

# Proposed Science TEKS

Middle School (Grades 6-8)

## OFFICIAL PUBLIC COMMENTS

### Alignment of Comments with Proposed TEKS

<u>Grade Level</u>	<u>Introduction Statements</u>	<u>Total Number of Knowledge/Skills (KS) and Student Expectations (SE)</u>	<u>Number of KS or SE Statements with at Least One Comment</u>
Grade 6	4	54	21
Grade 7	5	58	18
Grade 8	4	51	10
		163	49

**Proposed Science TEKS – High School – 1<sup>st</sup> Reading Version (rule text), January 2009**

**Official Public Comments – Compiled from February 13 – March 20, 2009**

<u>Text of Proposed Revisions to 19 TAC</u>	<u>Number of Comments</u>	<u>Public Comment/Recommendation</u>
<p><b>Chapter 112. Texas Essential Knowledge and Skills for Science</b>  <b>Subchapter B. Middle School</b></p>	1	<p>I much prefer the broader integration that we currently have. Our district has spent years aligning our curriculum so that each successive year builds on what was taught the previous year...and now you want to go back to the PAST? I vote NO on these proposed changes.</p>
	1	<p>I prefer the "spiraled" curriculum that we have seen over the past 10 years.</p>
	1	<p>I have concerns about the new middle school changes. Isn't the proposed change taking us back to how middle school was taught before the last change in the TEKS? Was it effective then?</p>
	1	<p>Due to the increasingly complexity of content and concepts it seems reasonable to go back to year-long focus strands.</p>
	1	<p>Simple machines not found in any grade level.</p>
	1	<p>Add a focus on interactions and equilibrium of body systems.</p>
	1	<p>TEKS are "an inch deep and a mile wide."</p>
	1	<p>Do not like new structure. Prefer spiraling of content.</p>
	1	<p>"Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable." Why has this statement been included?</p>
	2	<p>This entire phrase must be removed from the TEKS: "Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable."</p>
	1	<p>The SBOE should adopt the TEKS as presented by the writing team with the changes added to the document at the adoption of the TEKS at first reading in January.</p>
	1	<p>Organisms and the environment are general to 5-8. So, why the emphasis on physical in 6th, life in 7th, and earth in 8th?</p>

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	2	Will state provide funds to purchase necessary equipment and supplies?
	5	New TEKS are less vague and allow for a greater understanding of content.
	2	Like scientific topics at a greater depth. Students will no longer be bored and frustrated.
	1	If a student is being tested at Grade 8 over concepts taught in 6th grade which have not been spiraled across the 7th and 8th grade levels, this would put students at a disadvantage in meeting standards.
	1	Our PreK-8 Texas students need a strong foundation in scientific claims and evidence, performing inquiry-based investigations, problem solving and critical thinking in order to achieve success with their high school science courses. It is critical teachers have a clear specific framework which vertically aligns across grade levels to allow students to build upon sound scientific concepts and skills needed to compete in a global society.
	1	I am glad we are going to 40% lab in middle school.
	1	Excellent work! I can now see what each grade level is expected to teach. Highly recommend that the current textbooks for middle schools be aligned to the proposed TEKS to ensure all students have a consistent tool for research/reading/studying as well as the same teacher curriculum, e.g. model lessons for each SE.
	1	The integrated method of teaching middle school science should stay for several reasons: 1) it is better high school preparation, 2) it allows the students to build a solid science foundation, 3) we do not have resources to support or change, and 4) too much pressure will be on the 8th graders to recall material for TAKS testing.
	1	Remove ecology and environmental science from 6 <sup>th</sup> and 8 <sup>th</sup> grades and add them to the 7 <sup>th</sup> grade instead.
	1	The new TEKS are less vague and should allow for a greater understanding of living systems without reteaching material.
	9	I strongly support content-based TEKS revisions.

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<b>Science, Grade 6, Beginning with School Year 2010-2011</b>		
	1	No genetics content found in Grade 6. Also lacking focus on surface and ground water.
	1	Genetics are only covered in 7th grade; I propose either an introduction into the subject in 6th grade or a continuation of the subject in 8th grade.
	1	The student expectations are not developmentally appropriate for students at 6th grade. For example, calculating density at 6th grade is too high level for regular 6th graders. Also, asking 6th graders to understand molecules and compounds before they learn anything else is a poor sequencing choice. It would be more beneficial for 6th graders to understand the parts of an atom, and the differences between physical and chemical properties, and leave the molecules and compounds concept for 7th/8th grade.
	1	Content is too difficult; too much information is presented; can students handle density, compounds and mixtures, decimals and metrics, and computers in the lab?
	1	Remove ecology and environmental science. Move to grade 7.
	1	Science TEKS do not match 6th grade Math TEKS when referring to manipulating formulas (which is in 7th grade Math).
	1	Overall, I like the new 6 <sup>th</sup> grade science TEKS.
	3	Are 6th graders able to learn what we need them to know about physical science before high school-this year would be the foundational year for chemistry and physics, leaving 3-4 years (7,8,9,10) before they actually take these courses. Perhaps earth science would be a better choice for 6th grade and physical science for 8th (students aren't required to know earth science to graduate).
	1	There is no genetics component in the revised 6th grade TEKS. With all the advancements in genetics (cloning, stem cell research, etc.) this is an important area to be introduced at the 6th grade level.

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	1	Also gone from the 6th grade TEKS is the focus on surface and ground water. Again, as this is an area of so much current news / interest, I do not like to see it taken away.
	1	Nowhere in 6th, 7th or 8th grade Science do I see any mention of simple machines. The study of simple machines is the basis of modern physics and I know from the past, that many students who were not successful in many other areas of science, really blossomed when investigating and learning about simple machines.
	1	This entire phrase must be removed from the TEKS: Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.
	1	The SBOE should adopt the TEKS as presented by the writing team with the changes added to the document at the adoption of the TEKS at first reading in January.
	1	My first issue is that 6th graders are not functioning at the intelligence level that these TEKS require. My second issue is with the amount of material that the students must cover1) Matter an energy--compounds and mixtures and density. Using metrics and decimals when they have not been exposed to these and their brains are not developed enough is an issue. Computer usage--Although many students have a good background for gaming, MANY students do not have access to computers on a regular basis. I do like the more "Earth" types of science in 6th grade.

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<b>(a) Introduction.</b>		
(1) Science, as defined by the National Academy of Science, 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 scientifically testable.	1	Concern about the statement, "Students know that some questions are outside the realm of science because the deal with phenomena are not scientifically testable."
	1	Why has the last sentence been included?
(2) Scientific 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 become theories. Scientific theories are based on natural and physical phenomena and are capable of being tested by multiple, independent researchers. Students should know that scientific theories, unlike hypotheses, are well-established and highly reliable, but they may still be subject to change as new information and technologies are developed. Students should be able to distinguish between scientific decision-making methods and ethical/social decisions that involve the application of scientific information.		
(3) Grade 6 science is interdisciplinary in nature; however, much of the content focus is on physical science. National standards in science are organized as multi-grade blocks such as Grades 5-8 rather than individual grade levels. In order to follow the grade level format used in Texas, the various national standards are found among Grades 6, 7, and 8. Recurring themes are pervasive in sciences, mathematics, and technology. These ideas transcend disciplinary boundaries and include change and constancy, patterns, cycles, systems, models, and scale.		
(4) The strands for Grade 6 include:		
(A) Scientific investigations and reasoning.		
(i) To develop a rich knowledge of science and the natural world, students must become familiar with different modes of scientific inquiry, rules of evidence, ways of formulating questions, ways of proposing explanations, and the diverse ways scientists study the natural world and propose explanations based on evidence derived from their work.		

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(ii) Scientific investigations are conducted for different reasons. All investigations require a research question, careful observations, data gathering, and analysis of the data to identify the patterns that will explain the findings. Descriptive investigations are used to explore new phenomena such as conducting surveys of organisms or measuring the abiotic components in a given habitat. Descriptive statistics include frequency, range, mean, median, and mode. A hypothesis is not required in a descriptive investigation. On the other hand, when conditions can be controlled in order to focus on a single variable, experimental research design is used to determine causation. Students should experience both types of investigations and understand that different scientific research questions require different research designs.	15	Replace: Scientific investigations are conducted in different ways using different scientific research designs. However, all investigations require a well-designed research question or hypothesis, careful observations, data gathering and analysis of the data to identify the patterns that will explain the findings. Descriptive investigations are used to explore new phenomena such as conducting surveys of pond organisms, or measuring the abiotic components of a habitat. Descriptive statistics include frequency, mean, median, and mode. No hypothesis and no dependent and independent variables are used in this type of investigation. On the other hand, Comparative investigations are used when conditions can be kept constant in order to focus on a single variable. Comparative analysis is used to compare the strength of a relationship between two variables. The investigator selects the independent variable (IV) and records the responses of the dependent (responding) variable (DV). No control group is used for this type of investigation. Conditions other than IV or DV are held constant or at least they are the same for all test groups. The IV is the factor being selected. The DV is the factor that responds to changes of the IV. Statistics used in the Comparative method include some type of comparison between or among means of various DVs .However, when a scientific study can have a control, then an Experimental investigation is used to determine causation. Students in grades 5-12 should experience all three types of investigations and understand that different scientific research questions require different research designs.
(iii) Scientific investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and the methods, models, and conclusions built from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. Models have limitations and based on new discoveries are constantly being modified to more closely reflect the natural world.		
(B) Matter and energy.		
(i) Matter can be classified as elements, compounds, or mixtures. Students have already had experience with mixtures in Grade 5, so Grade 6 will concentrate on developing an understanding of elements and compounds. It is important that students learn the differences between elements and compounds based on observations, description of physical properties, and chemical reactions. Elements are represented by chemical symbols, while compounds are represented by chemical formulas. Subsequent grades will learn about the differences at the molecular and atomic level.	1	Omit the word "compounds" and the words "chemical reactions." Since sixth grade students will not yet have been introduced to atomic structure, bonding or valence electrons, it is inappropriate to introduce compounds or chemical reactions.

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(ii) Elements are classified as metals, nonmetals, and metalloids based on their physical properties. The elements are divided into three groups on the Periodic Table. Each different substance usually has a different density, so density can be used as an identifying property. Therefore, calculating density aids classification of substances.		
(iii) Energy resources are available on a renewable, nonrenewable, or indefinite basis. Understanding the origins and uses of these resources enables informed decision making. Students should consider the ethical/social issues surrounding Earth's natural energy resources, while looking at the advantages and disadvantages of their long-term uses.		
(C) Force, motion, and energy. Energy occurs in two types, potential and kinetic, and can take several forms. Thermal energy can be transferred by conduction, convection, or radiation. It can also be changed from one form to another. Students will investigate the relationship between force and motion using a variety of means, including calculations and measurements.	1	Omit the words "including calculations and measurements."
(D) Earth and space. The focus of this strand is on introducing Earth's processes. Students should develop an understanding of Earth as part of our solar system. The topics include organization of our solar system, the role of gravity, and space exploration.		
(E) Organisms and environments. Students will gain an understanding of the broadest taxonomic classifications of organisms and how characteristics determine their classification. The other major topics developed in this strand include the interdependence between organisms and their environments and the levels of organization within an ecosystem.		
<b>(b) Knowledge and skills.</b>		
<b>(1) Scientific investigation and reasoning. The student, for at least 40% of instructional time, conducts laboratory and field investigations following safety procedures and environmentally appropriate and ethical practices. The student is expected to:</b>		
(A) demonstrate safe practices during laboratory and field investigations as outlined in the Texas Safety Standards; and		
(B) practice appropriate use and conservation of resources, including disposal, reuse, or recycling of materials.		
<b>(2) Scientific investigation and reasoning. The student uses scientific inquiry methods during laboratory and field investigations. The student is expected to:</b>		

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(A) plan and implement descriptive investigations by making observations, asking well-defined questions, and using appropriate equipment and technology;		
(B) design and implement experimental investigations by making observations, asking well-defined questions, formulating testable hypotheses, and using appropriate equipment and technology;	16	Edit SE to read: design and implement comparative and experimental investigations...
(C) collect and record data using the International System of Units (SI) and qualitative means such as labeled drawings, writing, and graphic organizers;		
(D) construct tables and graphs, using repeated trials and means, to organize data and identify patterns; and		
(E) analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends.		
<b>(3) Scientific investigation and reasoning. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions and knows the contributions of relevant scientists. The student is expected to:</b>		
(A) differentiate among scientific fact, scientific hypothesis, scientific theory, and scientific law;		
(B) use models to represent aspects of the natural world such as a model of Earth's layers;		
(C) identify advantages and limitations of models such as size, scale, properties, and materials; and		
(D) relate the impact of research on scientific thought and society, including the history of science and contributions of scientists as related to the content.		
<b>(4) Scientific investigation and reasoning. The student knows how to use a variety of tools and safety equipment to conduct science inquiry. The student is expected to:</b>		
(A) use appropriate tools to collect, record, and analyze information, including journals/notebooks, beakers, Petri dishes, meter sticks, graduated cylinders, hot plates, test tubes, triple beam balances, microscopes, thermometers, calculators, computers, timing devices, and other equipment as needed to teach the curriculum; and		

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(B) use preventative safety equipment, including chemical splash goggles, aprons, and gloves, and be prepared to use emergency safety equipment, including an eye/face wash, a fire blanket, and a fire extinguisher.		
(5) <b>Matter and energy. The student knows the differences between elements and compounds. The student is expected to:</b>		
(A) know that an element is a pure substance represented by chemical symbols;	1	The verb "know" is a concern. This would require a rubric indicating the level of knowing.
(B) recognize that a limited number of the many known elements comprise the largest portion of solid Earth, living matter, oceans, and the atmosphere;	1	Comment: regarding recognize that a limited number of the many known elements comprise the largest portion of solid Earth, etc... is extremely random information for this knowledge statement. This is the only time that elements on the Earth are mentioned for middle school.
(C) differentiate between elements and compounds on the most basic level; and	1	Omit this statement entirely, or change it to read "differentiate between symbols and compound formulas."
	1	Omit this statement entirely or change it to read "identify element symbols and compound formulas."
	14	Replace SE with: recognize that elements combine to form compounds such as H <sub>2</sub> O, NaCl and CO <sub>2</sub> .
	1	Differentiate between elements and compounds on the most basic level. What is "the most basic level?"
(D) identify the formation of compounds by using the evidence of a possible chemical change such as production of a gas, change in temperature, production of a precipitate, or color change.	14	Replace SE with: identify the formation of a new substance by using the evidence of a possible chemical change such as production of a gas, change in temperature, production of a precipitate, or an unexpected color change.
	1	Delete "the formation of compounds by using the ..."
	1	Concern for a need for clarity to the "production of gas" and "color change" as these can exist in a physical change as well as a chemical change in matter.
	14	Add new SE: (E) recognize that elements combine to form compounds, such as water, carbon dioxide and sodium chloride.
	14	Add new SE: (F) identify that organic compounds contain carbon and other elements such as hydrogen, oxygen, phosphorus, nitrogen, or sulfur.

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<b>(6) Matter and energy. The student knows matter has physical properties that can be used for classification. The student is expected to:</b>		
(A) compare metals, nonmetals, and metalloids using physical properties such as luster, conductivity, or malleability;		
(B) calculate density to identify an unknown substance; and	14	Replace SE with: classify substances based on physical properties including volume and density.
	1	Calculating density is highly unnecessary and too abstract.
(C) test the physical properties of minerals, including hardness, color, luster, and streak.		
<b>(7) Matter and energy. The student knows that some of Earth's energy resources are available on a nearly perpetual basis, while others can be renewed over a relatively short period of time. Some energy resources, once depleted, are essentially nonrenewable. The student is expected to:</b>		
(A) research and debate the advantages and disadvantages of using coal, oil, natural gas, nuclear power, biomass, wind, hydropower, geothermal, and solar resources; and		
(B) design a logical plan to manage energy resources in the home, school, or community.	14	Delete term "logical" from SE.
<b>(8) Force, motion, and energy. The student knows force and motion are related to potential and kinetic energy. The student is expected to:</b>		
(A) compare and contrast potential and kinetic energy;		
(B) identify and describe the changes in direction, motion, and speed of an object when acted upon by unbalanced forces;	18	Replace SE with: identify and describe the changes in position, direction, and relative speed of an object when acted upon by unbalanced forces (note that "motion" is deleted from SE).
(C) calculate average speed using distance and time measurements; and	14	Delete SE and move to Grade 8, KS 6.
(D) measure and graph changes in motion.		
	14	Insert new SE: (E) investigate how inclined planes and pulleys can be used to change the amount of force to move an object.
	19	Insert new SE: (F) investigate and describe applications of Newton's law of inertia, law of force and acceleration, and law of action-reaction such as in vehicle restraints, sports activities, amusement park rides, and rocket launches.

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<b>(9) Force, motion, and energy. The student knows that the Law of Conservation of Energy states that energy can neither be created nor destroyed, it just changes form. The student is expected to:</b>	12	Edit KS to read: The student knows that energy occurs in many forms and can change forms.
	14	Edit KS to read: The student knows that there is a relationship among force, motion, and energy.
	1	Keep statement of fitting both the Law of Conservation of Energy for and the forms and types of energy.
(A) investigate methods of thermal energy transfer, including conduction, convection, and radiation;		
(B) verify through investigations that thermal energy moves in a predictable pattern from warmer to cooler until all the substances attain the same temperature such as an ice cube melting; and		
(C) demonstrate energy transformations such as energy in a flashlight battery changes from chemical energy to electrical energy to light energy.		
<b>(10) Earth and space. The student understands the structure of Earth, the rock cycle, and plate tectonics. The student is expected to:</b>		
(A) build a model to illustrate the structural layers of Earth, including the inner core, outer core, mantle, crust, asthenosphere, and lithosphere;		
(B) classify rocks as metamorphic, igneous, or sedimentary by the processes of their formation;	10	Delete and move to Grade 8, KS 9.
(C) identify the major tectonic plates, including Eurasian, African, Indo-Australian, Pacific, North American, and South American; and	1	Seems redundant to Grade 8 - 9B. Need clarification of differences.
(D) describe how plate tectonics causes major geological events such as ocean basins, earthquakes, volcanic eruptions, and mountain building.	1	Seems redundant to Grade 8 - 9B. Need clarification of differences.
	10	Delete and move to Grade 8, KS 9.
<b>(11) Earth and space. The student understands the organization of our solar system and the relationships among the various bodies that comprise it. The student is expected to:</b>		
(A) describe the physical properties, locations, and movements of the Sun, planets, Galilean moons, meteors, asteroids, and comets;		
(B) understand that gravity is the force that governs the motion of our solar system; and	1	What does “understand” look like in the classroom? This would require a rubric indicating the level understanding.

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(C) describe the history and future of space exploration, including the types of equipment and transportation needed for space travel.	2	Move to Grade 8.
	10	Move to Grade 6, KS 12.
<b>(12) Organisms and environments. The student knows all organisms are classified into Domains and Kingdoms. Organisms within these taxonomic groups share similar characteristics which allow them to interact with the living and nonliving parts of their ecosystem. The student is expected to:</b>	10	Move to Grade 7 and edit KS 6.12 and SE's to read: Earth and Space. The student knows components of our solar system.
(A) understand that all organisms are composed of one or more cells;	9	Move to Grade 7 and edit to read: (A) 7.9A analyze the characteristics of objects in our solar system that allow life to exist such as the proximity of the sun, presences of water, and composition of the atmosphere.
	1	What does “understand” look like in the classroom? This would require a rubric indicating the level understanding.
(B) recognize that the presence of a nucleus determines whether a cell is prokaryotic or eukaryotic;	9	Move to Grade 7 and edit to read (B) 7.9B identify the accommodations, considering the characteristics of our solar system that enable manned space exploration.
	2	Regarding taxonomy, this is an important topic. It will next be taught in Biology. Four years is a large gap in instruction when dealing with classification.
(C) recognize that the broadest taxonomic classification of living organisms is divided into currently recognized Domains;	9	Move to Grade 7 and to (C) 6.11C describe the history and future of space exploration including the types of equipment and transportation needed for space travel.
	2	Regarding taxonomy, this is an important topic. It will next be taught in Biology. Four years is a large gap in instruction when dealing with classification.
(D) identify the basic characteristics of organisms, including prokaryotic or eukaryotic, unicellular or multicellular, autotrophic or heterotrophic, and mode of reproduction, that further classify them in the currently recognized Kingdoms;	10	Move to Grade 7.
	2	Regarding taxonomy, this is an important topic. It will next be taught in Biology. Four years is a large gap in instruction when dealing with classification.
(E) describe biotic and abiotic parts of an ecosystem in which organisms interact; and	10	Move to new KS 13.
	1	In addition to organism interactions, students should be able to identify internal and external stimuli and responses as these changes the overall interactions in an ecosystem.

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(F) diagram the levels of organization within an ecosystem, including organism, population, community, and ecosystem.	9	Move to new KS 13.
	10	Insert new KS to read: (6.13) Organisms and environments. The student knows that there is a relationship between organisms and the environment. The student is expected to: (A) 7.10A observe and describe how different environments, biomes, support different varieties of organisms; (B) 7.10B describe how biodiversity contributes to the sustainability of an ecosystem; and (C) 7.10C describe the role of ecological succession after a natural disaster; (D) describe biotic and abiotic parts of an ecosystem in which organisms interact; and (E) diagram the levels of organization within an ecosystem including organism, population, community, and ecosystem.

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<b>Science, Grade 7, Beginning with School Year 2010-2011</b>		
	1	Congratulations! Progress is being made to having a 7th grade curriculum that addresses the needs and interests of the 7th graders that it is provided for. Please continue to emphasize highly the biological aspect of 7th grade science.
	1	I'm excited about the new revisions of the 7th grade TEKS. I will be able to more effectively cover the strands with a common theme...Life Science.
	1	7 <sup>th</sup> Grade lacks a transition for the Periodic Table. If 6th grade will begin the study of the Periodic Table, there needs to be a consistent build on it.
	1	To try and adequately develop all of these concepts to a level of mastery such that in eighth grade they will be in a better position to pass TAKS is ludicrous.
<b>(a) Introduction.</b>		
(1) 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 scientifically testable.		
(2) Scientific 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 become theories. Scientific theories are based on natural and physical phenomena and are capable of being tested by multiple, independent researchers. Students should know that scientific theories, unlike hypotheses, are well-established and highly reliable, but they may still be subject to change as new information and technologies are developed. Students should be able to distinguish between scientific decision-making methods and ethical/social decisions that involve the application of scientific information.		

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(3) Grade 7 science is interdisciplinary in nature; however, much of the content focus is on organisms and the environment. National standards in science are organized as a multi-grade blocks such as Grades 5-8 rather than individual grade levels. In order to follow the grade level format used in Texas, the various national standards are found among Grades 6, 7, and 8. Recurring themes are pervasive in sciences, mathematics, and technology. These ideas transcend disciplinary boundaries and include change and constancy, patterns, cycles, systems, models, and scale.		
(4) The strands for Grade 7 include:		
(A) Scientific investigation and reasoning.		
(i) To develop a rich knowledge of science and the natural world, students must become familiar with different modes of scientific inquiry, rules of evidence, ways of formulating questions, ways of proposing explanations, and the diverse ways scientists study the natural world and propose explanations based on evidence derived from their work.		
(ii) Scientific investigations are conducted for different reasons. All investigations require a research question, careful observations, data gathering, and analysis of the data to identify the patterns that will explain the findings. Descriptive investigations are used to explore new phenomena such as conducting surveys of organisms or measuring the abiotic components in a given habitat. Descriptive statistics include frequency, range, mean, median, and mode. A hypothesis is not required in a descriptive investigation. On the other hand, when conditions can be controlled in order to focus on a single variable, experimental research design is used to determine causation. Students should experience both types of investigations and understand that different scientific research questions require different research designs.	15	Replace: Scientific investigations are conducted in different ways using different scientific research designs. However, all investigations require a well-designed research question or hypothesis, careful observations, data gathering and analysis of the data to identify the patterns that will explain the findings. Descriptive investigations are used to explore new phenomena such as conducting surveys of pond organisms, or measuring the abiotic components of a habitat. Descriptive statistics include frequency, mean, median, and mode. No hypothesis and no dependent and independent variables are used in this type of investigation. On the other hand, Comparative investigations are used when conditions can be kept constant in order to focus on a single variable. Comparative analysis is used to compare the strength of a relationship between two variables. The investigator selects the independent variable (IV) and records the responses of the dependent (responding) variable (DV). No control group is used for this type of investigation. Conditions other than IV or DV are held constant or at least they are the same for all test groups. The IV is the factor being selected. The DV is the factor that responds to changes of the IV. Statistics used in the Comparative method include some type of comparison between or among means of various DVs .However, when a scientific study can have a control, then an Experimental investigation is used to determine causation. Students in grades 5-12 should experience all three types of investigations and understand that different scientific research questions require different research designs.

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	1	With regard to: “Descriptive investigations are used to explore new phenomena such as conducting surveys of organisms or measuring the abiotic components in a given habitat.” Why do we have to use life science to do this? Every time we see a “such as” I know it can be tested in 8 <sup>th</sup> grade.
(iii) Scientific investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and the methods, models, and conclusions built from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. Models have limitations and based on new discoveries are constantly being modified to more closely reflect the natural world.		
(B) Matter and energy. Matter and energy are conserved throughout living systems. Radiant energy from the Sun drives much of the flow of energy throughout living systems due to the process of photosynthesis in organisms described as producers. Most consumers then depend on producers to meet their energy needs. Decomposers play an important role in recycling matter. Organic compounds are composed of carbon and other elements that are recycled due to chemical changes that rearrange the elements for the particular needs of that living system. Large molecules such as carbohydrates are composed of chains of smaller units such as sugars, similar to a train being composed of multiple box cars. Subsequent grade levels will learn about the differences at the molecular and atomic level.		
(C) Force, motion, and energy. Force, motion, and energy are observed in living systems and the environment in several ways. Interactions between muscular and skeletal systems allow the body to apply forces and transform energy both internally and externally. Force and motion can also describe the direction and growth of seedlings, turgor pressure, and geotropism. Catastrophic events of weather systems such as hurricanes, floods, and tornadoes can shape and restructure the environment through the force and motion evident in them. Weathering, erosion, and deposition occur in environments due to the forces of gravity, wind, ice, and water.	1	They need some introduction to force and motion as it applies to machines in 7 <sup>th</sup> . The 8 <sup>th</sup> has 5 equations that could be on the TAKS test. Introduction to Newton’s Laws and to equations is essential in 7 <sup>th</sup> . You are totally eliminating this.

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(D) Earth and space. Earth and space phenomena can be observed in a variety of settings. Both natural events and human activities can impact Earth systems. There are characteristics of Earth and relationships to objects in our solar system that allow life to exist.	1	How many other objects does this relate to? They need reinforcement of an Earth and Moon relationship as expressed in the current TEKS (2) before 8 <sup>th</sup> grade.
(E) Organisms and environments.		
(i) Students will understand the relationship between living organisms and their environment. Different environments support different living organisms that are adapted to that region of Earth. Organisms are living systems that maintain a steady state with that environment and whose balance may be disrupted by internal and external stimuli. External stimuli include human activity or the environment. Successful organisms can reestablish a balance through different processes such as a feedback mechanism. Ecological succession can be seen on a broad or small scale.		
(ii) Students learn that all organisms obtain energy, get rid of wastes, grow, and reproduce. During both sexual and asexual reproduction, traits are passed onto the next generation. These traits are contained in genetic material that is found on genes within a chromosome from the parent. Changes in traits sometimes occur in a population over many generations. One of the ways a change can occur is through the process of natural selection. Students extend their understanding of structures in living systems from a previous focus on external structures to an understanding of internal structures and functions within living things.		
(iii) All living organisms are made up of smaller units called cells. All cells use energy, get rid of wastes, and contain genetic material. Students will compare plant and animal cells and understand the internal structures within them that allow them to obtain energy, get rid of wastes, grow, and reproduce in different ways. Cells can organize into tissues, tissues into organs, and organs into organ systems. Students will learn the major functions of human body systems such as the ability of the integumentary system to protect against infection, injury, and ultraviolet (UV) radiation; regulate body temperature; and remove waste.		

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(b) <b>Knowledge and skills.</b>		
(1) <b>Scientific investigation and reasoning. The student, for at least 40% of the instructional time, conducts laboratory and field investigations following safety procedures and environmentally appropriate and ethical practices. The student is expected to:</b>		
(A) demonstrate safe practices during laboratory and field investigations as outlined in the Texas Safety Standards; and		
(B) practice appropriate use and conservation of resources, including disposal, reuse, or recycling of materials.		
(2) <b>Scientific investigation and reasoning. The student uses scientific inquiry methods during laboratory and field investigations. The student is expected to:</b>		
(A) plan and implement descriptive investigations by making observations, asking well-defined questions, and using appropriate equipment and technology;		
(B) design and implement experimental investigations by making observations, asking well-defined questions, formulating testable hypotheses, and using appropriate equipment and technology;	16	Edit SE to read: design and implement comparative and experimental investigations...
(C) collect and record data using the International System of Units (SI) and qualitative means such as labeled drawings, writing, and graphic organizers;	1	The word qualitative is used but not the word quantitative -- why?
(D) construct tables and graphs, using repeated trials and means, to organize data and identify patterns; and		
(E) analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends.		
(3) <b>Scientific investigation and reasoning. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions and knows the contributions of relevant scientists. The student is expected to:</b>		
(A) differentiate among scientific fact, scientific hypothesis, scientific theory, and scientific law;		
(B) use models to represent aspects of the natural world such as human body systems and plant and animal cells;	1	Why are we being told which models we MUST include? All teachers use models but it should be our discretion and NOT just life science.
(C) identify advantages and limitations of models such as size, scale, properties, and materials; and		

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(D) relate the impact of research on scientific thought and society, including the history of science and contributions of scientists as related to the content.		
<b>(4) Science investigation and reasoning. The student knows how to use a variety of tools and safety equipment to conduct science inquiry. The student is expected to:</b>		
(A) use appropriate tools to collect, record, and analyze information, including life science models, hand lens, stereoscopes, microscopes, beakers, Petri dishes, microscope slides, graduated cylinders, test tubes, meter sticks, metric rulers, metric tape measures, timing devices, hot plates, balances, thermometers, calculators, water test kits, computers, temperature and pH probes, collecting nets, insect traps, globes, digital cameras, journals/notebooks, and other equipment as needed to teach the curriculum; and	1	Tools - is there really a need for test kits, collecting nets, insect traps?
(B) use preventative safety equipment, including chemical splash goggles, aprons, and gloves, and be prepared to use emergency safety equipment, including an eye/face wash, a fire blanket, and a fire extinguisher.		
<b>(5) Matter and energy. The student knows that interactions occur between matter and energy. The student is expected to:</b>		
(A) recognize that radiant energy from the Sun is transformed into chemical energy through the process of photosynthesis;		
(B) demonstrate and explain the cycling of matter within living systems such as in the decay of biomass in a compost bin; and	1  14  1	"Cycling of matter within living systems" is a broad concept. Is the intent to focus on decay of biomass?  Edit SE to read: identify the role of decomposers in the cycling of matter within living systems, such as in the decay of biomass in a compost bin.  Why can't this TEKS say "recognize some of the cycles that exist in Science and their relationship between matter and energy, such as water cycle, carbon dioxide/oxygen cycle, nitrogen cycle, lunar cycle, and the three types of rocks that exist on earth?"
(C) diagram the flow of energy through living systems, including food chains, food webs, and energy pyramids.	1	Regarding the diagram the flow of energy, I think the word "describe" or "explain" needs to be added in conjunction with diagram.

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<b>(6) Matter and energy. The student knows that matter has physical and chemical properties and can undergo physical and chemical changes. The student is expected to:</b>		
(A) identify that organic compounds contain carbon and other elements such as hydrogen, oxygen, phosphorus, nitrogen, or sulfur;	14	Delete and move to Grade 6 (5)(F): identify that organic compounds contain carbon and other elements such as hydrogen, oxygen, phosphorus, nitrogen, or sulfur.
	1	Either omit this SE or insert the words "by the compound formula" after the word identify.
	1	Regarding identify organic compounds, this is the only time the term “organic” is mentioned in middle school. Seems like a random vocabulary term.
(B) distinguish between physical and chemical changes in matter in the digestive system; and	1	Shouldn't this be in Biology? They need a beginning point to talk about the Periodic Table. We talk about this concept (stomach digestion) in the human systems section. They need more meat in the chemistry section.
(C) recognize how large molecules are broken down into smaller molecules such as carbohydrates can be broken down into sugars.	1	Delete SE. Too complex for students.
	1	This is about compounds so why doesn't it say so.
<b>(7) Force, motion, and energy. The student knows that there is a relationship among force, motion, and energy. The student is expected to:</b>	1	There needs to be more Physical Science basis here such as basic tools to do work along with life science examples in the human body.
(A) contrast situations where work is done with different amounts of force to situations where no work is done such as moving a box with a ramp and without a ramp, or standing still;	15	Replace SE with: investigate how lever-type structures within the human body are related to work.
	1	Does not make sense. Work is done when an object is moved.
	14	Edit SE to read: investigate how inclined planes and first class levers allow the body to do work with less force.
	1	Isn't this another way of saying Newton's Laws?
	1	Work is done when an object is moved, so work is done by moving a box with a ramp or without a ramp—work isn't done when the object doesn't move (standing still). Simple machines exchange force for distance, but as long as an object moves, work is done.

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(B) relate the amount of work done during an everyday activity to energy transformations; and	15	Replace SE: illustrate the transformation of energy within an organism, such as the transfer from chemical to mechanical or thermal energy.
	14	Edit SE to read: illustrate the transformation of energy within an organism such as the transfer from chemical energy to heat and thermal energy.
	1	Some of the equations and Newton’s Laws would be more beneficial.
(C) demonstrate and illustrate forces that affect motion in everyday life such as emergence of seedlings, turgor pressure, and geotropism.		
<b>(8) Earth and space. The student knows that natural events and human activity can impact Earth systems. The student is expected to:</b>	10	Move to Grade 8 and replace KS and SEs with: Organisms and Environments. All organisms are classified into Domains and Kingdoms. Organisms within these taxonomic groups share similar characteristics which allow them to interact with the living and nonliving parts of their ecosystem.
(A) predict and describe how different types of catastrophic events impact ecosystems such as floods, hurricanes, or tornadoes;	10	Replace SE with: recognize the broadest taxonomic classification of living organisms is divided into currently recognized Domains.
(B) analyze the effects of weathering, erosion, and deposition on the environment in ecoregions of Texas; and	5	Delete terms "in ecosystems of Texas."
	10	Replace SE with: identify the basic characteristics of organisms, including prokaryotic or eukaryotic, unicellular or multicellular, autotrophic or heterotrophic, and mode of reproduction, that further classify them in the currently recognized Kingdoms.
	1	So all examples of weathering, erosion, and deposition take place only in Texas?
(C) model the effects of human activity on groundwater and surface water in a watershed.	10	Replace SE with: examine organisms or their structures, such as insects or leaves, and use dichotomous keys for identification.
<b>(9) Earth and space. The student knows components of our solar system. The student is expected to:</b>	10	Move to Grade 6 and replace with: Organisms and Environment. The student knows that living systems at all levels of organization demonstrate the complementary nature of structure and function.
(A) analyze the characteristics of objects in our solar system that allow life to exist such as the proximity of the Sun, presence of water, and composition of the atmosphere; and	10	Replace SE with: investigate and explain how internal structures of organisms are adapted to perform specific functions, such as gills in fish, hollow bones in birds, or xylem in plants.
(B) identify the accommodations, considering the characteristics of our solar system, that enabled manned space exploration.	10	Replace SE with: understand that all organisms are composed of one or more cells.

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	10	Insert new (C)-(G) as follows: 7.12D differentiate between structure and function in plant and animal cell organelles including cell membrane, cell wall, nucleus, cytoplasm, mitochondrion, chloroplasts and vacuole(D) 7.12F recognize that according to the cell theory all organisms are composed of cells and cells which carry on similar functions, such as extracting energy from food to sustain life; (E) 6.12B recognize the presence of a nucleus determines whether a cell is prokaryotic or eukaryotic; (F) 7.12C recognize levels of organization in plants and animals including cells, tissues, organs, organ systems, and organisms; (G) 7.12B identify the main functions of the systems of the human organism including the circulatory, respiratory, skeletal, muscular, digestive ...
<b>(10) Organisms and environments. The student knows that there is a relationship between organisms and the environment. The student is expected to:</b>	10	Delete and move to Grade 6.
(A) observe and describe how different environments, including microhabitats in schoolyards and biomes, support different varieties of organisms;	1	The focus on using school ground to teach science need to be kept.
(A) observe and describe how different environments, including microhabitats in schoolyards and biomes, support different varieties of organisms;	5	Edit SE to read: observe and describe how different environments, including biomes, support different varieties of organisms.
(B) describe how biodiversity contributes to the sustainability of an ecosystem; and	9	Delete and move to Grade 6.
(B) describe how biodiversity contributes to the sustainability of an ecosystem; and	9	Delete and move to Grade 6.
(C) observe, record, and describe the role of ecological succession such as in a microhabitat of a garden with weeds.	15	Edit SE to read: observe, record, and describe the role of ecological succession of a garden with weeds or a natural disaster.
	5	Edit SE to read: describe the role of ecological succession after a natural disaster.
	9	Delete and move to Grade 6.
	1	Why are we changing it to a microhabitat instead of leaving it as ecosystem? I have other examples around me to use. I also know if it is a “such as” it could be tested on the 8 <sup>th</sup> grade test.
<b>(11) Organisms and environments. The student knows that populations and species demonstrate variation and inherit many of their unique traits through gradual processes over many generations. The student is expected to:</b>		

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(A) examine organisms or their structures such as insects or leaves and use dichotomous keys for identification;	10	Move SE to KS 8.
(B) explain variation within a population or species by comparing external features, behaviors, or physiology of organisms that enhance their survival such as migration, hibernation, or storage of food in a bulb; and	5	Delete terms "in a bulb."
(C) identify some changes in genetic traits that have occurred over several generations through natural selection and selective breeding such as the Galapagos Medium Ground Finch ( <i>Geospiza fortis</i> ) or domestic animals.	10	Move SE to KS 12.
(C) identify some changes in genetic traits that have occurred over several generations through natural selection and selective breeding such as the Galapagos Medium Ground Finch ( <i>Geospiza fortis</i> ) or domestic animals.	14	Add genus species to SE, Galapagos Medium Ground Finch ( <i>Geospiza fortis</i> ).
(C) identify some changes in genetic traits that have occurred over several generations through natural selection and selective breeding such as the Galapagos Medium Ground Finch ( <i>Geospiza fortis</i> ) or domestic animals.	10	Move SE to KS 12.
<b>(12) Organisms and environments. The student knows that living systems at all levels of organization demonstrate the complementary nature of structure and function. The student is expected to:</b>		
(A) investigate and explain how internal structures of organisms are adapted to perform specific functions such as gills in fish, hollow bones in birds, or xylem in plants;	15	Edit SE to read: investigate and explain how internal structures of organisms have adaptations that allow specific functions such as gills in fish, hollow bones in birds, or xylem in plants.
	1	This SE is much too broad.
	1	Why are the examples specific to life science?
(B) identify the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, excretory, reproductive, integumentary, nervous, and endocrine systems;	15	Edit SE to read: identify several main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, excretory, reproductive, integumentary, nervous, and endocrine systems.
	1	Edit SE to read: identify the main functions of the systems (functions are plural, implying more than one).
(C) recognize levels of organization in plants and animals, including cells, tissues, organs, organ systems, and organisms;		
(D) differentiate between structure and function in plant and animal cell organelles, including cell membrane, cell wall, nucleus, cytoplasm, mitochondrion, chloroplast, and vacuole;		
(E) compare the functions of a cell to the functions of organisms such as waste removal; and		
(F) recognize that according to cell theory all organisms are composed of cells and cells carry on similar functions such as extracting energy from food to sustain life.	5	Edit SE to read: recognize that according to the cell theory all organisms are composed of cells which carry on similar functions, such as extracting energy from food to sustain life.

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<b>(13) Organisms and environments. The student knows that a living organism must be able to maintain balance in stable internal conditions in response to external and internal stimuli. The student is expected to:</b>	14	Edit KS to read: The student knows that a living organism must be able to maintain internal balance in response to external and internal stimuli.
(A) investigate how organisms respond to external stimuli found in the environment such as phototropism and fight or flight; and	1	Should this be both an external and internal response.
(B) describe and relate responses in organisms that may result from internal stimuli such as wilting in plants and fever or vomiting in animals that allow them to maintain balance.		
<b>(14) Organisms and environments. The student knows that reproduction is a characteristic of living organisms and that the instructions for traits are governed in the genetic material. The student is expected to:</b>	1	I have great concerns over the lack of scaffolding about genetic inheritance in TEKS 7.14 prior to the depth of knowledge and understanding expected in Biology TEKS 6A-H. There is little or no support for this concept in 6 <sup>th</sup> or 8 <sup>th</sup> grade. With the 4x4 pushing Biology into the 9 <sup>th</sup> grade, the foundational knowledge for genetic variation is almost non-existent. Reread the objectives in 7.14. It starts at a definition of genetic inheritance, leads to a nominal comparison of asexual and sexual reproduction, and then focuses on genes on chromosomes as the controlling influence on traits. I feel teachers will have no clue how to string this all together.
(A) define heredity as the passage of genetic instructions from one generation to the next generation;		
(B) compare the results of uniform or diverse offspring from sexual reproduction or asexual reproduction; and		
(C) recognize that inherited traits of individuals are governed in the genetic material found in the genes within chromosomes.	15	Edit SE to read: recognize that inherited traits of individuals are governed in the genetic material found in the genes within chromosomes in the nucleus.

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<b>Science, Grade 8, Beginning with School Year 2010-2011</b>		
	1	Grade 8 TEKS are more straight forward and relate to each other better.
	1	Remove ecology and environmental science. Move to Grade 7.
	1	Bring solar system information from Grade 6 and Grade 7 into Grade 8. Consolidate.
	1	Glad that weather and earth/moon system are in 8th Grade.
	1	Genetics are only covered in 7th grade, I propose either an introduction into the subject in 6th grade or a continuation of the subject in 8th grade.
<b>(a) Introduction.</b>		
(1) 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 scientifically testable.		
(2) Scientific 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 become theories. Scientific theories are based on natural and physical phenomena and are capable of being tested by multiple, independent researchers. Students should know that scientific theories, unlike hypotheses, are well-established and highly reliable, but they may still be subject to change as new information and technologies are developed. Students should be able to distinguish between scientific decision-making methods and ethical/social decisions that involve the application of scientific information.		
(3) Grade 8 science is interdisciplinary in nature; however, much of the content focus is on earth and space science. National standards in science are organized as multi-grade blocks such as Grades 5-8 rather than individual grade levels. In order to follow the grade level format		

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used in Texas, the various national standards are found among Grades 6, 7, and 8. Recurring themes are pervasive in sciences, mathematics, and technology. These ideas transcend disciplinary boundaries and include change and constancy, patterns, cycles, systems, models, and scale.		
(4) The strands for Grade 8 include:		
(A) Scientific investigation and reasoning.		
(i) To develop a rich knowledge of science and the natural world, students must become familiar with different modes of scientific inquiry, rules of evidence, ways of formulating questions, ways of proposing explanations, and the diverse ways scientists study the natural world and propose explanations based on evidence derived from their work.		
(ii) Scientific investigations are conducted for different reasons. All investigations require a research question, careful observations, data gathering, and analysis of the data to identify the patterns that will explain the findings. Descriptive investigations are used to explore new phenomena such as conducting surveys of organisms or measuring the abiotic components in a given habitat. Descriptive statistics include frequency, range, mean, median, and mode. A hypothesis is not required in a descriptive investigation. On the other hand, when conditions can be controlled in order to focus on a single variable, experimental research design is used to determine causation. Students should experience both types of investigations and understand that different scientific research questions require different research designs.	15	Replace: Scientific investigations are conducted in different ways using different scientific research designs. However, all investigations require a well-designed research question or hypothesis, careful observations, data gathering and analysis of the data to identify the patterns that will explain the findings. Descriptive investigations are used to explore new phenomena such as conducting surveys of pond organisms, or measuring the abiotic components of a habitat. Descriptive statistics include frequency, mean, median, and mode. No hypothesis and no dependent and independent variables are used in this type of investigation. On the other hand, Comparative investigations are used when conditions can be kept constant in order to focus on a single variable. Comparative analysis is used to compare the strength of a relationship between two variables. The investigator selects the independent variable (IV) and records the responses of the dependent (responding) variable (DV). No control group is used for this type of investigation. Conditions other than IV or DV are held constant or at least they are the same for all test groups. The IV is the factor being selected. The DV is the factor that responds to changes of the IV. Statistics used in the Comparative method include some type of comparison between or among means of various DVs. However, when a scientific study can have a control, then an Experimental investigation is used to determine causation. Students in grades 5-12 should experience all three types of investigations and understand that different scientific research questions require different research designs.
(iii) Scientific investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and the methods, models, and conclusions built from these investigations change as new observations are made.		

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Models of objects and events are tools for understanding the natural world and can show how systems work. Models have limitations and based on new discoveries are constantly being modified to more closely reflect the natural world.		
(B) Matter and energy. Students recognize that matter is composed of atoms. Students examine information on the Periodic Table to recognize that elements are grouped into families. In addition, students understand the basic concept of conservation of mass. Lab activities will allow students to demonstrate evidence of chemical reactions. They will use chemical formulas and balanced equations to show chemical reactions and the formation of new substances.	1	Students should recognize if an equation is balanced or not – but not actually “balance” the equation. This was clarified in another section (5 F), but I feel the descriptions of the student expectation should be consistent.
(C) Force, motion, and energy. Students experiment with the relationship between forces and motion through the study of Newton's three laws. Students learn how these forces relate to geologic processes and astronomical phenomena. In addition, students recognize that these laws are evident in everyday objects and activities. Mathematics is used to calculate speed using distance and time measurements.		
(D) Earth and space. Students identify the role of natural events in altering Earth systems. Cycles within Sun, Earth, and Moon systems are studied as students learn about seasons, tides, and lunar phases. Students learn that stars and galaxies are part of the universe and that distances in space are measured by using light waves. In addition, students use data to research scientific theories of the origin of the universe. Students will illustrate how Earth features change over time by plate tectonics. They will interpret land and erosional features on topographic maps. Students learn how interactions in solar, weather, and ocean systems create changes in weather patterns and climate.		
(E) Organisms and environments. In studies of living systems, students explore the interdependence between these systems. Interactions between organisms in ecosystems, including producer/consumer, predator/prey, and parasite/host relationships, are investigated in aquatic and terrestrial systems. Students describe how biotic and abiotic factors affect the number of organisms and populations present in an ecosystem. In addition, students explore how organisms and their populations respond to short- and long-term environmental changes, including those caused by human activities.		

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<b>(b) Knowledge and skills.</b>		
<b>(1) Scientific investigation and reasoning. The student, for at least 40% of instructional time, conducts laboratory and field investigations following safety procedures and environmentally appropriate and ethical practices. The student is expected to:</b>		
(A) demonstrate safe practices during laboratory and field investigations as outlined in the Texas Safety Standards; and		
(B) practice appropriate use and conservation of resources, including disposal, reuse, or recycling of materials.		
<b>(2) Scientific investigation and reasoning. The student uses scientific inquiry methods during laboratory and field investigations. The student is expected to:</b>		
(A) plan and implement descriptive investigations by making observations, asking well-defined questions, and using appropriate equipment and technology;		
(B) design and implement experimental investigations by making observations, asking well-defined questions, formulating testable hypotheses, and using appropriate equipment and technology;	10	Edit SE to read: design and implement comparative and experimental investigations...
(C) collect and record data using the International System of Units (SI) and qualitative means such as labeled drawings, writing, and graphic organizers;		
(D) construct tables and graphs, using repeated trials and means, to organize data and identify patterns; and		
(E) analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends.		
<b>(3) Scientific investigation and reasoning. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions and knows the contributions of relevant scientists. The student is expected to:</b>		
(A) differentiate among scientific fact, scientific hypothesis, scientific theory, and scientific law;		
(B) use models to represent aspects of the natural world such as an atom, a molecule, space, or a geologic feature;		
(C) identify advantages and limitations of models such as size, scale, properties, and materials; and		

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(D) relate the impact of research on scientific thought and society, including the history of science and contributions of scientists as related to the content.		
<b>(4) Scientific investigation and reasoning. The student knows how to use a variety of tools and safety equipment to conduct science inquiry. The student is expected to:</b>		
(A) use appropriate tools to collect, record, and analyze information, including lab journals/notebooks, beakers, meter sticks, graduated cylinders, anemometers, psychrometers, hot plates, test tubes, spring scales, balances, microscopes, thermometers, calculators, computers, spectrosopes, timing devices, and other equipment as needed to teach the curriculum; and	1	Tools - anemometer and psychrometer are not appropriate for this grade level.
(B) use preventative safety equipment, including chemical splash goggles, aprons, and gloves, and be prepared to use emergency safety equipment, including an eye/face wash, a fire blanket, and a fire extinguisher.		
<b>(5) Matter and energy. The student knows that matter is composed of atoms and has chemical and physical properties. The student is expected to:</b>		
(A) describe the structure of atoms, including the masses, electrical charges, and locations, of protons and neutrons in the nucleus and electrons in the electron cloud;		
(B) identify that protons determine an element's identity and valence electrons determine its chemical properties, including reactivity;		
(C) interpret the arrangement of the Periodic Table, including groups and periods, to explain how properties are used to classify elements;		
(D) recognize that chemical formulas are used to identify substances and determine the number of atoms of each element in chemical formulas containing subscripts;		
(E) investigate how evidence of chemical reactions indicate that new substances with different properties are formed; and		
(F) recognize whether a chemical equation containing coefficients is balanced or not and how that relates to the law of conservation of mass.		

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<b>(6) Force, motion, and energy. The student knows that there is a relationship between force, motion, and energy. The student is expected to:</b>		
(A) demonstrate and calculate how unbalanced forces change the speed or direction of an object's motion;	12	Replace SE with: demonstrate and calculate how unbalanced forces (net forces) change the object's acceleration resulting in a change in speed or direction or both (speed and direction) of the object's motion.
(B) differentiate between speed, velocity, and acceleration; and	12  14	Edit SE to read: differentiate among speed, velocity, and acceleration.  Edit SE to read: differentiate between velocity and acceleration.
(C) investigate and describe applications of Newton's law of inertia, law of force and acceleration, and law of action-reaction such as in vehicle restraints, sports activities, amusement park rides, Earth's tectonic activities, and rocket launches.	15	Replace SE with: calculate average speed using distance and time measurements.
<b>(7) Earth and space. The student knows the effects resulting from cyclical movements of the Sun, Earth, and Moon. The student is expected to:</b>		
(A) model and illustrate how the tilted Earth rotates on its axis, causing day and night, and revolves around the Sun causing changes in seasons;		
(B) demonstrate and predict the sequence of events in the lunar cycle; and		
(C) relate the lunar cycle to its effect on ocean tides.	20	Replace SE with: relate the positions of the moon and sun to their effect on ocean tides.
<b>(8) Earth and space. The student knows characteristics of the universe. The student is expected to:</b>		
(A) describe components of the universe, including stars, nebulae, and galaxies, and use models such as the Hertzsprung-Russell diagram for classification;	1	A nebulae is a stage in a star's development, not actually a "different" component of the universe.
(B) recognize that the Sun is a medium-sized star near the edge of a disc-shaped galaxy of stars and that the Sun is many thousands of times closer to Earth than any other star;	1	Our galaxy is classified as a spiral galaxy (not disc-shaped). It does appear like a disc from the "side." This may confuse some students when they are taught how to classify galaxies.
(C) explore how different wavelengths of the electromagnetic spectrum such as light and radio waves are used to gain information about distances and properties of components in the universe;		

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(D) model and describe how light years are used to measure distances and sizes in the universe; and		
(E) research how scientific data are used as evidence to develop scientific theories to describe the origin of the universe.		
<b>(9) Earth and space. The student knows that natural events can impact Earth systems. The student is expected to:</b>		
(A) describe the historical development of evidence that supports plate tectonic theory;	12	Replace SE with: illustrate the historical development of evidence that supports plate tectonic theory.
(B) relate plate tectonics to the formation of crustal features; and	9	Replace SE with: illustrate how plate tectonics causes major geological events, such as ocean basins, earthquakes, volcanic eruptions, and mountain building.
(C) interpret topographic maps and satellite views to identify land and erosional features and predict how these features may be reshaped by weathering.	1	Students should identify land features and predict how they were shaped by erosion and weathering.
	9	Insert new SE: (D) classify rocks as metamorphic, igneous, or sedimentary by the processes of their formation (moved from Grade 6 - 10B).
	9	Insert new SE: (E) analyze the effects of weathering, erosion, and deposition on the environment; and (moved from Grade 7 - 8B).
<b>(10) Earth and space. The student knows that climatic interactions exist among Earth, ocean, and weather systems. The student is expected to:</b>		
(A) recognize that the Sun provides the energy that drives convection within the atmosphere and oceans, producing winds and ocean currents;		
(B) identify how global patterns of atmospheric movement influence local weather using weather maps that show high and low pressures and fronts; and		
(C) identify the role of the oceans in the formation of weather systems such as hurricanes.		
	9	Add new SE: (D) predict and describe how the different types of catastrophic events, such as floods, hurricanes, or tornadoes impact ecosystems (moved from Grade 7 - 8D).

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<b>(11) Organisms and environments. The student knows that interdependence occurs among living systems and the environment and that human activities can affect these systems. The student is expected to:</b>	1	Genetics must be a continued theme in Life Science. It must be included when exploring how environmental changes affect organisms and the traits in subsequent population.
(A) describe producer/consumer, predator/prey, and parasite/host relationships as they occur in food webs within marine, freshwater, and terrestrial ecosystems;	1	Move to Grade 7.
(B) investigate how organisms and populations in an ecosystem depend on and may compete for biotic and abiotic factors such as quantity of light, water, range of temperatures, or soil composition;	1	Move to Grade 7.
(C) explore how short- and long-term environmental changes affect organisms and traits in subsequent populations; and	1	Move to Grade 7.
(D) recognize human dependence on ocean systems and explain how human activities such as runoff, artificial reefs, or use of resources have modified these systems.	9	Delete SE.
	1	Move to Grade 7.
	14	Edit SE to read: "...such as polluted runoff..."
	9	Add new SE: (E) model the effects of human activity on ground water and surface water in a watershed (moved from Grade 7 - 8C).