§112.20. Science, Grade 8~~, Adopted 2017.~~		
TEKS with edits		Work Group Comments/Rationale
(b)	Introduction	
(1)	In Grades 6 – 8, 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 for high school courses. In Grade 8, the following concepts will be addressed in each strand:	
(A)	Scientific and engineering practices. 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.	
(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.	
(B)	Matter and energy. Students will make connections between elements, compounds, and mixtures that were introduced in prior grade levels. Students will examine the properties of water, acids, and bases. In addition, students will understand the basic concept of conservation of mass using chemical equations.	
(C)	Force, motion, and energy. Students will be introduced to Newton's second law of motion and investigate how all three laws of motion act simultaneously within systems. Students will understand that waves transfer energy and further explore the characteristics and applications of waves.	
(D)	Earth and space. Students learn that stars and galaxies are part of the universe. In addition, students use data to research scientific theories of the origin of the universe. Students learn how interactions in solar, weather, and ocean systems create changes in weather patterns and climate. In addition, they will understand that climate can be impacted by natural events and human activities.	
(E)	Organisms and environments. Students will identify the function of organelles. Traits are contained in genetic material that is found on genes within a chromosome from the parent. These traits influence the success of a species over time. Students explore how organisms and their populations respond to environmental changes, including those caused by human activities.	

(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.	
(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)	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 practices and ethical and social decisions that involve science.	
(5)	Recurring themes and concepts. Science consists of recurring themes and making connections between overarching concepts. Recurring themes include structure and function, systems, models, and patterns. All systems have basic properties that can be described in space, time, energy, and matter. Stability and change 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)	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, for at least 40% of instructional time, 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 C 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, comparative, and experimental investigations and use engineering practices to design solutions to problems;	
(C)	use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency approved safety standards;	
(D)	use appropriate tools, such as graduated cylinders, metric rulers, periodic tables, balances, scales, thermometers, temperature probes, laboratory ware, timing devices, pH indicators, hot plates, models, microscopes, slides, life science models, petri dishes, dissecting kits, magnets, spring scales or force sensors, tools that model wave behavior, satellite images, and hand lenses;	Work Group C added appropriate scientific tools for Grade 8.
(E)	collect quantitative data using the International System of Units (SI) and qualitative data as evidence;	
(F)	construct appropriate tables, graphs, maps, and charts using repeated trials and means, to organize data;	
(G)	develop and use models to represent phenomena, systems, processes, or solutions to engineering problems; and	
(H)	distinguish between scientific hypotheses, theories, and laws	
(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 descriptive statistical features, patterns, sources of error, or limitations;	
(C)	use mathematical calculations to assess quantitative relationships in data; and	

(D)	evaluate experimental and engineering designs.	**Multiple Viewpoints on Scientific and Engineering Practices SEs:** Add to 2.D, "evaluate experimental and engineering designs" *using multiple criteria, including cost-benefit analysis*.
(3)	Scientific and engineering practices. The student develops evidence-based explanations and communicates findings, conclusions, and proposed solutions.	
(A)	develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories;	
(B)	communicate explanations and solutions individually and collaboratively in a variety of settings and formats; and	
(C)	engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.	
(4)	Scientific and engineering practices. The students knows the contributions of scientists and recognizes the importance of scientific research and innovation on society. The student is expected to:	
(A)	relate the impact of past and current research on scientific thought and society, including the process of science and contributions of diverse scientists as related to the content;	
(B)	make informed decisions by evaluating evidence from multiple appropriate sources to assess the credibility, accuracy, and methods used; and	
(C)	research and explore connections between grade-level appropriate science concepts and STEM careers.	**Multiple Viewpoints on Scientific and Engineering Practices SEs:** Replace 4C. "research and explore connections between grade-level appropriate science SEP concepts and STEM careers" with "*4(C)1. Research three resources such as museums, libraries, organizations, private companies, and online platforms where students can investigate STEM careers.* SEP *4(C)2. Identify three resources to identify mentors employed in a STEM field who could be interviewed for a discussion of the advantages/disadvantages of pursuing a STEM career."*

(5)	Matter and energy. The student understands that matter can be classified according to its properties and is conserved in chemical changes. The student is expected to:	
(A)	characterize and classify matter as elements, compounds, homogeneous mixtures, or heterogeneous mixtures;	8.5.A Based on recommendation from Chemistry Work Group B this topic was moved from HS to MS. (Chem.4.D) This standard elaborates and extends concepts introduced in elementary school and developed in 6th and 7th grade.
(B)	describe the properties of cohesion, adhesion, and surface tension in water and relate to observable phenomena, such as the formation of droplets, transport in plants, and insects walking on water;	8.5.B Based on recommendations from Biology and Chemistry Work Group B, these topics are introduced to build a foundation for later high school courses.
(C)	compare and contrast the properties of acids and bases including pH relative to water, sour or bitter taste, and how they feel to the touch; and	8.5.C Based on recommendations from content advisors and Biology Work Group B, this topic has been added to build a foundation for later high school courses.
(D)	investigate how mass is conserved in chemical reactions and relate conservation of mass to the rearrangement of atoms using chemical equations, including photosynthesis.	8.5.D Revised from 8.5.E to clarify expectation and vertically align with grades 6 and 7. Conservation of mass is a fundamental concept in science and has been broken out into its own SE.
(6)	Force, motion, and energy. The student understands the relationship between force and motion. The student is expected to:	
(A)	calculate and analyze how the acceleration of an object is dependent upon the net force acting on the object and the mass of the object using Newton's Second Law of motion; and	8.6.A Revised to introduce Newton's 2nd Law and build on the concept of force introduced in 6th and 7th grades. Adds specificity to the SE. Also revised to more clearly distinguish between the existing 8.6.A and 8.6.C.
(B)	investigate and describe how Newton's three laws of motion act simultaneously within systems such as in vehicle restraints, sports activities, amusement park rides, Earth's tectonic activities, and rocket launches.	8.6.B Revised to avoid introducing the misconception that any of Newton's laws can be applied in isolation.
(7)	Force, motion, and energy. The student knows how energy is transferred through waves. The student is expected to:	The workgroup decided not to include an introduction to wave behavior (reflection, refraction, interference, etc.) due to limited instructional time.
(A)	explain how energy is transferred through transverse and longitudinal waves;	8.7.A added to introduce types of waves and relate to energy transfer

(B)	compare the characteristics of amplitude, frequency, and wavelength in transverse waves, including the electromagnetic spectrum; and	8.7.B added to build on types of waves by introducing their characteristics and essential vocabulary. Calculation of quantities involving wavelength, velocity, and frequency was not included as this is an introduction to the topic and it can be further developed in HS courses.
(C)	explain the use of electromagnetic waves in applications such as radiation therapy, wireless technologies, fiber optics, microwaves, ultraviolet sterilization, astronomical observations, and X-rays.	8.7.C added to add relevance to waves in students' everyday lives
(8)	Earth and space. The student knows characteristics of the universe. The student is expected to:	
(A)	describe the life cycle of stars and compare and classify stars using the Hertzsprung-Russell diagram;	8.8.A adapted from 8.8A to clarify student expectation about life cycle of stars
(B)	categorize galaxies as spiral, elliptical, and irregular and locate the solar system within the Milky Way galaxy; and	8.8B adapted from 8.8B to clarify types of galaxies students are expected to know
(C)	research how scientific data are used as evidence to develop scientific theories to describe the origin of the universe.	8.8C recommend keeping to provide opportunities for students to examine evidence in support of scientific theories
(9)	Earth and space. The student knows that climatic interactions exist among Earth, ocean, and weather systems. The student is expected to:	8.9.B was deleted as duplicative of other content.
(A)	describe how weather and climate are influenced by interactions involving sunlight, the hydrosphere, and atmosphere;	Revised from 8.10.A to focus on interactions.
(B)	identify global patterns of atmospheric movement and how they influence local weather; and	Revised from 8.10.B for clarity.
(C)	describe the interactions among ocean currents and air masses that produce el Niño, la Niña, and tropical cyclones.	Revised from 8.10.C for clarity.
(10)	Earth and space. The student knows that natural events and human activity can impact global climate. The student is expected to:	**Multiple viewpoints:** there was a proposal for an additional SE for grade 8: *Research and describe the costs and benefits of reducing greenhouse gas emissions versus reducing global energy poverty.* There was concern about adding additional instructional time as well as topics such as economics and policy that overlap with content covered in social studies courses.

(A)	describe how volcanic eruptions, meteor impacts, abrupt changes in ocean currents and the release and absorption of greenhouse gases influence climate; and	8.10.A and B were added in response to content advisors' recommendation and includes both natural and human factors that influence climate as well as leaving space for discussions of historical and modern climate change.
(B)	research and describe how human actions can affect climate change.	
(11)	Organisms and environments. The student knows how cells support the health of organisms and their environments. The student is expected to:	
(A)	identify the function of the cell membrane, cell wall, nucleus, ribosomes, cytoplasm, mitochondria, chloroplasts, and vacuoles in plant or animal cells; and	8.11.A is revised from existing 7.12.D. The language is clarified to focus on the functions carried out by cellular organelles.
(B)	describe the function of genes within chromosomes in determining inherited traits of offspring.	8.11.B was revised from 7.14C and the verb was changed for greater rigor.
(12)	Organisms and environments. The student knows the relationship between adaptation, variation, and survival. The student is expected to:	
	describe how variations within a population lead to adaptations that influence the probability of survival and reproductive success of a species over generations.	8.12 was added to incorporate the idea of adaptations and relate to the biological concept of fitness.
(13)	Organisms and environments. The student understands how ecosystems and populations change. The student is expected to:	
(A)	analyze the effects on food webs when new species are introduced, existing species are eliminated, and existing populations fluctuate; and	This connects vertically to concepts in 3-8th grades and horizontally to concepts in other strands. This completes the learning progression and prepares students for the proposed Biology TEKS
(B)	describe how primary and secondary ecological succession affect populations and species diversity after ecosystems are disrupted by natural events or human activity.	7.8.A, 7.10.C, 8.11.B, & B.11.B were combined. WGB recommended that succession be taught in MS and removed it from the Biology TEKS.
~~(a)~~	~~Introduction.~~	
~~(1)~~	~~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 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.~~	
	~~The strands for Grade 8 include the following.~~	

(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.	
(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. 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 to identify substances.	
(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. 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 and satellite views. 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. 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.~~	
~~(2)~~	~~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.~~	
~~(3)~~	~~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.~~	
~~(4)~~	~~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 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:~~	
~~(A)~~	~~demonstrate safe practices during laboratory and field investigations as outlined in Texas Education Agency-approved safety standards; and~~	
~~(B)~~	~~practice appropriate use and conservation of resources, including disposal, reuse, or recycling of materials.~~	
~~(2)~~	~~Scientific investigation and reasoning. The student uses scientific practices during laboratory and field investigations. The student is expected to:~~	
~~(A)~~	~~plan and implement comparative and 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;~~	
~~(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.~~	
~~(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:~~	
~~(A)~~	~~analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student;~~	
~~(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~~	
~~(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.~~	
~~(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:~~	
~~(A)~~	~~use appropriate tools, including lab journals/notebooks, beakers, meter sticks, graduated cylinders, anemometers, psychrometers, hot plates, test tubes, spring scales, balances, microscopes, thermometers, calculators, computers, spectroscopes, timing devices, and other necessary equipment to collect, record, and analyze information; and~~	
~~(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)~~	~~Matter and energy. The student knows that matter is composed of atoms and has chemical and physical properties. The student is expected to:~~	
~~(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;~~	Deleted on recommendation from Workgroup B and these topics have been incorporated into the standards for chemistry.

~~(B)~~	~~identify that protons determine an element's identity and valence electrons determine its chemical properties, including reactivity;~~	Deleted on recommendation from Workgroup B and these topics have been incorporated into the standards for chemistry.
~~(C)~~	~~interpret the arrangement of the Periodic Table, including groups and periods, to explain how properties are used to classify elements;~~	Deleted on recommendation from Workgroup B and these topics have been incorporated into the standards for chemistry.
~~(D)~~	~~recognize that chemical formulas are used to identify substances and determine the number of atoms of each element in chemical formulas containing subscripts; and~~	Moved to grade 7 and revised in 7.5.A.
~~(E)~~	~~investigate how evidence of chemical reactions indicates that new substances with different properties are formed and how that relates to the law of conservation of mass.~~	Revised and renumbered to 8.5.D.
~~(6)~~	~~Force, motion, and energy. The student knows that there is a relationship between force, motion, and energy. The student is expected to:~~	
~~(A)~~	~~demonstrate and calculate how unbalanced forces change the speed or direction of an object's motion;~~	Revised under the same number.
~~(B)~~	~~differentiate between speed, velocity, and acceleration; and~~	Deleted because part was included in 7.6.B and acceleration is introduced in revised 8.6.A.
~~(C)~~	~~investigate and describe applications of Newton's three laws of motion such as in vehicle restraints, sports activities, amusement park rides, Earth's tectonic activities, and rocket launches.~~	Revised and renumbered to 8.6.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:~~	
~~(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;~~	Moved to grade 6 and revised as 6.8.A.
~~(B)~~	~~demonstrate and predict the sequence of events in the lunar cycle; and~~	Deleted with the recommendation to move to grade 5 science TEKS
~~(C)~~	~~relate the positions of the Moon and Sun to their effect on ocean tides.~~	Moved to grade 6 and revised as 6.8.B.
~~(8)~~	~~Earth and space. The student knows characteristics of the universe. The student is expected to:~~	
~~(A)~~	~~describe components of the universe, including stars, nebulae, and galaxies, and use models such as the Hertzsprung-Russell diagram for classification;~~	Revised under the same number.
~~(B)~~	~~recognize that the Sun is a medium-sized star located in a spiral arm of the Milky Way galaxy and that the Sun is many thousands of times closer to Earth than any other star;~~	Revised under the same number.
~~(C)~~	~~identify how different wavelengths of the electromagnetic spectrum such as visible light and radio waves are used to gain information about components in the universe; and~~	Deleted and an element of it was added to proposed 8.7.C on uses of EM spectrum

~~(D)~~	~~research how scientific data are used as evidence to develop scientific theories to describe the origin of the universe.~~	Renumbered to 8.8.C.
~~(9)~~	~~Earth and space. The student knows that natural events can impact Earth systems. The student is expected to:~~	
~~(A)~~	~~describe the historical development of evidence that supports plate tectonic theory;~~	Moved to grade 7 and renumbered to 7.9.A.
~~(B)~~	~~relate plate tectonics to the formation of crustal features; and~~	8.9.B was deleted as duplicative of other content.
~~(C)~~	~~interpret topographic maps and satellite views to identify land and erosional features and predict how these features may be reshaped by weathering.~~	8.9.C was deleted to reduce scope and streamline instructional time; interpreting topographic maps and satellite images is not a critical concept for middle school.
~~(10)~~	~~Earth and space. The student knows that climatic interactions exist among Earth, ocean, and weather systems. The student is expected to:~~	
~~(A)~~	~~recognize that the Sun provides the energy that drives convection within the atmosphere and oceans, producing winds;~~	Revised and renumbered to 8.9.A.
~~(B)~~	~~identify how global patterns of atmospheric movement influence local weather using weather maps that show high and low pressures and fronts; and~~	Revised and renumbered to 8.9.B.
~~(C)~~	~~identify the role of the oceans in the formation of weather systems such as hurricanes.~~	Revised and renumbered to 8.9.C.
~~(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:~~	
~~(A)~~	~~investigate how organisms and populations in an ecosystem depend on and may compete for biotic factors such as food and abiotic factors such as quantity of light, water, range of temperatures, or soil composition;~~	Moved to grade 6 and renumbered to 6.13.A.
~~(B)~~	~~explore how short- and long-term environmental changes affect organisms and traits in subsequent populations; and~~	Revised and renumbered as 8.13.B.
~~(C)~~	~~recognize human dependence on ocean systems and explain how human activities such as runoff, artificial reefs, or use of resources have modified these systems.~~	Deleted and concepts incorporated into other SEs.