

Mystery Festival

Grades 1-2-3-4-5-6-7-8

National Science Education Standards

SCIENCE AS INQUIRY STANDARDS

LEVELS K-4	LEVELS 5-8
Abilities necessary to do scientific inquiry	Abilities necessary to do scientific inquiry
Understanding about scientific inquiry	Understanding about scientific inquiry

PHYSICAL SCIENCE STANDARDS

LEVELS K-4	LEVELS 5-8
Properties of objects and materials	Properties and changes of properties in matter

LIFE SCIENCE STANDARDS

LEVELS K-4	LEVELS 5-8
Characteristics of organisms	Reproduction and heredity

SCIENCE AND TECHNOLOGY STANDARDS

LEVELS K-4	LEVELS 5-8
Abilities of technological design	Abilities of technological design

HISTORY AND NATURE OF SCIENCE STANDARDS

LEVELS K-4	LEVELS 5-8
Science as a human endeavor	Science as a human endeavor
	Nature of science

Texas Essential Knowledge and Skills

Grade 1 Science

(a) Introduction.

- (1) In Grade 1, science introduces the use of simple investigations and fieldwork to help students develop the skills of asking questions, gathering information, making measurements using non-standard units, using tools such as a thermometer, to extend their senses, constructing explanations, and drawing conclusions.
- (2) As students learn science skills, they identify component of the natural world including rocks, soil, and natural resources. Students observe that heat from the sun or friction, is an example of something that causes change. In addition, Grade 1

students identify basic needs of living things, explore ways that living things depend on each other, and group living and nonliving things. Students identify parts that can be put together with other parts to do new things.

- (3) 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.
 - (4) 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.
 - (5) 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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| (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 develops abilities necessary to do science inquiry in both the field and the classroom. | The student is expected to:
(A) ask questions about objects and events;
(B) plan and conduct simple investigations;
(C) gather information using simple equipment and tools to extend the senses;
(D) construct reasonable explanations and draw conclusions; and
(E) communicate findings about simple investigations. |
| (3) Scientific processes. The student knows that information and critical thinking are used in making decisions. | The student is expected to:
(A) make decisions using information, and
(B) discuss and justify the merits of decisions. |

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| (4) Scientific processes. The student uses age-appropriate tools and models to verify that objects and parts of objects can be observed, described, and measured. | The student is expected to:
(A) collect information using tools including hand lenses, clocks, computers, thermometers, and balances;
(B) record and compare collected information; and
(C) measure objects and parts of objects, using non-standard units such as paper clips, hands, and pencils. |
| (5) Science concepts. The student knows that objects have properties and patterns. | The student is expected to:
(A) sort objects and events based on properties and patterns; and
(B) identify, predict, and create patterns including those seen in charts, graphs, and numbers. |
| (7) Science concepts. The student knows that many types of change occur. | The student is expected to:
(A) observe, measure, and record changes in size, weight, color, position, quantity, sound, and movement. |

Grade 2 Science

(a) Introduction.

- (1) In Grade 2, science introduces the use of simple investigations and fieldwork to help students develop the skills of making measurements using standard and non-standard units, using tools such as rulers and clocks to collect information, classifying and sequencing objects and events, and identifying patterns.
 - (3) 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.
 - (4) 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.
 - (5) 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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| (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 develops abilities necessary to do science inquiry in both the field and the classroom. | The student is expected to:
(A) ask questions about objects and events;
(B) plan and conduct simple investigations
(C) compare results of investigations with what students and scientists know about the world;
(D) gather information using simple equipment and tools to extend the senses;
(E) construct reasonable explanations and draw conclusions using information and prior knowledge; and
(F) communicate findings about simple investigations. |
| (3) Scientific processes. The student knows that information and critical thinking are used in making decisions. | The student is expected to:
(A) make decisions using information, and
(B) discuss and justify the merits of decisions. |
| (4) Scientific processes. The student uses age-appropriate tools and models to verify that objects and parts of objects can be observed, described, and measured. | The student is expected to:
(A) collect information using tools including rulers, meter sticks, measuring cups, clocks, hand lenses, computers, thermometers, and balances; and
(B) measure and compare objects and parts of objects, using standard and non-standard units. |
| (5) Science concepts. The student knows hat objects have properties and patterns. | The student is expected to:
(A) classify and sequence objects and events based on properties and patterns; and
(B) identify, predict, replicate, and create patterns including those seen in charts, graphs, and numbers. |

- (7) Science concepts. The student knows that many types of change occur. The student is expected to:
- (A) observe, measure, record, analyze, predict, and illustrate changes in size, weight, temperature, color, position, quantity, sound, and movement.

Grade 3 Science

(a) Introduction.

- (1) In Grade 3, the study of science includes planning and implementing simple laboratory investigations and fieldwork to develop the skills of collecting information using tools such as a microscope, making inferences, communicating conclusions, and making informed decisions.
 - (2) As students learn science skills, they identify the importance of components of the natural world including rocks, soils, water, and atmospheric gases. They observe the direction and position of objects as they are pushed and pulled, and movement of the Earth's surface as examples of change caused by a force. Grade 3 students investigate magnetism and gravity. In addition, students explore organisms' needs, habitats, competition with other organisms, and their ecosystem.
 - (3) 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.
 - (4) 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.
 - (5) 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 simple graphs, tables, and charts to organize, examine and evaluate information.

(3) Scientific processes. The student knows that information, critical thinking, and scientific problem solving are used in making 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 3 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 and analyze information using tools including calculators, microscopes,, cameras, safety goggles, sound recorders, clocks, computers, thermometers, hand lenses, meter sticks, rulers, balances, magnets, 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) gather information about the physical properties of matter including temperature, magnetism, hardness, and weight using appropriate instruments; and
 - (B) identify matter as liquids, solids, and gases.

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

- (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 of research on scientific thought, society, and the environment; and
- (E) connect Grade 4 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 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.

(5) Science concepts. The student knows that systems exist in the world.

The student is expected to:

- (B) identify and describe the role of the components in nonliving systems, such as a light bulb in a circuit and stream in a watershed.

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| (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. |
| (11) Science concepts. The student knows structures and functions of Earth systems. | The student is expected to:
(A) test properties of soils including texture, capacity to retain water,, and ability to support life,
(B) summarize the effects of the oceans on land; and
(C) identify the sun as the major source of energy for the Earth and understand its role in the growth of plants, in the creation of winds, and in the water cycle. |

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 of research on scientific thought, society, and the environment; and
- (E) connect Grade 5 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 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 state, 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.

(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, and flow; and
- (B) draw conclusions about "what happened before" using data such as from tree-growth rings and sedimentary rock sequences.

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.
 - (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 and 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.
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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> |
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(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 of 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.

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| (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. |
| (13) Science concepts. The student knows the structures and functions of Earth systems. | The student is expected to:
(A) summarize the rock cycle; and
(B) identify relationships between groundwater and surface water in a watershed. |

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

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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> |
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(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 of 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.

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| (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. |
| (9) Science concepts. The student knows that traits of organisms are contained in genetic material. | The student is expected to:
(A) compare asexual and sexual reproduction to illustrate that the traits of organisms are contained in genetic material; and
(B) distinguish between dominant and recessive traits and recognize that inherited traits of an individual can be determined by one or many genes. |

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.
 - (4) Grade 8 students predict possible outcomes that result from different genetic combinations and explore the extinction of some species.
 - (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; and
- (E) connect Grade 8 science concepts with careers.

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| <p>(4) Scientific processes. The student knows how to use a variety of tools and methods to conduct science inquiry.</p> | <p>The student is expected to:</p> <ul style="list-style-type: none">(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. |
| <p>(6) Science concepts. The student knows that substances have physical and chemical properties.</p> | <p>The student is expected to:</p> <ul style="list-style-type: none">(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 surfaces, insulation, adhesives, and plastics. |
| <p>(7) Science concepts. The student knows that complex interactions occur between matter and energy.</p> | <p>The student is expected to:</p> <ul style="list-style-type: none">(B) identify and demonstrate that loss or gain of heat energy occurs during exothermic and endothermic chemical reactions. |
| <p>(9) Science concepts. The student knows that traits of organisms are contained in genetic material.</p> | <p>The student is expected to:</p> <ul style="list-style-type: none">(A) distinguish between inherited traits and other characteristics that result from interactions with the environment; and(B) make predictions about possible outcomes of genetic combinations of inherited characteristics. |