Vitamin C Testing
Grades 4-5-6-7-8-9

National Science Education Standards

SCIENCE AS INQUIRY STANDARDS		
LEVELS K-4	**LEVELS 5-8**	**LEVELS 9-12**
Abilities necessary to do scientific inquiry	Abilities necessary to do scientific inquiry	Abilities necessary to do scientific inquiry
Understanding about scientific inquiry	Understanding about scientific inquiry	Understanding about scientific inquiry

PHYSICAL SCIENCE STANDARDS		
LEVELS K-4	**LEVELS 5-8**	**LEVELS 9-12**
Properties of objects and materials	Properties and changes of properties in matter	Structure and properties of matter
		Chemical reactions

SCIENCE AND TECHNOLOGY STANDARDS		
LEVELS K-4	**LEVELS 5-8**	**LEVELS 9-12**
Abilities to distinguish between natural objects ad objects made by humans	Understanding about science and technology	Understanding about science and technology
Understanding about science and technology		

SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES		
LEVELS K-4	**LEVELS 5-8**	**LEVELS 9-12**
Personal health	Personal health	Personal and community health

HISTORY AND NATURE OF SCIENCE STANDARDS		
LEVELS K-4	**LEVELS 5-8**	**LEVELS 9-12**
Science as a human endeavor	Science as a human endeavor	Science as a human endeavor
	Nature of science	Nature of scientific knowledge
	History of science	Historical perspectives

Texas Essential Knowledge and Skills

Grade 4 Science

(a) Introduction.

(1) In Grade 4, the study of science includes planning and implementing laboratory investigations and fieldwork using scientific methods, analyzing information, making informed decisions, and using tools such as compasses and computers to collect and organize information.

(2) As students learn science skills, they identify components and processes of the natural world including properties of soil, effects of the oceans on land, and the role of the sun as our major source of energy. In addition, Grade 4 students identify the physical properties of matter and observe the addition or reduction of heat as an example of what can cause changes in states of matter.

(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 simple 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; (E) connect Grade 4 science concepts with careers; and (F) connect Grade 4 science concepts with the history of science and contributions of scientists.
(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 and analyze information using tools including calculators, safety goggles, microscopes, cameras, sound recorders, computers, hand lenses, rulers, thermometers, meter sticks, timing devices, balances, and compasses; and (B) demonstrate that repeated investigations may increase the reliability of results.
(7) Science concepts. The student knows that matter has physical properties.	The student is expected to: (A) observe and record changes in the states of matter caused by the addition or reduction of heat; and

(B) conduct tests, compare data, and draw conclusions about physical properties of matter including states of matter, conduction, and buoyancy.

Grade 5 Science

(a) Introduction.

(1) In Grade 5, the study of science includes planning and implementing laboratory investigations and fieldwork using scientific methods, analyzing information, making informed decisions, and using tools such as nets, cameras, and computers to collect and organize information.

(2) As students learn science skills, they identify structures and functions of Earth systems including the crust, mantle, and core and the effect of weathering on landforms. Students learn that growth, erosion, and dissolving are examples of how some past events have affected present events. Grade 5 students learn about magnetism, physical states of matter, and conductivity as properties that are used to classify matter. In addition, students learn that light, heat, electricity, and magnetism are all forms of 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 simple 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; (E) connect Grade 5 science concepts with careers; and (F) connect Grade 5 science concepts with the history of science and contributions of scientists.
(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 and analyze information using tools including calculators, microscopes, cameras, sound recorders, computers, hand lenses, rulers, thermometers, compasses, balances, meter sticks, timing devices, magnets, collecting nets, and safety goggles; and (B) demonstrate that repeated investigations may increase the reliability of results.
(7) Science concepts. The student knows that matter has physical properties.	The student is expected to: (A) classify matter based on its physical properties including magnetism, physical sate, and the ability to conduct or insulate heat, electricity, and sound;

(B) demonstrate that some mixtures maintain the physical properties of their ingredients;
(C) identify changes that can occur in the physical properties of the ingredients of solutions such as dissolving sugar in water; and
(D) observe and measure characteristic properties of substances that remain constant such as boiling points, melting points, and solubility.

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.

(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; (E) connect Grade 6 science concepts with careers; and (F) connect Grade 6 science concepts with the history of science and contributions of scientists.
(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 ore 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: (A) define the concepts of matter and energy; and (B) explain and illustrate the interactions between matter and energy in the water cycle and in the decay of biomass.

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; (E) connect Grade 7 science concepts with careers; and (F) connect Grade 7 science concepts with the history of science and contributions of scientists.
(4) Scientific processes. The student knows	The student is expected to:

how to use a variety of tools and methods to conduct science inquiry.	(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.
(7) Science concepts. The student knows that complex interactions occur between matter and energy.	The student is expected to: (A) illustrate examples of potential and kinetic energy in everyday life such as objects at rest, movement of geologic faults, and falling water; and (B) identify that radiant energy from the sun is transferred into chemical energy through the process of photosynthesis.

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.

(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;

	(E) connect Grade 8 science concepts with careers; and (F) connect Grade 8 science concepts with the history of science and contributions of scientists.
(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; (C) recognize the importance of formulas and equations to express what happens in a chemical reaction; 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.

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; (D) describe connections between physics and chemistry, and future careers; and (E) research and describe the history of physics, chemistry, and contributions of scientists.
(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; (B) analyze energy changes that accompany chemical reactions such as those occurring

	in heat packs, cold packs, and glow sticks to classify them as energonic or exergonic reactions; and (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; and (B) relate the concentration of ions in a solution to physical and chemical properties such as pH, electrolytic behavior, and reactivity.

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.

(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; (D) describe connections between biology and future careers.
(9) Science concepts. The student knows metabolic processes and energy transfers that occur in living organisms.	The student is expected to: (A) compare the structures and functions of different types of biomolecules such as carbohydrates, lipids, proteins, and nucleic acids; (C) investigate and identify the effects of enzymes on food molecules.