and animals allow~~ them to survive in their ~~a particular~~ environment; and	Work group decided to emphasize animals at grade 3 and plants at grade 4. Also added the extra verb to make the student expectation more measurable. CCRS: VI.E.1
(B)	*explore, illustrate, and compare life cycles in living organisms such as beetles, crickets, radishes, or lima beans.* ~~investigate and compare how animals and plants undergo a series of orderly changes in their diverse life cycles such as tomato plants, frogs, and lady beetles.~~	This student expectation has been moved from Grade 4.

§112.6~~15~~. Science, Grade 4, Adopted 2017.		
TEKS with edits		Work Group Comments/Rationale
(a)	**Introduction.**	
(1)	In Kindergarten–Grade 5, content is organized into recurring strands. The concepts within each grade level build on prior knowledge and prepare students for the next grade level and establish a foundation in science. In Grade 4, the following concepts will be addressed in each strand:	Work Group E drafted paragraph (1).
(A)	Scientific and engineering practices. ~~Scientific inquiry.~~ *Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the* grade level *and question being asked. Student learning for different types of investigations include descriptive investigations* (Kindergarten-Grade 5), *which involve collecting data and recording observations without making comparisons; comparative investigations* (Grades 6-12), *which involve collecting data with variables that are manipulated to compare results; and experimental investigations* (Grades 5-12), *which involve processes similar to comparative investigations but in which a control is identified.*	
(i)	*Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models*	
(ii)	*Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.*	
(iii)	To support instruction in the content standards, it is recommended that ~~D~~*districts* ~~are encouraged to~~ integrate ~~facilitate~~ scientific and engineering practices through *classroom and outdoor investigations for at least 50% of instructional time.*	This sentence appears in the current TEKS and has been added to the draft recommendations and revised.
(B)	Matter and energy. In Grade 4, students will investigate matter's measurable properties including mass, volume, states, temperature, magnetism, and relative density, to determine how it is classified, changed, and used. Students will compare and contrast a variety of mixtures, including solutions.	
(C)	Force, motion, and energy. In Grade 4 students investigate forces including static electricity, friction, gravity, and magnetism in order to observe their effects on objects. They will differentiate among mechanical, sound, light, thermal, and electrical energy. Students will observe the cycle of energy and the parts of a system while exploring series circuits that produce light and thermal energy. They will build on their understanding of series circuits in Grade 5 when they explore parallel circuits. As students explore thermal and electrical energy, they will observe the behavior of different materials to identify patterns and label the materials as conductors or insulators.	

(D)	Earth and space. In Grade 4 students learn about processes on Earth that create patterns of change. These processes include the water cycle, weathering, erosion, and deposition. This understanding of patterns is further developed as students build on their understanding of weather from Grade 3 as they learn about the characteristics of seasons and the lunar cycle. Students will build on this understanding in Grade 5 when they learn about day and night, shadows and the apparent movement of the Sun. Finally, students will identify Earth's resources and classify them as renewable or nonrenewable.	
(E)	Organisms and environments. In this strand, students begin to understand how organisms within an ecosystem interact. They investigate producers to learn how they make food. Students will build on their understanding of food chains, from Grade 3, as they explore food webs where they will describe the flow of energy from producers to consumers and decomposers. They will also use fossil evidence to describe environments of the past. Additionally, students will explore plant structures and their functions. They will also differentiate between inherited and acquired traits of organisms.	
(2)	Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not currently scientifically testable.	An introduction subcommittee developed recommendations for paragraphs (2)–(6), which have been incorporated into the Work Group E recommendations chart.
(3)	Scientific hypotheses and theories. Students are expected to know that:	
(A)	hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; and	
(B)	scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well established and highly reliable explanations, but they may be subject to change as new areas of science and new technologies are developed.	
~~(4)~~	~~*Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.*~~	For Kindergarten through Grade 5, paragraph (4) of the introduction appears in paragraph (1) with a description of the strands.

~~(A)~~	~~*Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.*~~	
~~(B)~~	~~*Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.*~~	
(4) ~~(5)~~	Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carried out. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information).	
(5) ~~(6)~~	Science consists of recurring themes and making connections between overarching concepts. Recurring themes include systems, models, and patterns. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested, while models allow for boundary specification and provide a tool for understanding the ideas presented. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.	
(6) ~~(7)~~	Statements containing the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	
(b)	**Knowledge and skills.**	A separate Scientific and Engineering Practices Work Group developed recommendations for revisions to the current process skills for K-12, which have been incorporated into the Work Group E recommendations chart.
(1)	**Scientific and engineering practices. The student asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:**	
(A)	ask questions and define problems based on observations or information from text, phenomena, models, or investigations;	
(B)	use scientific practices to plan and conduct descriptive investigations and use engineering practices to design solutions to problems;	
(C)	demonstrate safe practices and the use of safety equipment during classroom and field investigations as outlined in Texas Education Agency-approved safety standards;	

(D)	use tools to observe, measure, test, and analyze information, including hand lenses, metric rulers, Celsius thermometers, calculators, laser pointers, mirrors, digital scales, balances, graduated cylinders, beakers, hot plates, meter sticks, magnets, notebooks, timing devices, sieves; materials for building circuits; materials to support observation of habitats of organisms such as terrariums, aquariums, and collecting nets; and materials to support digital data collection such as computers, tablets, and cameras;	
(E)	collect observations and measurements as evidence;	
(F)	construct appropriate graphic organizers used to collect data, including tables, bar graph, line graph, tree map, concept map, Venn diagram, flow chart or sequence map, an input-output table that shows cause and effect; and	
(G)	develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.	
(2)	**Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:**	
(A)	identify advantages and limitations of models such as their size, scale, properties, and materials;	
(B)	analyze data by identifying any significant features, patterns, or sources of error;	
(C)	use mathematical calculations to compare patterns and relationships; and	
(D)	evaluate a design or object using criteria.	
(3)	**Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:**	
(A)	develop explanations and propose solutions supported by data and models	
(B)	communicate individually and collaboratively valid conclusions to determine explanations from both direct and indirect evidence	Work group agrees with SBOE amendments at September 2020 SBOE meeting.
(C)	listen actively to others' explanations to identify relevant evidence and engage respectfully in scientific discussion	
(4)	**Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:**	
~~(A)~~	~~make informed decisions when reviewing informational resources and promotional materials for products and services~~	Work group agrees with SBOE amendments at September 2020 SBOE meeting.

(A)	explain how scientific discoveries and innovative solutions to problems impact science and society	
(B)	research and explore connections (connect) between grade-level appropriate science concepts and STEM careers	
~~(1)~~	**~~Scientific investigation and reasoning. The student conducts classroom and outdoor investigations, following home and school safety procedures and environmentally appropriate and ethical practices. The student is expected to:~~**	
~~(A)~~	~~demonstrate safe practices and the use of safety equipment as described in Texas Education Agency-approved safety standards during classroom and outdoor investigations using safety equipment, including safety goggles or chemical splash goggles, as appropriate, and gloves, as appropriate; and~~	
~~(B)~~	~~make informed choices in the use and conservation of natural resources and reusing and recycling of materials such as paper, aluminum, glass, cans, and plastic.~~	
~~(2)~~	**~~Scientific investigation and reasoning. The student uses scientific practices during laboratory and outdoor investigations. The student is expected to:~~**	
~~(A)~~	~~plan and implement descriptive investigations, including asking well-defined questions, making inferences, and selecting and using appropriate equipment or technology to answer his/her questions;~~	
~~(B)~~	~~collect and record data by observing and measuring, using the metric system, and using descriptive words and numerals such as labeled drawings, writing, and concept maps;~~	
~~(C)~~	~~construct simple tables, charts, bar graphs, and maps using tools and current technology to organize, examine, and evaluate data;~~	
~~(D)~~	~~analyze data and interpret patterns to construct reasonable explanations from data that can be observed and measured;~~	
~~(E)~~	~~perform repeated investigations to increase the reliability of results; and~~	
~~(F)~~	~~communicate valid oral and written results supported by data.~~	
~~(3)~~	**~~Scientific investigation and reasoning. The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:~~**	
~~(A)~~	~~analyze, evaluate, and critique scientific explanations by using evidence, logical reasoning, and experimental and observational testing;~~	
~~(B)~~	~~represent the natural world using models such as the water cycle and stream tables and identify their limitations, including accuracy and size; and~~	

~~(C)~~	~~connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists.~~	
~~(4)~~	**~~Scientific investigation and reasoning. The student knows how to use a variety of tools, materials, equipment, and models to conduct science inquiry. The student is expected to:~~**	
~~(A)~~	**~~collect, record, and analyze information using tools, including calculators, microscopes, cameras, computers, hand lenses, metric rulers, Celsius thermometers, mirrors, spring scales, balances, graduated cylinders, beakers, hot plates, meter sticks, magnets, collecting nets, and notebooks; timing devices; and materials to support observation of habitats of organisms such as terrariums and aquariums..~~**	
(5)	**Matter and energy. The student knows that matter has measurable physical properties and those properties determine how matter is classified, changed, and used. The student is expected to:**	The work group discussed the absence of a "used" student expectation but determined that teachers can use these student expectation as an opportunity for real world application. Work group recommends including specificity and examples in the TEKS guide.
(A)	classify and describe matter using ~~measure, compare, and contrast~~ observable physical properties ~~of matter~~, including mass, volume, states (solid, liquid, gas), temperature, magnetism, and relative density (the ability to sink or float); and	Visual representation would be needed to teach this student expectation. You can't "measure" sinking or floating or a state of matter. Added density because of content advisor recommendation to add proper scientific terminology. TEKS guide should reference all physical properties to date (K–5).
(B)	compare and contrast a variety of mixtures, including solutions that are composed of liquids in liquids and solids in liquids, and explore the conservation of matter.	Added exploration of conservation of matter to align with grade 5 and grade 8 and to align with the framework.
(6)	**Force, motion, and energy. The student knows the nature of forces and their interactions. The student is expected to:** ***~~Force, motion, and energy. The student knows that energy exists in many forms and can be observed in cycles, patterns, and systems. The student is expected to:~~***	The work group split the forces, motion, and energy knowledge and skills statement into two knowledge and skills statements to align with middle school and show the progression of the skills.
(A)	investigate and record observations of the forces of static electricity and friction *~~differentiate among forms of energy, including mechanical, sound, electrical, light, and thermal;~~*	Added a student expectation based on the K-12 framework; this skill is a prerequisite for middle school: (6.5.A). Aligns with the K-12 framework.
~~(B)~~	*~~differentiate between conductors and insulators of thermal and electrical energy;~~*	
~~(C)~~	*~~demonstrate that electricity travels in a closed path, creating an electrical circuit; and~~*	
(B) ~~(D)~~	design a descriptive investigation to explore the effect of force on an object such as ~~a push or a pull,~~ gravity, friction, or magnetism.	Deleted push and pull because the skill is already covered in Grades 1–3.

(7)	***Force, motion, and energy. The student knows that energy exists in many forms and can be observed in cycles, patterns, and systems. The student is expected to:***	The work group split the forces, motion, and energy knowledge and skills statement into two knowledge and skills statements to align with middle school and show the progression of the skills.
(A)	*differentiate among ~~forms of energy, including~~ mechanical, sound, ~~electrical~~, light, ~~and~~ thermal~~,~~* and electrical energy*;*	Added more specific language to make the student expectation measurable.
(B)	identify ~~differentiate between~~ *conductors and insulators of thermal and electrical energy;*	Changed verb to clarify the student expectation.
(C)	*demonstrate* and identify *that electricity travels in a closed path, creating* a series ~~an electrical~~ *circuit* that can produce light and thermal energy*; and*	Added more specific language to make the student expectation measurable.
(9) ~~(7)~~	**Earth and space. The student knows that there are processes on Earth that create patterns of change. ~~The students know that Earth consists of useful resources and its surface is constantly changing.~~ The student is expected to:**	Change was made to make the knowledge and skills statement more reflective of the student expectations below it. The work group split resources to a new knowledge and skills statement (10). CCRS alignment: IX.A.1 and IX.A.2
(A)	*describe and illustrate the continuous movement of water above and on the surface of Earth through the water cycle and explain the role of the Sun as a major source of energy in this process; and* ~~examine properties of soils, including color and texture, capacity to retain water, and ability to support the growth of plants~~;	Moved from (8)(B) in the current TEKS. This student expectation was deleted because this skill has been incorporated into Grade 3 and provides the foundation to be taught in Grade 5.
(B)	model and describe ~~observe and identify~~ slow changes to Earth's surface caused by weathering, erosion, and deposition from water, wind, and ice; and	Changed verbs to VA to Grade 3. Edited Earth's surface to "landforms" to be more specific and to clarify the student expectation. TEKS guide: focus should be on the processes, not the actual landforms.
~~(C)~~	~~*identify and classify Earth's renewable resources, including air, plants, water, and animals, and nonrenewable resources, including coal, oil, and natural gas, and the importance of conservation.*~~	Moved to new 10.A
(8)	**Earth and space. The student recognizes ~~knows that there are recognizable~~ patterns ~~in the natural world and~~ among the Sun, Earth, and Moon system and their effects. The student is expected to:**	

~~(A)~~	~~measure, record, and predict changes in weather;~~	This student expectation has been deleted because it is covered in Grade 3. Predict has been moved to Grade 3.
~~(B)~~	~~*describe and illustrate the continuous movement of water above and on the surface of Earth through the water cycle and explain the role of the Sun as a major source of energy in this process; and*~~	Moved to new 9.A.
(A) ~~(C)~~	collect and analyze data to identify sequences and predict patterns of change in ~~shadows,~~ seasons ~~such as change in temperature and length of daylight, *and the observable appearance of the Moon* over time~~.	Moving shadows to Grade 5. This is student expectation has been divided into two student expectations.
(B)	collect and analyze data to identify sequences and predict patterns of change in *the observable appearance of the Moon* from Earth during the lunar cycle	This student has been created from the previous student expectation.
(10)	**Earth and Space. The student understands how natural resources are important and can be managed. The student is expected to:**	New knowledge and skills statement to focus on natural resources and to VA with 6-8.
(A)	*identify and classify Earth's renewable resources, including air, plants, water, and animals, and nonrenewable resources, including coal, oil, and natural gas, ~~and the importance of conservation.~~*	
(11) ~~(9)~~	**Organisms and environments. The student knows and understands that living organisms within an ecosystem interact with one another and with their environment. The student is expected to:**	
(A)	investigate and explain how ~~that~~ most producers *make their own food* using ~~need~~ sunlight, water, and carbon dioxide ~~to *make their own food*, while consumers are dependent on other organisms for food~~; and	This student expectation was reworded for clarity and to make the student expectation more measurable. CCRS alignment: VI.B.3 and VI.G.2
(B)	describe the flow of energy through food webs, including the roles of the Sun, producers, consumers, and decomposers ~~beginning with the Sun, and predict how changes in the ecosystem affect the food web.~~	This student expectation was reworded to eliminate overlap between grades 4 and 5. "including the roles of the sun, producers, consumers, and decomposers" was moved from Grade 5. "Predict the changes…" clause was moved to Grade 5. CCRS alignment: VI.G.2

(C)	identify and describe past environments based on fossil evidence	Student expectation moved from Grade 5 to introduce the concept at an earlier grade level and to build a bridge to the concept at grade 7 (7.9.A). This concept is in the K–12 Framework document. CCRS alignment: VI.G.1 and IX.E.1.
(12) ~~(10)~~	**Organisms and environments. The student knows that organisms undergo similar life processes and have structures and behaviors that help them survive within their environment. The student is expected to:**	
(A)	explore and explain how structures and functions of plants enable them ~~organisms~~ to survive in their environment;	Work group decided to emphasize animals at grade 3 and plants at grade 4. Also added the extra verb to make the student expectation more measurable. CCRS: VI.E.1
(B)	differentiate between inherited and acquired physical traits of organisms ~~explore and describe examples of traits that are inherited from parents to offspring such as eye color and shapes of leaves and behaviors that are learned such as reading a book and a wolf pack teaching their pups to hunt effectively; and~~	This new student expectation goes deeper into content because acquired physical traits have been added to inherited. Clarified the dichotomy in the SE. CCRS:VI.G.3
~~(C)~~	~~explore, illustrate, and compare life cycles in living organisms such as beetles, crickets, radishes, or lima beans.~~	Moved to Grade 3.

§112.7~~16.~~ Science, Grade 5~~, Adopted 2017~~.		
	TEKS with edits	Work Group Comments/Rationale
(a)	**Introduction.**	
(1)	In Kindergarten–Grade 5, content is organized into recurring strands. The concepts within each grade level build on prior knowledge and prepare students for the next grade level and establish a foundation in science. In Grade 5, the following concepts will be addressed in each strand:	Work Group E drafted paragraph (1).
(A)	Scientific and engineering practices. ~~Scientific inquiry.~~ *Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the* grade level and *question being asked. Student learning for different types of investigations include descriptive investigations* (Kindergarten-Grade 5), *which involve collecting data and recording observations without making comparisons; comparative investigations* (Grades 6-12), *which involve collecting data with variables that are manipulated to compare results; and experimental investigations* (Grades 5-12), *which involve processes similar to comparative investigations but in which a control is identified.*	
(i)	*Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.*	
(ii)	*Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.*	
(iii)	To support instruction in the content standards, it is recommended that ~~D~~d*istricts* ~~are encouraged to~~ integrate ~~facilitate~~ scientific and engineering practices through *classroom and outdoor investigations for at least 50% of instructional time.*	This sentence appears in the current TEKS and has been added to the draft recommendations and revised.
(B)	Matter and energy. In Grade 5, students will investigate matter expanding their understanding of properties learned in Grade 4 (mass, volume, states, temperature, magnetism and relative density) to include solubility and the ability to conduct or insulate both thermal and electrical energy. Students will observe the combination of substances to make mixtures and develop an understanding of conservation of matter. These concepts lead to the understanding of elements and compounds, Students will build on this understanding in middle school when they learn to determine density and to identify evidence of chemical changes.	

(C)	Force, motion, and energy. In Grade 5 students investigate equal and unequal forces and the effects these forces have on objects (motion and direction). Additionally, students investigate energy including mechanical, light, thermal, electrical and sound. They uncover cycles (e.g., movement of thermal energy), patterns (e.g., behavior of light including reflection and refraction), and systems (e.g. the parts in a series and parallel circuit) through their exploration. Students will build on this understanding in middle school when they begin to use calculations and measurements to study force, motion and energy through the study of Newton's Laws of Motion.	
(D)	Earth and space. This strand is focused on identifying recognizable patterns and processes as students learn about Earth's rotation and demonstrate the effects this movement has on Earth's surface including day and night, shadows, and the apparent movement of the Sun. Students continue their learning of patterns and processes on Earth while exploring weather, climate, the water cycle, the formation of sedimentary rock and fossil fuels, and the formation of landforms. Finally, students learn ways to manage renewable and nonrenewable resources to support a healthy environment.	
(E)	Organisms and environments. This strand focuses on identifying relationships, systems, and cycles within organisms and environments. Students describe the interactions of biotic and abiotic factors in an ecosystem. They build on their understanding of food webs from Grade 4 by predicting how ecosystem changes will affect the flow of energy. Additionally, they will describe how humans impact the ecosystem. Students also learn how organisms' structures help them to survive, and they will distinguish between instinctual and learned behaviors in animals. This will set the foundation for Grade 6 where students will compare and contrast variations within organisms and how they impact survival.	
(2)	Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not currently scientifically testable.	An introduction subcommittee developed recommendations for paragraphs (2)–(6), which have been incorporated into the Work Group E recommendations chart.
(3)	Scientific hypotheses and theories. Students are expected to know that:	
(A)	hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; and	

(B)	scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well established and highly reliable explanations, but they may be subject to change as new areas of science and new technologies are developed.	
~~(4)~~	~~*Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world using scientific and engineering practices. Scientific methods of investigation are descriptive, comparative, or experimental. The method chosen should be appropriate to the question being asked. Student learning for different types of investigations include descriptive investigations, which involve collecting data and recording observations without making comparisons; comparative investigations, which involve collecting data with variables that are manipulated to compare results; and experimental investigations, which involve processes similar to comparative investigations but in which a control is identified.*~~	For Kindergarten through Grade 5, paragraph (4) of the introduction appears in paragraph (1) with a description of the strands.
~~(A)~~	~~*Scientific practices. Students should be able to ask questions, plan and conduct investigations to answer questions, and explain phenomena using appropriate tools and models.*~~	
~~(B)~~	~~*Engineering practices. Students should be able to identify problems and design solutions using appropriate tools and models.*~~	
(4) ~~(5)~~	Science and social ethics. Scientific decision making is a way of answering questions about the natural world involving its own set of ethical standards about how the process of science should be carried out. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information).	
(5) ~~(6)~~	Science consists of recurring themes and making connections between overarching concepts. Recurring themes include systems, models, and patterns. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested, while models allow for boundary specification and provide a tool for understanding the ideas presented. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.	
(6) ~~(7)~~	Statements containing the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	

(b)	**Knowledge and skills.**	A separate Scientific and Engineering Practices Work Group developed recommendations for revisions to the current process skills for K-12, which have been incorporated into the Work Group E recommendations chart.
(1)	**Scientific and engineering practices. The student asks questions, identifies problems, and plans and safely conducts classroom, laboratory, and field investigations to answer questions, explain phenomena, or design solutions using appropriate tools and models. The student is expected to:**	A separate Scientific and Engineering Practices Work Group developed recommendations for revisions to the current process skills for K-12, which have been incorporated into the Work Group E recommendations chart.
(A)	ask questions and define problems based on observations or information from text, phenomena, models, or investigations;	
(B)	use scientific practices to plan and conduct descriptive and simple experimental investigations and use engineering practices to design solutions to problems;	
(C)	demonstrate safe practices and the use of safety equipment during classroom and field investigations as outlined in Texas Education Agency-approved safety standards;	
(D)	use tools to observe, measure, test, and analyze information, including calculators, microscopes, hand lenses, metric rulers, Celsius thermometers, prisms, concave and convex lenses, laser pointers, mirrors, digital scales, balances, spring scales, graduated cylinders, beakers, hot plates, meter sticks, magnets, collecting nets, and notebooks; timing devices; materials for building circuits; materials to support observations of habitats or organisms such as terrariums and aquariums; and materials to support digital data collection such as computers, tablets, and cameras;	
(E)	collect observations and measurements as evidence;	
(F)	construct appropriate graphic organizers used to collect data, including tables, bar graph, line graph, tree map, concept map, Venn diagram, flow chart or sequence map, an input-output table that shows cause and effect; and	TEKS guide: add cause and effect. Data can be more than just numbers.
(G)	develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.	
(2)	**Scientific and engineering practices. The student analyzes and interprets data to derive meaning, identify features and patterns, and discover relationships or correlations to develop evidence-based arguments or evaluate designs. The student is expected to:**	
(A)	identify advantages and limitations of models such as their size, scale, properties, and materials;	
(B)	analyze data by identifying any significant features, patterns, or sources of error;	
(C)	use mathematical calculations to compare patterns and relationships; and	

(D)	evaluate experimental and engineering designs.	
(3)	**Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions. The student is expected to:**	
(A)	develop explanations and propose solutions supported by data and models;	
(B)	communicate individually and collaboratively valid conclusions to determine explanations from both direct and indirect evidence; and	Work group agrees with SBOE edits recommended at the September 2020 SBOE meeting.
(C)	listen actively to others' explanations to identify relevant evidence and engage respectfully in scientific discussion.	
(4)	**Scientific and engineering practices. The student knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:**	
~~(A)~~	~~make informed decisions when reviewing informational resources and promotional materials for products and services~~	Work group agrees with SBOE edits recommended at the September 2020 SBOE meeting.
(A)	explain how scientific discoveries and innovative solutions to problems impact science and society; and	
(B)	research and explore connections (connect) between grade-level appropriate science concepts and STEM careers.	
~~(1)~~	~~**Scientific investigation and reasoning. The student conducts classroom and outdoor investigations following home and school safety procedures and environmentally appropriate and ethical practices. The student is expected to:**~~	
~~(A)~~	~~demonstrate safe practices and the use of safety equipment as outlined in Texas Education Agency-approved safety standards during classroom and outdoor investigations using safety equipment, including safety goggles or chemical splash goggles, as appropriate, and gloves, as appropriate; and~~	
~~(B)~~	~~make informed choices in the conservation, disposal, and recycling of materials.~~	
~~(2)~~	~~**Scientific investigation and reasoning. The student uses scientific practices during laboratory and outdoor investigations. The student is expected to:**~~	
~~(A)~~	~~describe, plan, and implement simple experimental investigations testing one variable;~~	
~~(B)~~	~~ask well-defined questions, formulate testable hypotheses, and select and use appropriate equipment and technology;~~	

(C)	collect and record information using detailed observations and accurate measuring;	
(D)	analyze and interpret information to construct reasonable explanations from direct (observable) and indirect (inferred) evidence;	
(E)	demonstrate that repeated investigations may increase the reliability of results;	
(F)	communicate valid conclusions in both written and verbal forms; and	
(G)	construct appropriate simple graphs, tables, maps, and charts using technology, including computers, to organize, examine, and evaluate information.	
(3)	**Scientific investigation and reasoning. The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:**	
(A)	analyze, evaluate, and critique scientific explanations by using evidence, logical reasoning, and experimental and observational testing;	
(B)	draw or develop a model that represents how something that cannot be seen such as the Sun, Earth, and Moon system and formation of sedimentary rock works or looks; and	
(C)	connect grade-level appropriate science concepts with the history of science, science careers, and contributions of scientists.	
(4)	**Scientific investigation and reasoning. The student knows how to use a variety of tools and methods to conduct science inquiry. The student is expected to**	
(A)	collect, record, and analyze information using tools, including calculators, microscopes, cameras, computers, hand lenses, metric rulers, Celsius thermometers, prisms, mirrors, balances, spring scales, graduated cylinders, beakers, hot plates, meter sticks, magnets, collecting nets, and notebooks; timing devices; and materials to support observations of habitats or organisms such as terrariums and aquariums.	

(5)	**Matter and energy. The student knows that matter has measurable physical properties and those properties determine how matter is classified, changed, and used. The student is expected to:**	
(A)	compare and contrast ~~classify~~ matter based on measurable, testable, or ~~and~~ observable physical properties, including mass, magnetism, physical state (solid, liquid, and gas), relative density (sinking and floating using water as a reference point), solubility in water, and the ability to conduct or insulate thermal energy and ~~or~~ electric energy;	All physical properties are not all measurable, testable, and observable. Change was made regarding the ability to conduct or insulate thermal and electric energy because students need to know both. Thorough explanation should be included in the TEKS guide: mass, weight, and the relationship between the two. Ensure that students won't be required to distinguish between mass and weight. CCRS alignment: VII.A.1, VII.I.1, VII.I.5, VIII.A.2, VIII.A.3, VIII.A.4, VIII.A.5
(B)	demonstrate and explain that some mixtures maintain physical properties of their substances ~~ingredients~~ such as iron filings and sand and sand and water; and	Wording change was made to include more precise scientific terminology and to VA the student expectations to the TEKS in middle school. CCRS alignment VII.I.1, VII.I.2
(C)	compare the properties of substances before and after they are combined into a solution and demonstrate that matter is conserved ~~identify changes that can occur in the physical properties of the ingredients of solutions such as dissolving salt in water or adding lemon juice to water~~.	TEKS guide: identify the scientific and engineering practices student expectations that can be measured with this student expectations. Wording change adds clarity to the student expectation; therefore, students will know and be able to do. Added "including the conservation of matter" to align with the K-12 framework.
(D)	model how matter can be divided into particles that are too small to be seen	Added a student expectation based on the K-12 framework; this skill is a prerequisite for middle school: (6.5.A). TEKS guide: modeling should be conception. K-12 framework recommends that students model.

(6)	**Force, motion, and energy. The student knows the nature of forces and their interactions.** ~~***The student knows that energy occurs in many forms and can be observed in cycles, patterns, and systems.***~~ **The student is expected to:**	The work group split the forces, motion, and energy knowledge and skills statement into two knowledge and skills statements to align with middle school and show the progression of the skills.
(A)	investigate the equal and unequal forces acting on an object and describe the effects that may create movement, including the identification of patterns of motion. ~~*explore the uses of energy, including mechanical, light, thermal, electrical, and sound energy;*~~	The work group added this new student expectation to address K-12 framework and to build a foundation for the middle school TEKS. The student expectation was moved to new (7). TEKS guide: Forces that are not counterbalanced can change an object's speed or direction. Varying strength and direction cause equal or unequal forces.
~~(B)~~	~~*demonstrate that the flow of electricity in closed circuits can produce light, heat, or sound;*~~	The student expectation was moved to a new knowledge and skills statement (7).
~~(C)~~	~~*demonstrate that light travels in a straight line until it strikes an object and is reflected or travels through one medium to another and is refracted; and*~~	The student expectation was moved to a new knowledge and skills statement (7).
(B) ~~(D)~~	design a simple experimental investigation that tests the effect of force on an object.	
(7)	**Force, motion, and energy.** ***The student knows that energy occurs in many forms and can be observed in cycles, patterns, and systems.*** **The student is expected to:**	
(A)	investigate and identify ~~explore~~ *the uses of* ~~energy, including~~ *mechanical, light, thermal, electrical, and sound energy;*	Add to TEKS guide: teachers can talk about solar energy in light and thermal energy. Changed verb to more appropriate link to the STEM standards and to make the student expectation more measurable.
(B)	demonstrate that the flow of electricity in series and parallel circuits can produce light, thermal, or sound energy and identify the requirements for a functioning electrical circuit. ~~*demonstrate that the flow of electricity in closed circuits can produce light, heat, or sound;*~~	Changed wording to make the student expectation more specific.
(C)	*demonstrate that light travels in a straight line until it strikes an object and is reflected or travels* from ~~through~~ *one medium to another and is refracted* and differentiate between reflection and refraction*; and*	Changed wording to make the student expectation more specific and students should be able to explain through the differentiation. TEKS guide: define medium.

(9) ~~(7)~~	**Earth and space. The student knows that there are recognizable patterns and processes on Earth. ~~The student knows Earth's surface is constantly changing and consists of useful resources.~~ The student is expected to:**	
(A)	*differentiate between weather and climate;*	Moved from (8)(A).
(B)	*explain how the Sun and the ocean interact in the water cycle* and affect weather;	Moved from (8)(B). Added clarification for the student expectation and took the concept deeper than Grade 4.
(C) ~~(A)~~	model and describe ~~explore~~ the processes that led to the formation of sedimentary rocks and fossil fuels; and	Changed the verb to make the student expectation more observable and measurable.
(D) ~~(B)~~	model and identify how changes to Earth's surface by wind, water, or ice result in the formation of landforms, including deltas, canyons, and sand dunes ~~recognize how landforms such as deltas, canyons, and sand dunes are the result of changes to Earth's surface by wind, water, or ice.~~	Verb change to make the student expectation measurable. Wording changed so that students understand the cause and effect of landform formation. TEKS guide: include regional landforms.
(8)	**Earth and space. The student knows that there are recognizable patterns ~~in the natural world and~~ among the Sun, Earth, and Moon system. The student is expected to:**	
~~(A)~~	~~*differentiate between weather and climate;*~~	Moved to new (9)(A).
~~(B)~~	~~*explain how the Sun and the ocean interact in the water cycle;*~~	Moved to new (9)(B).
(A) ~~(C)~~	demonstrate that Earth rotates on its axis once approximately every 24 hours causing the day/night cycle, shadows, and the apparent movement of the Sun across the sky; and	Moved shadows from grade 4. The rotation causes shadows. The concept of shadows is more appropriately placed in grade 5 with these other two effects.
~~(D)~~	~~identify and compare the physical characteristics of the Sun, Earth, and Moon.~~	Deleted this student expectation because the concepts are already covered in grades 3, 4, and 7.
(10)	**Earth and Space. The student understands how natural resources are important and can be managed. The student is expected to:**	New knowledge and skills statement to focus on natural resources and to align with 6-8. Previously, this skill was in scientific investigation and reasoning. The work group wanted to be sure to incorporate in the revised standards.
(A)	explain how conservation, disposal, and recycling of renewable and non-renewable natural resources impact the environment	This skill aligns to the CCRS: X.E.4 and X.E.5. New student expectation aligns to 6.10 in the middle school standards.

(11) ~~(9)~~	**Organisms and environments. The student knows that there are relationships, systems, and cycles within environments. The student is expected to:**	
(A)	observe and describe how ~~the way~~ organisms ~~live and~~ survive ~~*in their ecosystem*~~ by interacting with biotic and abiotic factors *in their ecosystem* ~~the living and nonliving components~~;	Student expectation was edited to make it more measurable, and biotic and abiotic was changed on the recommendation of Work Group D. CCRS alignment: III.A.1, VI.G.2, VI.G.3
(B)	*predict how changes in the ecosystem affect the flow of energy in* a ~~the~~ *food web* ~~and describe the *flow of energy* within a food web, *including the roles of the Sun, producers, consumers, and decomposers* and~~.; ~~describe the flow of energy within a food web, including the roles of the Sun, producers, consumers, and decomposers;~~	This skill was moved from grade 4 and "predict the changes…" was moved from grade 4 to create a progression of learning regarding the flow of energy. CCRS alignment: V.C.1, V.E.1, VI.B.3, and VI.G.2
(C)	describe how human activities have beneficial and harmful impacts on ecosystems. ~~predict the effects of changes in ecosystems caused by living organisms, including humans, such as the overpopulation of grazers or the building of highways; and~~	The work group would like to include the positive impacts of humans. CCRS alignment: III.A.1, VI.G.2
~~(D)~~	~~*identify fossils as evidence of past living organisms* and the nature of the environments at the time using models.~~	This student expectation was divided into two student expectations, one student expectation at grade 3 and one at grade 4. The decision was made because of time to teach. Based on the framework, students should understand that plants and animals lived a long time ago.
(12) ~~(10)~~	**Organisms and environments. The student knows that organisms have structures and behaviors that help them survive within their environments. The student is expected to:**	
(A)	analyze the structures and functions of different species to identify how organisms survive in the same environment; and ~~compare the structures and functions of different species that help them live and survive in a specific environment such as hooves on prairie animals or webbed feet in aquatic animals; and~~	Clarified the student expectation to make it more measurable and to build upon the revised Grade 3 and Grade 4 student expectations. CCRS alignment: VI.C.2, VI.E.1, VI.F.1
(B)	differentiate between instinctual and learned behavioral traits of animals. ~~differentiate between inherited traits of plants and animals such as spines on a cactus or shape of a beak and learned behaviors such as an animal learning tricks or a child riding a bicycle.~~	This new student expectation goes deeper into content because instinctual has been added to learned behavioral traits. Clarified the dichotomy in the student expectation.