

Stories in Stone

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
Position and motion of objects	Motion and forces	Motions and forces
		Interactions of energy and matter

EARTH AND SPACE SCIENCE STANDARDS		
LEVELS K-4	LEVELS 5-8	LEVELS 9-12
Properties of earth materials	Structure of the earth system	Energy in the earth system
	Earth's history	Geochemical cycles
		Origin and evolution of the earth system

SCIENCE AND TECHNOLOGY STANDARDS		
LEVELS K-4	LEVELS 5-8	LEVELS 9-12
Abilities of technological design	Understanding about science and technology	Understanding about science and technology
Understanding about science and technology		

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.
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(b) Knowledge and skills

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| <p>(1) Scientific processes. The student conduct laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.</p> | <p>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</p> |
| <p>(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.</p> | <p>The student is expected to:
(A) plan and implement investigative procedures including asking questions,</p> |

- 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.

(6) Science concepts. The student knows that change can create recognizable patterns.

The student is expected to:

- (A) identify patterns of change such as weather, metamorphosis, and objects in the sky.

- (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.
- (10) Science concepts. The student knows that certain past events affect present and future events. The student is expected to:
- (A) identify and observe effects of events that require time for changes to be noticeable including growth, erosion, dissolving, weathering, and flow; and
 - (B) draw conclusions about "what happened before" using fossils or charts and tables.

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

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| (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.
- (6) Science concepts. The student knows that some change occurs in cycles.
- The student is expected to:
- (A) identify events and describe changes that occur on a regular basis such as in daily, weekly, an seasonal cycles.
- (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 state, and the ability to conduct or insulate heat, electricity, and sound.
- (11) Science concepts. The student knows that certain past events affect present and future events.
- The student is expected to:
- (A) identify and observe actions that require time for changes to be measurable, including growth, erosion, dissolving, weathering, an flow;
- (B) draw conclusions about "what happened before" using data such as from tree-growth rings and sedimentary rock sequences; and
- (C) identify past events that led to the formation of the Earth' renewable, non-renewable, and inexhaustible resources.
- (12) Science concepts. The student knows the structures and functions of Earth systems.
- The student is expected to:
- (A) distinguish among the layers of the Earth including the crust, mantle, and core; and
- (B) interpret how land forms are the result of a combination of constructive and destructive forces such as deposition of

sediment and weathering.

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.
 - (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.
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(b) Knowledge and skills

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| <p>(1) Scientific processes. The student conduct laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices.</p> | <p>The student is expected to:</p> <p>(A) demonstrate safe practices during laboratory investigations and fieldwork; and</p> <p>(B) make wise choices in the use and conservation of resources and the disposal of materials.</p> |
| <p>(2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations.</p> | <p>The student is expected to:</p> <p>(A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology;</p> |

- (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.

- (5) Science concepts. The student knows that there is a relationship between force and

The student is expected to:

 - (A) identify and describe the changes in

motion.

position, direction of motion, and speed of an object when acted upon by force;

- (B) demonstrate that changes in motion can be measured and graphically represented; and
- (C) identify forces that shape features of the Earth including uplifting, movement of water, and volcanic activity.

(13) Science concepts. The student knows the structures and functions of Earth systems.

The student is expected to:
(A) summarize the rock cycle.

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.
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(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.

(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.

(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.

(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,; an
(C) make inferences and draw conclusion about effects of human activity on Earth' 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.
- (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.
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(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.

(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.

(10) Science concepts. The students knows that cycles exist in Earth systems.

The student is expected to:

(A) analyze and predict the sequence of events in the lunar and rock cycles.

(12) Science concepts. The student knows that natural events and human activities can alter Earth systems.

The student is expected to:

(A) predict land features resulting from gradual changes such as mountain building, beach erosion, and land subsidence.

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.
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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 physics and chemistry, and future careers.

(4) Scientific processes. The student knows concepts of force and motion evident in everyday life.

The student is expected to:

- (B) investigate and describe applications of Newton's laws such as in vehicle restraints, sports activities, geological processes, and satellite orbits.

(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.