Acid Rain
Grades 6-7-8-9-10

National Science Education Standards

SCIENCE AS INQUIRY STANDARDS	
LEVELS 5-8	**LEVELS 9-12**
Abilities necessary to do scientific inquiry	Abilities necessary to do scientific inquiry
Understanding about scientific inquiry	Understanding about scientific inquiry

PHYSICAL SCIENCE STANDARDS	
LEVELS 5-8	**LEVELS 9-12**
Properties and changes of properties in matter	Structure and properties of matter
	Chemical Reactions

LIFE SCIENCE STANDARDS	
LEVELS 5-8	**LEVELS 9-12**
Populations and ecosystems	Interdependence of organisms

EARTH AND SPACE SCIENCE STANDARDS	
LEVELS 5-8	**LEVELS 9-12**
Structure of the earth system	Origin and evolution of the earth system

SCIENCE AND TECHNOLOGY STANDARDS	
LEVELS 5-8	**LEVELS 9-12**
Understanding about science and technology	Understanding about science and technology

SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES	
LEVELS 5-8	**LEVELS 9-12**
Populations, resources, and environments	Population growth
Risks and benefits	Environmental quality
Science and technology in society	Science and technology in local, national, and global challenges

HISTORY AND NATURE OF SCIENCE STANDARDS	
LEVELS 5-8	**LEVELS 9-12**
Science as a human endeavor	Science as a human endeavor
Nature of science	Nature of scientific knowledge

Texas Essential Knowledge and Skills

Grade 6 Science

(a) Introduction.

(1) In Grade 6, the study of science includes conducting laboratory investigations and fieldwork using scientific methods, analyzing information, making informed decisions, and using tools such as beakers, test tubes and spring scales to collect, analyze, and record information.

(2) As students learn science skills, they identify components of the solar system including the sun, planets, moon, an asteroids and learn how seasons and the length of the day are caused by the tilt an rotation of the Earth as it orbits the sun. Students investigate the rock cycle and identify sources of water in a watershed.

(3) In addition, Grade 6 students identify changes in objects including position, direction, and speed when acted upon by a force. Students classify substances by their chemical properties and identify the water cycle ad decay of biomass as examples of the interactions between matter and energy.

(4) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(5) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(6) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions build 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. They have limitations and based on new discoveries are constantly being modified to more closely reflect the physical world.

(b) Knowledge and skills

(1) Scientific processes. The student conduct laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.	The student is expected to: (A) demonstrate safe practices during laboratory investigations and fieldwork; and (B) make wise choices in the use and conservation of resources and the disposal of materials.

(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.	The student is expected to: (A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology; (B) collect information by observing and measuring in various ways; (C) organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence; (D) communicate valid conclusions; and (E) construct graphs, tables, and charts to organize, examine, and evaluate information.
(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to: (A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information; (B) draw inferences based on information related to promotional material for products and services; (C) represent the physical world using models and identify their limitations; (D) evaluate the impact or research on scientific thought, society, and the environment; and (E) connect Grade 6 science concepts with careers.
(4) Scientific processes. The student knows how to use a variety of tools and methods to conduct science inquiry.	The student is expected to: (A) collect, analyze, and record information using tools including beakers, petri dishes, metric-meter sticks, graduated cylinders, weather instruments, timing devices, heating apparatuses, test tubes, safety goggles, spring scales, magnets, balances, microscopes, telescopes, thermometers, calculators, field equipment, compasses, computers, and computer probes; and (B) identify patterns in collected information using percent, average, range, and frequency.
(6) Science concepts. The student knows that substances have chemical properties.	The student is expected to: (A) demonstrate that new substances can be made when two or more substances are chemically combined and compare the properties of the new substances to the original substances; and (B) classify substances by their chemical properties.

(7) Science concepts. The student knows that complex interactions occur between matter and energy.	The student is expected to: (B) explain and illustrate the interactions between matter and energy in the water cycle and in the decay of biomass.
(11) Science concepts. The students knows that the responses of organisms are caused by internal or external stimuli.	The student is expected to: (B) identify responses in organisms due to external stimuli such as the presence or absence of heat or light.

Grade 7 Science

(a) Introduction.

(1) In Grade 7, the study of science includes conducting laboratory investigations and fieldwork using scientific methods, critical-thinking, problem-solving, and using tools such as weather instruments and graphing calculators to collect and analyze information to explain a phenomena.

(2) As students learn science skills, they identify gravity and phases of the moon as components of the solar system and explore the effects of events such as hurricanes on the Earth. Students use pulleys and levers to understand the relationship between force and motion. Students then relate the concept to processes in the human organism such as the movement of blood. In addition, Grade 7 students study chemical and physical properties of substances, examine the tarnishing of metal or burning of wood as example of chemical processes, and identify physical properties used to place elements on the periodic table.

(4) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(5) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(6) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions build 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. They have limitations and based on new discoveries are constantly being modified to more closely reflect the physical world.

(b) Knowledge and skills

(1) Scientific processes. The student conduct laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.	The student is expected to: (A) demonstrate safe practices during laboratory investigations and fieldwork; and (B) make wise choices in the use and conservation of resources and the disposal of materials.

(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.	The student is expected to: (A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology; (B) collect information by observing and measuring in various ways; (C) organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence; (D) communicate valid conclusions; and (E) construct graphs, tables, and charts to organize, examine, and evaluate information.
(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to: (A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information; (B) draw inferences based on information related to promotional material for products and services; (C) represent the physical world using models and identify their limitations; (D) evaluate the impact or research on scientific thought, society, and the environment; and (E) connect Grade 7 science concepts with careers.
(4) Scientific processes. The student knows how to use a variety of tools and methods to conduct science inquiry.	The student is expected to: (A) collect, analyze, and record information using tools including beakers, petri dishes, meter sticks, graduated cylinders, weather instruments, heating apparatuses, dissecting equipment, test tubes, safety goggles, spring scales, balances, microscopes, telescopes, thermometers, graphing calculators, field equipment, compasses, computers, computer probes, timing devices, magnets, and compasses; and (B) analyze collected information to recognize patterns such as rates of change.
(5) Science concepts. The student knows that there is a relationship between force and motion.	The student is expected to: ((C) relate forces to basic processes in living organisms including the flow of blood and the emergence of seedlings.

(6) Science concepts. The student knows that substances have physical and chemical properties.	The student is expected to: (A) identify and demonstrate everyday examples of chemical phenomena such as rusting and tarnishing of metals and burning of wood.
(10) Science concepts. The students knows that the responses of organisms are caused by internal or external stimuli.	The student is expected to: (B) observe and identify changes in organisms resulting from external stimuli such as an earthworm being touched or a pant responding to light.
(11) Science concepts. The students knows that there is a relationship between organisms and the environment.	The student is expected to: (A) identify components of an ecosystem; (B) observe and describe how organisms including producers, consumers, and decomposers live together in an environment and use existing resources; (C) describe how different environments support different varieties of organisms.
(13) Science concepts. The student knows that natural events and human activity can alter Earth systems.	The student is expected to: (A) describe and predict the impact of different catastrophic events on the Earth; (B) analyze effects of regional erosional deposition and weathering,; and (C) make inferences and draw conclusion about effects of human activity on Earth's renewable, non-renewable, and inexhaustible resources.

Grade 8 Science

(a) Introduction.

(1) In Grade 8, the study of science includes conducting laboratory investigations using scientific methods, analyzing data, critical-thinking, scientific problem-solving, and using tools such as telescopes to collect, analyze, and record information.

(2) As students learn science skills, they identify the roles of both human activities and natural events in altering Earth systems. Students learn that stars and galaxies are part of the universe, identify light years as a way to describe distance, and learn about scientific theories of the origin of the universe. Cycles within Earth systems are studied as students learn about lunar cycles and the rock cycle.

(3) Students examine information on the periodic table to recognize that elements are grouped into families. In addition, students demonstrate that exothermic and endothermic chemical reactions indicate that energy is lost or gained during a chemical reaction. Matter and energy are explored through the interactions in solar, weather, and ocean systems. Students identify the origin of waves and investigate their ability to travel through different media.

(5) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(6) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate

to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(7) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions build 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. They have limitations and based on new discoveries are constantly being modified to more closely reflect the physical world.

(b) Knowledge and skills

(1) Scientific processes. The student conduct laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.	The student is expected to: (A) demonstrate safe practices during laboratory investigations and fieldwork; and (B) make wise choices in the use and conservation of resources and the disposal of materials.
(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.	The student is expected to: (A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology; (B) collect information by observing and measuring in various ways; (C) organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence; (D) communicate valid conclusions; and (E) construct graphs, tables, and charts to organize, examine, and evaluate information.
(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to: (A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information; (B) draw inferences based on information related to promotional material for products and services; (C) represent the physical world using models and identify their limitations; (D) evaluate the impact or research on scientific thought, society, and the environment; and (E) connect Grade 8 science concepts with careers.

(4) Scientific processes. The student knows how to use a variety of tools and methods to conduct science inquiry.	The student is expected to: (A) collect, analyze, and record information using tools including beakers, petri dishes, meter sticks, graduated cylinders, weather instruments, heating apparatuses, dissecting equipment, test tubes, safety goggles, spring scales, balances, microscopes, telescopes, thermometers, graphing calculators, field equipment, compasses, computers, computer probes, water test kits,, timing devices; and (B) extrapolate from collected information to make predictions.
(6) Science concepts. The student knows that substances have physical and chemical properties.	The student is expected to: (A) demonstrate that substances may react chemically to form new substances; and (D) identify that physical and chemical properties that influence the development and application of everyday materials such as cooking surface, insulation, adhesives, and plastics.
(7) Science concepts. The student knows that complex interactions occur between matter and energy.	The student is expected to: (A) describe interactions within solar, weather, and ocean systems.
(8) Science concepts. The student knows the relationship between structure and function in living systems.	The student is expected to: (C) describe interactions within ecosystems.
(10) Science concepts. The students knows that cycles exist in Earth systems.	The student is expected to: (C) predict the results of modifying the Earth's nitrogen, water, and carbon cycles.
(12) Science concepts. The student knows that natural events and human activities can alter Earth systems.	The student is expected to: (B) analyze how natural or human events may have contributed to the extinction of some species; and (C) describe how human activities have modified soil, water, and air quality.

Integrated Physics and Chemistry

(b) Introduction.

(1) In Integrated Physics and Chemistry, students conduct laboratory investigations and fieldwork, use scientific methods during investigations, and make informed decisions using, critical-thinking and scientific problem-solving. This course integrates the disciplines of physics and chemistry in the following topics: motion, waves, energy transformations, properties of matter, changes in matter, and solution chemistry.

(2) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(3) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(4) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions build 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. They have limitations and based on new discoveries are constantly being modified to more closely reflect the physical world.

(c) Knowledge and skills

(1) Scientific processes. The student , for at least 40% of instructional time, conducts laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.	The student is expected to: (A) demonstrate safe practices during laboratory investigations and fieldwork; and (B) make wise choices in the use and conservation of resources and the disposal of materials.
(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.	The student is expected to: (A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology; (B) collect information by observing and measuring in various ways; (C) organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence; and (D) communicate valid conclusions.
(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to: (A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information; (B) draw inferences based on information related to promotional material for products and services; (C) represent the physical world using models and identify their limitations; and (D) describe connections between physics and chemistry, and future careers.

(8) Science concepts. The student knows that changes in matter affect everyday life.	The student is expected to: (A) distinguish between physical and chemical changes in matter such as oxidation, digestion, changes in states, and stages in the rock cycle; ((E) research and describe the environmental and economic impact of the end-products of chemical reactions.
(9) Science concepts. The student knows how solution chemistry is part of everyday life.	The student is expected to: (A) relate the structure of water to its function as the universal solvent; (B) relate the concentration of ions in a solution to physical and chemical properties such as pH, electrolytic behavior, and reactivity; and (C) simulate the effects of acid rain on soil, buildings, statues,, or microorganisms or that results in the neutralization of the effects of acid rain.

Biology

(b) Introduction.

(1) In Biology, students conduct laboratory investigations and fieldwork, use scientific methods during investigations, and make informed decisions using, critical-thinking and scientific problem-solving. Students in Biology study a variety of topics that include: structures and functions of cells and viruses, growth and development of organisms; cells, tissues, organs, nucleic acids, and genetics; biological evolution; taxonomy, metabolism and energy transfers in living organisms; living systems; homeostasis; ecosystems; and plants and the environment.

(2) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(3) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

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(c) Knowledge and skills

(1) Scientific processes. The student , for at least 40% of instructional time, conducts laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.	The student is expected to: (A) demonstrate safe practices during laboratory investigations and fieldwork; and (B) make wise choices in the use and conservation of resources and the disposal of materials.
(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.	The student is expected to: (A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology; (B) collect information by observing and measuring in various ways; (C) organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence; and (D) communicate valid conclusions.
(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to: (A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information; (B) draw inferences based on information related to promotional material for products and services; (C) represent the physical world using models and identify their limitations; (D) describe connections between biology and future careers; and (E) evaluate models according to their adequacy in representing biological objects or events.
(9) Science concepts. The student knows metabolic processes and energy transfers that occur in living organisms.	The student is expected to: (D) analyze the flow of matter and energy through different levels of organization and between organisms and the physical environment.
(11) Science concepts. The student knows that organisms maintain homeostasis.	The student is expected to: (B) investigate and identify how organisms, including humans, respond to external stimuli; and (C) analyze the importance of nutrition, environmental conditions, and physical exercise on health.

(12) Science concepts. The student knows that interdependence and interactions occur within an ecosystem.	The student is expected to: (A) analyze the flow of energy through various cycles including the carbon, oxygen, nitrogen,, and water cycles; (C) compare variations, tolerances, and adaptations of plants and animals in different biomes; and (E) investigate and explain the interactions in an ecosystem including food chains, food webs, and food pyramids.

Environmental Systems

(b) Introduction.

(1) In Environmental Systems, students conduct laboratory investigations and fieldwork, use scientific methods during investigations, and make informed decisions using, critical thinking and scientific problem-solving. Students in Environmental Systems study a variety of topics that include: biotic and abiotic factors in habitats; ecosystems and biomes; interrelationships among resources and an environmental system; sources and flow of energy through an environmental system; relationships between carrying capacity ad changes in populations and ecosystems; and changes in environments.

(2) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(3) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

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(c) Knowledge and skills

(1) Scientific processes. The student , for at least 40% of instructional time, conducts laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.	The student is expected to: (A) demonstrate safe practices during laboratory investigations and fieldwork; and (B) make wise choices in the use and conservation of resources and the disposal of materials.

(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.	The student is expected to: (A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology; (B) collect information by observing and measuring in various ways; (C) organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence; and (D) communicate valid conclusions.
(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to: (A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information; (B) make responsible choices in selecting everyday products and services using scientific information; (C) evaluate the impact of research on scientific thought, society, and the environment; and (D) describe connections between environmental science and future careers.
(4) Science concepts. The student knows the relationships of biotic and abiotic factors within habitats, ecosystems, and biomes.	The student is expected to: (B) make observations and compile data about fluctuations in abiotic cycles and evaluate the effects of abiotic factors on local ecosystems and biomes; (C) evaluate the impact of human activity such as methods of pest control, hydroponics, organic gardening, or farming on ecosystems;
(5) Science concepts. The student knows the interrelationships among the resources within the local environmental system.	The student is expected to: (A) summarize methods of land use and management; (B) identify source, use, quality, and conservation of water; (C) document the use an conservation of both renewable and non-renewable resources; (D) identify renewable and non-renewable resources that must come from outside an ecosystem such as food, water, lumber, and energy; (E) analyze and evaluate the economic significance and interdependence of components of the environmental system; and (F) evaluate the impact of human activity and technology on land fertility and aquatic viability.

(7) Science concepts. The student knows the relationship between carrying capacity an changes in populations and ecosystems.	The student is expected to: (C) evaluate the depletion of non-renewable resources and propose alternatives.
(8) Science concepts. The student knows that environments change.	The student is expected to: (A) analyze and describe the effects on environments of events such as fires, hurricanes, deforestation, mining, population growth, and municipal development; (B) explain how regional changes in the environment may have a global effect, (C) describe how communities have restored an ecosystem; and (D) examine and describe a habitat restoration or protection program.

Aquatic Science

(b) Introduction.

(1) In Aquatic Science, students conduct laboratory investigations and fieldwork, use scientific methods during investigations, and make informed decisions using, critical thinking and scientific problem-solving. Students in Aquatic Science study a variety of topics that include: components of an aquatic ecosystem; relationships among aquatic habitats and ecosystems; roles of cycles within an aquatic environment; adaptations of aquatic organism; changes within aquatic environments, geological phenomena an fluid dynamics affects; and origin and use of water in a watershed.

(2) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(3) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(4) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions build 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. They have limitations and based on new discoveries are constantly being modified to more closely reflect the physical world.

(c) Knowledge and skills

(1) Scientific processes. The student , for at least 40% of instructional time, conducts laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.	The student is expected to: (A) demonstrate safe practices during laboratory investigations and fieldwork; and (B) make wise choices in the use and conservation of resources and the disposal of materials.

(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.	The student is expected to: (A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology; (B) collect information by observing and measuring in various ways; (C) express and manipulate quantities using mathematical procedures such as dimensional analysis, scientific notation, and significant figures; (D) organize, analyze, evaluate, make inferences, and predict trends from data; and (E) communicate valid conclusions.
(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to: (A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information; (B) make responsible choices in selecting everyday products and services using scientific information; (C) evaluate the impact of research on scientific thought, society, and the environment; and (D) describe connections between aquatic science and future careers.
(4) Science concepts. The student knows the components of aquatic ecosystems.	The student is expected to: (B) research and identify biological, chemical, geological, and physical component of an aquatic ecosystem; and (C) collect an analyze baseline quantitative data such as pH, salinity, temperature, mineral content, nitrogen compounds, and turbidity from an aquatic environment.
(5) Science concepts. The student knows the relationships within and among the aquatic habitats and ecosystems in an aquatic environment.	The student is expected to: (C) identify the interdependence of organisms in an aquatic environment such as a pond, river, lake, ocean, or aquifer, and the biosphere; and (D) evaluate trends in data to determine the factors that impact aquatic ecosystems.
(6) Science concepts. The student knows the roles of cycles in an aquatic environment.	The student is expected to: (A) identify the role of various cycles such as carbon, nitrogen, water, and nutrients, in an aquatic environment; and (B) interpret the role of aquatic systems in climate and weather.

(7) Science concepts. The student knows environmental adaptations of aquatic organisms.	The student is expected to: (C) predict adaptations of an organism prompted by environmental changes.
(8) Science concepts. The student knows that aquatic environments change.	The student is expected to: (A) predict effects of chemical, organic, physical,, and thermal changes on the living an nonliving components of an aquatic ecosystem; (B) analyze the cumulative impact of natural and human influence on n aquatic system; (C) identify and describe a local or global issue affecting an aquatic system; and (D) analyze and discuss human influences on an aquatic environment including fishing, transportation, and recreation.

Chemistry

(b) Introduction.

(1) In Chemistry, students conduct laboratory investigations and fieldwork, use scientific methods during investigations, and make informed decisions using, critical thinking and scientific problem-solving. Chemistry students study a variety of topics that include: characteristics of matter, energy transformations during physical an chemical changes; atomic structure; periodic table of elements; behavior of gases; bonding; nuclear fusion and nuclear fission; oxidation-reduction reactions chemical equations; solutes; properties of solutions; acids an bases; and chemical reactions. Students will investigate how chemistry is an integral part of our daily lives.

(2) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(3) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(4) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions build 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. They have limitations and based on new discoveries are constantly being modified to more closely reflect the physical world.

(c) Knowledge and skills

(1) Scientific processes. The student , for at least 40% of instructional time, conducts laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.	The student is expected to: (A) demonstrate safe practices during laboratory investigations and fieldwork; and (B) make wise choices in the use and conservation of resources and the disposal of materials.
(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.	The student is expected to: (A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology; (B) collect information by observing and measuring in various ways; (C) express and manipulate chemical quantities using scientific conventions such as dimensional analysis, scientific notation, and significant figures; (D) organize, analyze, evaluate, make inferences, and predict trends from data; and (E) communicate valid conclusions.
(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to: (A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information; (B) make responsible choices in selecting everyday products and services using scientific information; (C) evaluate the impact of research on scientific thought, society, and the environment; and (D) describe connections between chemistry and future careers.
(4) Science concepts. The student knows the characteristics of matter.	The student is expected to: (B) investigate chemical changes and examine the physical and chemical properties that accompany these changes.
(5) Science concepts. The student knows that energy transformations occur during physical or chemical changes in matter.	The student is expected to: (A) identify changes in matter, determine the nature of the change, and examine the forms of energy involved.
(13) Science concepts. The student knows the factors that influence the solubility of solutes in a solvent.	The student is expected to: (B) evaluate the significance of water as a solvent in living organisms and in the environment.

(15) Science concepts. The student knows the properties and behavior of acids and bases.	The student is expected to: (A) analyze common household products using a variety of indicators to classify the products as acids or bases; (B) measure of pH of common household and commercial products an relate the pH to the concentration of hydronium ions and hydroxide ions; (D) identify the characteristics of a neutralization reaction and the quantity of the acid or base required; and (E) describe effects of acids and bases on an ecological system.

Geology, Meteorology, and Oceanography

(b) Introduction.

(1) In Geology, Meteorology, and Oceanography, students conduct laboratory investigations and fieldwork, use scientific methods during investigations, and make informed decisions using, critical thinking and scientific problem-solving. Students in Geology, Meteorology, and Oceanography study a variety of topics that include: characteristics and conditions of the Earth; formation and history of the Earth; plate tectonics; origin and composition of minerals and rocks and the rock cycle; processes and products of weathering; natural energy resources; interactions in a watershed; characteristics of oceans; characteristics of the atmosphere; and the role of energy in weather and climate.

(2) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(3) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(4) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions build 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. They have limitations and based on new discoveries are constantly being modified to more closely reflect the physical world.

(c) Knowledge and skills

(1) Scientific processes. The student , for at least 40% of instructional time, conducts laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.	The student is expected to: (A) demonstrate safe practices during laboratory investigations and fieldwork; and (B) make wise choices in the use and conservation of resources and the disposal of materials.

(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.	The student is expected to: (A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology; (B) collect information by observing and measuring in various ways; (C) organize, analyze, evaluate, make inferences, and predict trends from data; and (D) communicate valid conclusions.
(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions.	The student is expected to: (A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information; (B) make responsible choices in selecting everyday products and services using scientific information; (C) evaluate the impact of research on scientific thought, society, and the environment; (D) describe connections between geology, meteorology, oceanography, and future careers.
(4) Science concepts. The student knows the Earth's unique characteristics and conditions.	The student is expected to: (B) analyze conditions on Earth that enable organisms to survive.
(9) Science concepts. The student knows the role of natural energy resources.	The student is expected to:(B) analyze issues regarding the use of fossil fuels and other renewable, non-renewable, or alternative energy resources; and (C) analyze the significance and economic impact of the use of fossil fuels and alternative energy resources.
(12) Science concepts. The student knows the characteristics of the atmosphere.	The student is expected to: (A) identify the atmosphere as a mixture of gases, water vapor, and particulate matter,(B) analyze the range of atmospheric conditions that organisms will tolerate including types of gases, temperature, particulate matter, and moisture; and (C) determine the impact on the atmosphere of natural events and human activity.