

Discovering Density

Grades 6-7-8-9-10

National Science Education Standards

SCIENCE AS INQUIRY STANDARDS

LEVELS 5-8	LEVELS 9-12
Abilities necessary to do scientific inquiry	Abilities necessary to do scientific inquiry
Understanding about scientific inquiry	Understanding about scientific inquiry

PHYSICAL SCIENCE STANDARDS

LEVELS 5-8	LEVELS 9-12
Properties and changes of properties in matter	Structure and properties of matter

HISTORY AND NATURE OF SCIENCE STANDARDS

LEVELS 5-8	LEVELS 9-12
Science as a human endeavor	Science as a human endeavor
Nature of science	Nature of scientific knowledge

Texas Essential Knowledge and Skills

Grade 6 Science

(a) Introduction.

- (1) In Grade 6, the study of science includes conducting laboratory investigations and fieldwork using scientific methods, analyzing information, making informed decisions, and using tools such as beakers, test tubes and spring scales to collect, analyze, and record information.
- (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 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;
(C) represent the physical world using models and identify their limitations; and
(D) evaluate the impact or research on scientific thought, society, and the environment. |
| (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. |

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;
- (C) represent the physical world using models and identify their limitations;
- (D) evaluate the impact or research on scientific thought, society, and the environment.

(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.

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.

(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;
- (C) represent the physical world using models and identify their limitations;
- (D) evaluate the impact or research on scientific thought, society, and the environment.

(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.

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; and
- (C) represent the physical world using models and identify their limitations.

(7) Science concepts. The student knows relationships exist between properties of matter and its components.

The student is expected to:

- (A) investigate and identify properties of fluids including density, viscosity, and buoyancy;

(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.

Chemistry

(b) Introduction.

- (1) In Chemistry, students conduct laboratory investigations and fieldwork, use scientific methods during investigations, and make informed decisions using, critical thinking and scientific problem-solving. Chemistry students study a variety of topics that include: characteristics of matter, energy transformations during physical and chemical changes; atomic structure; periodic table of elements; behavior of gases; bonding; nuclear fusion and nuclear fission; oxidation-reduction reactions chemical equations; solutes; properties of solutions; acids and bases; and chemical reactions. Students will investigate how chemistry is an integral part of our daily lives.
- (2) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.
- (3) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.
- (4) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions build from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world

and can show how systems work. They have limitations and based on new discoveries are constantly being modified to more closely reflect the physical world.

(c) Knowledge and skills

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| (1) Scientific processes. The student, for at least 40% of instructional time, conducts laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices. | The student is expected to:
(A) demonstrate safe practices during laboratory investigations and fieldwork; and
(B) make wise choices in the use and conservation of resources and the disposal of materials. |
| (2) Scientific processes. The student uses scientific methods during fieldwork and laboratory investigations. | The student is expected to:
(A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology;
(B) collect information by observing and measuring in various ways;
(C) express and manipulate chemical quantities using scientific conventions such as dimensional analysis, scientific notation, and significant figures;
(D) organize, analyze, evaluate, make inferences, and predict trends from data; and
(E) communicate valid conclusions. |
| (3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions. | The student is expected to:
(A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information; and
(C) evaluate the impact of research on scientific thought, society, and the environment. |
| (4) Science concepts. The student knows the characteristics of matter. | The student is expected to:
(D) investigate and identify properties of mixtures and pure substances. |
| (14) Science concepts. The student knows the relationships among the concentration, electrical conductivity, and colligative properties of a solution. | The student is expected to:
(A) compare unsaturated, saturated, and supersaturated solutions. |