Adel DeSoto Minburn CSD
K-2 Science Standards
Scope and Sequence

Board approved:
Revised May 2012

The Iowa Core Curriculum for Science reflects the belief that ALL students should experience science through a curriculum that is rigorous, relevant, global in its perspective, collaborative in nature, and connected by strong visible links to other areas of study. This document follows the format and content of NSES in which there are eight categories of standards. Four of the categories ù Science as Inquiry, Physical Science, Earth and Space Science, and Life Science ù are content specific, while the remaining categories ù Science and Technology, Science in Personal and Social Perspectives, and the History and Nature of Science ù address the application of knowledge. These remaining standards sets call for students to develop abilities to identify and state a problem, design, implement and evaluate a solution, and they complement the abilities developed in the Science as Inquiry Standards. They also help students develop decision-making skills and understand that science reflects its history and is an ongoing, changing enterprise. As such, these standards should be integrated throughout the four content specific categories stated above. These sets include the following at the 9—12 level: Science and Technology ù abilities of technological design, and understanding about science and technology; Science in Personal and Social Perspectives ù personal and community health, population growth, natural resources, environmental quality, natural and human-induced hazards, and science and technology in local, national, and global changes; History and Nature of Science ù science as a human endeavor, nature of scientific knowledge, and historical perspectives (see appendix). Science as Inquiry and the application standards from the NSES are integrated into the knowledge base by design. The content category of Unifying Concepts and Processes complements the other standards. The concepts and procedures in this category provide students with productive and insightful ways of thinking about and integrating basic ideas that explain the natural and designed world (see appendix for details). These concepts and processes include:

* Systems, order, and organization
* Evidence, models, and explanation
* Constancy, change, and measurement
* Evolution and equilibrium
* Form and function

Science is more than a body of knowledge. It is a way of thinking and a way of investigating. Students must have the opportunity to examine the impact science has had, and will continue to have, on the environment and society. These opportunities are the focus of the integrated standards.

The Iowa Core Curriculum for Science emphasizes student inquiry. The depth of understanding required of our students is not possible with lectures, readings, cookbook labs, and plug-and-chug problem solving. Students must be actively investigating: designing experiments, observing, questioning, exploring, making and testing hypotheses, making and comparing predictions, evaluating data, and communicating and defending conclusions. A district's science curriculum cannot align to the Iowa Core Curriculum for Science without including inquiry as a guaranteed and viable, testable component in every science course. The science instruction should be engaging and relevant for the students. Strong connections between the lessons and the students' daily lives must be made. This core curriculum reflects high standards of science achievement for ALL students and not just those who have traditionally succeeded in science classes. The challenge is to create an educational system that connects students to the scientific world. The broad range of understandings and skills possessed by students when they enter 9th grade will require a system that is clearly articulated and masterfully implemented from kindergarten through grade 12. Teachers will need support and time to prepare for this challenge. This is a first bold step toward a vision of scientific literacy for all.

Scientific Inquiry Standards K-2

Kindergarteners:	Grade 1 students:	Grade 2 students:
Ask questions about objects, organisms, and events in the environment.		
1. Answer questions by seeking information from their own observations, investigations and from reliable sources of information. (PK)	1. Answer questions by seeking information from their own observations, investigations and from reliable sources of information.	1. Answer questions by seeking information from their own observations, investigations and from reliable sources of information.
Plan and conduct simple investigations.		
2. Design and conduct simple investigations to answer questions. (PK)	2. Design and conduct simple investigations to answer questions.	2. Design and conduct simple investigations to answer questions.
3. Follow appropriate safety procedures when conducting investigation.	3. Follow appropriate safety procedures when conducting investigation.	3. Follow appropriate safety procedures when conducting investigation.
Use tools to gather data and extend the senses.		
4. Students use tools such as rulers, thermometers, watches, balances, spring scales, magnifiers, and microscopes to extend their senses and their abilities to gather data.	4. Students use tools such as rulers, thermometers, watches, balances, spring scales, magnifiers, and microscopes to extend their senses and their abilities to gather data.	4. Students use tools such as rulers, thermometers, watches, balances, spring scales, magnifiers, and microscopes to extend their senses and their abilities to gather data.
Use mathematics in scientific inquiry.		
5. Mathematics is used to gather, organize and present data and to construct convincing explanations.	5. Mathematics is used to gather, organize and present data and to construct convincing explanations.	5. Mathematics is used to gather, organize and present data and to construct convincing explanations.
Use data to construct reasonable explanations.		
6. Students learn what constitutes evidence. (PK)	6. Students learn what constitutes evidence.	6. Students learn what constitutes evidence.
7. Students' explanations should reflect the evidence they have obtained. (PK)	7. Students' explanations should reflect the evidence they have obtained.	7. Students' explanations should reflect the evidence they have obtained.
Communicate investigations and explanations.		
8. Students should begin to develop the abilities to communicate, critique, and analyze their work and the work of other students.	8. Students should begin to develop the abilities to communicate, critique, and analyze their work and the work of other students.	8. Students should begin to develop the abilities to communicate, critique, and analyze their work and the work of other students.
9. Students should communicate orally, through writing or through drawings. (PK)	9. Students should communicate orally, through writing or through drawings.	9. Students should communicate orally, through writing or through drawings.
Follow appropriate safety procedures when conducting investigations.		

Earth and Space Standards K-2

Earth and space science is the field of study concerned with the planet Earth or one or more of its parts. Earth and space science includes the science used to study the lithosphere (the solid portion of the earth), the atmosphere (the gaseous envelope surrounding the earth), the hydrosphere (the ice, water, and water vapor at or near the earth's surface), the biosphere (the zone at or near the earth's surface that supports life), and space beyond the atmosphere. It is the interactions between these parts, how they impact life on the planet and how we can use observations today to discover what forces created the surface features of the planet centuries ago that form a central portion of this study. Climate, weather, environmental issues, soil science and water quality are all open areas of inquiry in this field.

Earth and space science instruction must include the inquiry knowledge and skills described in the inquiry section of the Iowa Core Curriculum for Science. Instruction should be engaging and relevant and strong connections must be made to students' lives.

Kindergarteners:	Grade 1 students:	Grade 2 students:
Understand and apply knowledge of properties of each material.		
1. Earth materials are solid rocks and soils, water and the gases are atmosphere. The varied materials have difference physical and chemical properties.	1. Earth materials are solid rocks and soils, water and the gases are atmosphere. The varied materials have difference physical and chemical properties.	1. Earth materials are solid rocks and soils, water and the gases are atmosphere. The varied materials have difference physical and chemical properties.
2. Soils have properties of color and texture, capacity to retain water, and ability to support the growth of many kinds of plants, including those in our food supply.	2. Soils have properties of color and texture, capacity to retain water, and ability to support the growth of many kinds of plants, including those in our food supply.	2. Soils have properties of color and texture, capacity to retain water, and ability to support the growth of many kinds of plants, including those in our food supply.
Understand and apply knowledge of observable information about daily and seasonal weather conditions.		
3. Weather changes from day to day and over the seasons. (PK)	3. Weather changes from day to day and over the seasons.	3. Weather changes from day to day and over the seasons.
4. The sun provides the light and heat necessary to maintain the temperature of the earth.	4. The sun provides the light and heat necessary to maintain the temperature of the earth.	4. The sun provides the light and heat necessary to maintain the temperature of the earth.

Life Science Standards K-2

Life science is concerned with the study of living organisms and their interactions with each other and their environments. Life science examines the structure, function, growth, origin, evolution, distribution and classification of living things. Specialized disciplines of life sciences are grouped by the type of organism being studied: botany is the study of plants, zoology the study of animals, microbiology the study of microscopic organisms.

Life science instruction must include the inquiry knowledge and skills described in the inquiry section of the Science ore Curriculum Instruction should be engaging and relevant and strong connections must be made to students' lives.

Kindergarteners:	Grade 1 students:	Grade 2 students:
Understand and apply knowledge of the characteristics of living things and how living things are both similar to and different from each other and from non-living things.		
1. Living things share some common characteristics that are both similar to and different from non-living things.	1. Living things share some common characteristics that are both similar to and different from non-living things.	1. Living things share some common characteristics that are both similar to and different from non-living things.
2. Different species of plants and animals have different observable characteristics by which they can be classified. (PK)	2. Different species of plants and animals have different observable characteristics by which they can be classified.	2. Different species of plants and animals have different observable characteristics by which they can be classified.
Understand and apply knowledge of life cycles of plants and animals.		
3. Plants and animals have life cycles that include being born, developing into adults, reproducing, and eventually dying. (PK)	3. Plants and animals have life cycles that include being born, developing into adults, reproducing, and eventually dying.	3. Plants and animals have life cycles that include being born, developing into adults, reproducing, and eventually dying.
4. Plants and animals closely resemble their parents.	4. Plants and animals closely resemble their parents.	4. Plants and animals closely resemble their parents.
Understand and apply knowledge of the basic needs of plants and animals and how they interact with each other and their physical environment.		
5. Organisms have basic needs. For example, animals need air, water, and food; plants require air, water, nutrients, and light. (PK)	5. Organisms have basic needs. For example, animals need air, water, and food; plants require air, water, nutrients, and light.	5. Organisms have basic needs. For example, animals need air, water, and food; plants require air, water, nutrients, and light.
6. Organisms interact with each other and their physical environment. (PK)	6. Organisms interact with each other and their physical environment.	6. Organisms interact with each other and their physical environment.
7. Organisms can survive only in environments in which their needs can be met.	7. Organisms can survive only in environments in which their needs can be met.	7. Organisms can survive only in environments in which their needs can be met.
8. The world has many different environments, and distinct environments support the life of different types of organisms.	8. The world has many different environments, and distinct environments support the life of different types of organisms.	8. The world has many different environments, and distinct environments support the life of different types of organisms.
Understand and apply knowledge of ways to help take care of the environment.		
9. Chapter 12 of the Iowa Administrative Code states that science instruction shall include conservation of natural resources; and environmental awareness.	9. Chapter 12 of the Iowa Administrative Code states that science instruction shall include conservation of natural resources; and environmental awareness.	9. Chapter 12 of the Iowa Administrative Code states that science instruction shall include conservation of natural resources; and environmental awareness.
10. Humans depend on their natural and constructed environments.	10 Humans depend on their natural and constructed environments.	10. Humans depend on their natural and constructed environments.

11. Humans change environments in ways that can be either beneficial or detrimental to themselves or other organisms. (PK)	11. Humans change environments in ways that can be either beneficial or detrimental to themselves or other organisms.	11. Humans change environments in ways that can be either beneficial or detrimental to themselves or other organisms.
Understand and apply knowledge of basic human body structures (human body parts and their functions).		
Understand and apply knowledge of good health habits.		

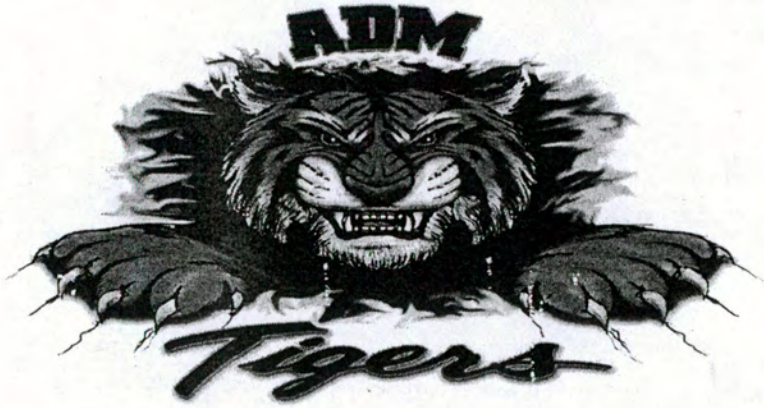
Physical Science Standards K-2

Physical science is the term for the study of non-living systems, and includes physics and chemistry. The foundations of physical science rest upon key concepts and theories, each of which explain and/or model a particular aspect of the behavior of nature.

Physics includes describing and measuring motion: the theory of gravity; energy, work, and power; energy forms; kinetic molecular theory; the principals of waves and sound; the principles of electricity, magnetism, and electromagnetism; and the principles, sources, and properties of light.

Chemistry is the science of matter. Its studies include atomic theory; water and its properties; chemical elements, chemical reactions, and energy transformations; nuclear chemistry; and organic chemistry. In all areas of physical science the focus is on the application of the knowledge to solve real life problems. It is the use of the conceptual knowledge and not simply the knowledge itself that should form the core of this discipline. Physical science instruction must include the inquiry knowledge and skills described in the inquiry section of the Science Core Curriculum. Instruction should be engaging and relevant and strong connections must be made to students' lives.

Kindergarteners:	Grade 1 students:	Grade 2 students:
Understand and apply knowledge of observable and measurable properties of objects.		
1. Objects have many observable properties including size, weight, shape color, temperature and the ability to react with other substances. Those properties can be measured using tools such as rulers, balances and thermometers. (PK)	1. Objects have many observable properties including size, weight, shape color, temperature and the ability to react with other substances. Those properties can be measured using tools such as rulers, balances and thermometers.	1. Objects have many observable properties including size, weight, shape color, temperature and the ability to react with other substances. Those properties can be measured using tools such as rulers, balances and thermometers.
2. Objects are made of one or more materials.	2. Objects are made of one or more materials.	2. Objects are made of one or more materials.
3. Objects can be described by the properties of the materials from which they are made. Properties can be used to separate or sort a group of objects or materials.	3. Objects can be described by the properties of the materials from which they are made. Properties can be used to separate or sort a group of objects or materials.	3. Objects can be described by the properties of the materials from which they are made. Properties can be used to separate or sort a group of objects or materials.
Understand and apply knowledge of characteristics of liquids and solids.		
4. Materials can exist in different states – solid, liquid, and gas.	4. Materials can exist in different states – solid, liquid, and gas.	4. Materials can exist in different states – solid, liquid, and gas.
5. Some common materials, such as water, can be changed from one state to another by heating and cooling.	5. Some common materials, such as water, can be changed from one state to another by heating and cooling.	5. Some common materials, such as water, can be changed from one state to another by heating and cooling.
Understand and apply knowledge of the positions and motions of objects.		
6. The position of an object can be described by locating it relative to its background.	6. The position of an object can be described by locating it relative to its background.	6. The position of an object can be described by locating it relative to its background.
7. An object's motion can be described by observing and measuring its position over time.	7. An object's motion can be described by observing and measuring its position over time.	7. An object's motion can be described by observing and measuring its position over time.
8. An object's position or movement can be changed by pushing or pulling.	8. An object's position or movement can be changed by pushing or pulling.	8. An object's position or movement can be changed by pushing or pulling.



Adel DeSoto Minburn CSD
3-5 Science Standards
Scope and Sequence

Board approved:
Revised May 2012

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* Evidence, models, and explanation
* Constancy, change, and measurement
* Evolution and equilibrium
* Form and function

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Scientific Inquiry Standards 3-5

Grade 3 students:	Grade 4 students:	Grade 5 students:
Identify and generate questions that can be answered through scientific investigations.		
1. Students ask questions that they can answer with scientific knowledge combined with their own observations	1. Students ask questions that they can answer with scientific knowledge combined with their own observations	1. Students ask questions that they can answer with scientific knowledge combined with their own observations
2. Students recognize that different questions lead to different types of investigations.	2. Students recognize that different questions lead to different types of investigations.	2. Students recognize that different questions lead to different types of investigations.
Recognize that scientists perform different types of investigations.		
3. Types of investigations include describing objects, events, and organisms; classifying them; and doing a fair test (experimenting), depending on the types of questions they want to answer.	3. Types of investigations include describing objects, events, and organisms; classifying them; and doing a fair test (experimenting), depending on the types of questions they want to answer.	3. Types of investigations include describing objects, events, and organisms; classifying them; and doing a fair test (experimenting), depending on the types of questions they want to answer.
Plan and conduct scientific investigations.		
4. Students should engage in systematic observation, making accurate measurements, and identifying and controlling variables.	4. Students should engage in systematic observation, making accurate measurements, and identifying and controlling variables.	4. Students should engage in systematic observation, making accurate measurements, and identifying and controlling variables.
5. Students understand the concept of a fair test.	5. Students understand the concept of a fair test.	5. Students understand the concept of a fair test.
6. Students follow appropriate safety procedures when conducting investigations.	6. Students follow appropriate safety procedures when conducting investigations.	6. Students follow appropriate safety procedures when conducting investigations.
Use appropriate tools and techniques to gather, process, and analyze data.		
7. Students enhance their skills with tools such as rulers, thermometers, balances, spring scales, magnifiers and microscopes.	7. Students enhance their skills with tools such as rulers, thermometers, balances, spring scales, magnifiers and microscopes.	7. Students enhance their skills with tools such as rulers, thermometers, balances, spring scales, magnifiers and microscopes.
8. Students are introduced to the use of computers and calculators for conducting investigations	8. Students are introduced to the use of computers and calculators for conducting investigations	8. Students are introduced to the use of computers and calculators for conducting investigations
9. Students' use of appropriate tools is guided by the questions asked and the investigations students design.	9. Students' use of appropriate tools is guided by the questions asked and the investigations students design.	9. Students' use of appropriate tools is guided by the questions asked and the investigations students design.
Incorporate mathematics in science inquiries.		
10. Mathematics is used to gather, organize and present data and to construct convincing explanations.	10. Mathematics is used to gather, organize and present data and to construct convincing explanations.	10. Mathematics is used to gather, organize and present data and to construct convincing explanations.
Use evidence to develop reasonable explanations.		
11. Students should determine what constitutes evidence.	11. Students should determine what constitutes evidence.	11. Students should determine what constitutes evidence.
12. Students should judge the merits or strengths of the data and information used to make explanations.	12. Students should judge the merits or strengths of the data and information used to make explanations.	12. Students should judge the merits or strengths of the data and information used to make explanations.

Grade 3 students:	Grade 4 students:	Grade 5 students:
13. Students' explanations should reflect the evidence they have obtained in their investigations	13. Students' explanations should reflect the evidence they have obtained in their investigations	13. Students' explanations should reflect the evidence they have obtained in their investigations
14. Students should check their explanations against scientific knowledge, their own experiences, and observations of others.	14. Students should check their explanations against scientific knowledge, their own experiences, and observations of others.	14. Students should check their explanations against scientific knowledge, their own experiences, and observations of others.
Communicate scientific procedures and explanations.		
15. Students should communicate, critique, and analyze their work and the work of other students.	15. Students should communicate, critique, and analyze their work and the work of other students.	15. Students should communicate, critique, and analyze their work and the work of other students.
16. Students should share procedures and explanations through various means of communication.	16. Students should share procedures and explanations through various means of communication.	16. Students should share procedures and explanations through various means of communication.
Follow appropriate safety procedures when conducting investigations.		

Earth and Space Standards 3-5

Earth and space science is the field of study concerned with the planet Earth or one or more of its parts. Earth and space science includes the science used to study the lithosphere (the solid portion of the earth), the atmosphere (the gaseous envelope surrounding the earth), the hydrosphere (the ice, water, and water vapor at or near the earth's surface), the biosphere (the zone at or near the earth's surface that supports life), and space beyond the atmosphere. It is the interactions between these parts, how they impact life on the planet and how we can use observations today to discover what forces created the surface features of the planet centuries ago that form a central portion of this study. Climate, weather, environmental issues, soil science and water quality are all open areas of inquiry in this field.

Earth and space science instruction must include the inquiry knowledge and skills described in the inquiry section of the Iowa Core Curriculum for Science. Instruction should be engaging and relevant and strong connections must be made to students' lives.

Grade 3 students:	Grade 4 students:	Grade 5 students:
Understand and apply knowledge of properties and uses of earth materials.		
1. The different physical and chemical properties of each material make them useful in different ways, for example, as building materials, as sources of fuel, or for growing the plants we use as foods.	1. The different physical and chemical properties of each material make them useful in different ways, for example, as building materials, as sources of fuel, or for growing the plants we use as foods.	1. The different physical and chemical properties of each material make them useful in different ways, for example, as building materials, as sources of fuel, or for growing the plants we use as foods.
Understand and apply knowledge of processes and changes on or in the earth's land, oceans, and atmosphere.		
2. The surface of the earth changes. Some changes are due to slow processes, such as erosion and weathering, and some changes are due to rapid processes such as landslides, volcanic eruptions, floods and earthquakes.	2. The surface of the earth changes. Some changes are due to slow processes, such as erosion and weathering, and some changes are due to rapid processes such as landslides, volcanic eruptions, floods and earthquakes.	2. The surface of the earth changes. Some changes are due to slow processes, such as erosion and weathering, and some changes are due to rapid processes such as landslides, volcanic eruptions, floods and earthquakes.
Understand and apply knowledge of processes and changes on or in the earth's land, oceans, and atmosphere.		
3. Fossils provide evidence of plants and animals that lived long ago and the nature of the environment at that time.	3. Fossils provide evidence of plants and animals that lived long ago and the nature of the environment at that time.	3. Fossils provide evidence of plants and animals that lived long ago and the nature of the environment at that time.
Understand and apply knowledge of weather and weather patterns.		
4. Weather is always changing and can be described by measurable quantities such as temperature, wind direction and speed and precipitation.	4. Weather is always changing and can be described by measurable quantities such as temperature, wind direction and speed and precipitation.	4. Weather is always changing and can be described by measurable quantities such as temperature, wind direction and speed and precipitation.
5. Large masses of air with certain properties move across the surface of the earth. The movement and interaction of these air masses is used to forecast the weather.	5. Large masses of air with certain properties move across the surface of the earth. The movement and interaction of these air masses is used to forecast the weather.	5. Large masses of air with certain properties move across the surface of the earth. The movement and interaction of these air masses is used to forecast the weather.
Understand and apply knowledge of the properties, movements, and locations of objects in our solar system.		
6. Most objects in the solar system are in regular and predictable motion. The rotation of the earth on its axis every 24 hours produces the day-and-night cycle. To people on the earth this turning of the planet makes it seem as though the sun, planets,	6. Most objects in the solar system are in regular and predictable motion. The rotation of the earth on its axis every 24 hours produces the day-and-night cycle. To people on the earth this turning of the planet makes it seem as though the sun, planets,	6. Most objects in the solar system are in regular and predictable motion. The rotation of the earth on its axis every 24 hours produces the day-and-night cycle. To people on the earth this turning of the planet makes it seem as though the sun, planets,

and stars are orbiting the earth once a day.

7. The sun appears to move across the sky in the same way every day. Its apparent path changes slowly across
8. The moon's orbit around the earth once in about 28 days charges what part of the moon is lighted by the sun and how much of that part can be seen from the earth – the phases of the moon.
9. Eight planets and many other objects revolve around our Sun in predictable patterns. These plants and objects are composed of varied materials.

and stars are orbiting the earth once a day.

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8. The moon's orbit around the earth once in about 28 days charges what part of the moon is lighted by the sun and how much of that part can be seen from the earth – the phases of the moon.
9. Eight planets and many other objects revolve around our Sun in predictable patterns. These plants and objects are composed of varied materials.

Life Science Standards 3-5

Life science is concerned with the study of living organisms and their interactions with each other and their environments. Life science examines the structure, function, growth, origin, evolution, distribution and classification of living things. Specialized disciplines of life sciences are grouped by the type of organism being studied: botany is the study of plants, zoology the study of animals, microbiology the study of microscopic organisms.

Life science instruction must include the inquiry knowledge and skills described in the inquiry section of the Science ore Curriculum Instruction should be engaging and relevant and strong connections must be made to students' lives.

Grade 3 students:	Grade 4 students:	Grade 5 students:
Understand and apply knowledge of organisms and their environments.		
1. Animals depend on plants. Some animals eat plants for food. Other animals eat animals that eat the plants.	1. Animals depend on plants. Some animals eat plants for food. Other animals eat animals that eat the plants.	1. Animals depend on plants. Some animals eat plants for food. Other animals eat animals that eat the plants.
2. An organism's patterns of behavior are related to the nature of that organism's environment, including the kinds and numbers of other organisms present, the availability of food and resources, and the physical characteristics of the environment. When the environment changes, some plants and animals survive and reproduce, others die or move to new locations.	2. <u>An organism's patterns of behavior are related to the nature of that organism's environment, including the kinds and numbers of other organisms present, the availability of food and resources, and the physical characteristics of the environment. When the environment changes, some plants and animals survive and reproduce, others die or move to new locations.</u>	2. An organism's patterns of behavior are related to the nature of that organism's environment, including the kinds and numbers of other organisms present, the availability of food and resources, and the physical characteristics of the environment. When the environment changes, some plants and animals survive and reproduce, others die or move to new locations.
3. All organisms cause changes in the environment in which they live. Some of these changes are detrimental to the organism or other organisms, whereas others are beneficial.	3. All organisms cause changes in the environment in which they live. Some of these changes are detrimental to the organism or other organisms, whereas others are beneficial.	3. All organisms cause changes in the environment in which they live. Some of these changes are detrimental to the organism or other organisms, whereas others are beneficial.
Understand and apply knowledge of environmental stewardship.		
4. Chapter 12 of the Iowa Administrative Code states that science instruction shall include conservation of natural resources; and environmental awareness.	4. Chapter 12 of the Iowa Administrative Code states that science instruction shall include conservation of natural resources; and environmental awareness.	4. Chapter 12 of the Iowa Administrative Code states that science instruction shall include conservation of natural resources; and environmental awareness.
5. <u>Humans change environments in ways that can be either beneficial or detrimental to themselves or other organisms.</u>	5. Humans change environments in ways that can be either beneficial or detrimental to themselves or other organisms.	5. Humans change environments in ways that can be either beneficial or detrimental to themselves or other organisms.
Understand and apply knowledge of basic human body systems and how they work together.		
6. The human organism has systems that interact with one another. These systems include circulatory, respiratory, digestive, musculoskeletal, etc.	6. The human organism has systems that interact with one another. These systems include circulatory, respiratory, digestive, musculoskeletal, etc.	6. <u>The human organism has systems that interact with one another. These systems include circulatory, respiratory, digestive, musculoskeletal, etc.</u>
Understand and apply knowledge of personal health and wellness issues.		

Physical Science Standards 3-5

Physical science is the term for the study of non-living systems, and includes physics and chemistry. The foundations of physical science rest upon key concepts and theories, each of which explains and/or models a particular aspect of the behavior of nature.

Physics includes describing and measuring motion: the theory of gravity; energy, work, and power; energy forms; kinetic molecular theory; the principals of waves and sound; the principles of electricity, magnetism, and electromagnetism; and the principles, sources, and properties of light.

Chemistry is the science of matter. Its studies include atomic theory; water and its properties; chemical elements, chemical reactions, and energy transformations; nuclear chemistry; and organic chemistry. In all areas of physical science the focus is on the application of the knowledge to solve real life problems. It is the use of the conceptual knowledge and not simply the knowledge itself that should form the core of this discipline. Physical science instruction must include the inquiry knowledge and skills described in the inquiry section of the Science Core Curriculum. Instruction should be engaging and relevant and strong connections must be made to students' lives.

Grade 3 students:	Grade 4 students:	Grade 5 students:
Understand and apply knowledge of how to describe and identify substances based on characteristic properties.		
1. It may be necessary to use magnification to observe the component parts of some materials.	1. It may be necessary to use magnification to observe the component parts of some materials.	1. It may be necessary to use magnification to observe the component parts of some materials.
2. A substance has characteristic properties. A mixture of substances often can be separated into the original substances using one or more of the characteristic properties.	2. A substance has characteristic properties. A mixture of substances often can be separated into the original substances using one or more of the characteristic properties.	2. A substance has characteristic properties. A mixture of substances often can be separated into the original substances using one or more of the characteristic properties.
3. The properties of a substance can be measured using tools and technology.	3. The properties of a substance can be measured using tools and technology.	3. The properties of a substance can be measured using tools and technology.
4. When a new material (compound) is made by chemically combining two or more materials it has properties that are different from the original materials. For that reason, many different materials can be made from a small number of basic materials.	4. When a new material (compound) is made by chemically combining two or more materials it has properties that are different from the original materials. For that reason, many different materials can be made from a small number of basic materials.	4. When a new material (compound) is made by chemically combining two or more materials it has properties that are different from the original materials. For that reason, many different materials can be made from a small number of basic materials.
Understand and apply knowledge of states of matter and changes in states of matter.		
5. Materials can exist in different states – solid, liquid and gas. Some common materials can be changed from one state to another by heating or cooling.	5. Materials can exist in different states – solid, liquid and gas. Some common materials can be changed from one state to another by heating or cooling.	5. Materials can exist in different states – solid, liquid and gas. Some common materials can be changed from one state to another by heating or cooling.
Understand and apply knowledge of the concept of conservation of mass/matter.		
6. When something is broken into parts, the parts have the same total mass as the original item.	6. When something is broken into parts, the parts have the same total mass as the original item.	6. When something is broken into parts, the parts have the same total mass as the original item.
Understand and apply knowledge of sound, light, electricity, magnetism, and heat.		
7. Sound is produced when vibrations from objects travel through a medium and are received. Sound can vary in volume. The pitch of a sound can be varied by changing the rate of vibration.	7. Sound is produced when vibrations from objects travel through a medium and are received. Sound can vary in volume. The pitch of a sound can be varied by changing the rate of vibration.	7. Sound is produced when vibrations from objects travel through a medium and are received. Sound can vary in volume. The pitch of a sound can be varied by changing the rate of vibration.

8. Light travels in a straight line until it strikes an object. Light can be reflected by a mirror, refracted by a lens, or absorbed by an object.	8. Light travels in a straight line until it strikes an object. Light can be reflected by a mirror, refracted by a lens, or absorbed by an object.	8. Light travels in a straight line until it strikes an object. Light can be reflected by a mirror, refracted by a lens, or absorbed by an object.
9. Electricity in circuits can produce light, heat, sound, and magnetic effects. Electricity can only flow through a closed circuit.	9. Electricity in circuits can produce light, heat, sound, and magnetic effects. Electricity can only flow through a closed circuit.	9. Electricity in circuits can produce light, heat, sound, and magnetic effects. Electricity can only flow through a closed circuit.
10. Magnets attract and repel each other and certain kinds of other materials.	10. Magnets attract and repel each other and certain kinds of other materials.	10. Magnets attract and repel each other and certain kinds of other materials.
11. Heat can be produced in many ways, such as burning, rubbing, or mixing one substance with another. Heat can move from one object to another by conduction.	11. Heat can be produced in many ways, such as burning, rubbing, or mixing one substance with another. Heat can move from one object to another by conduction.	11. Heat can be produced in many ways, such as burning, rubbing, or mixing one substance with another. Heat can move from one object to another by conduction.
Understand and apply knowledge of how forces are related to an object's motion.		
12. The motion of an object can be described by its position, direction of motion, and speed. That motion can be measured and represented on a graph.	12. The motion of an object can be described by its position, direction of motion, and speed. That motion can be measured and represented on a graph.	12. The motion of an object can be described by its position, direction of motion, and speed. That motion can be measured and represented on a graph.
13. Changes in speed or direction of motion are caused by forces. The greater the force, the greater the change in motion. The more massive an object, the less effort a given force will have in changing its motions.	13. Changes in speed or direction of motion are caused by forces. The greater the force, the greater the change in motion. The more massive an object, the less effort a given force will have in changing its motions.	13. Changes in speed or direction of motion are caused by forces. The greater the force, the greater the change in motion. The more massive an object, the less effort a given force will have in changing its motions.

Adel DeSoto Minburn CSD
6-8 Science Standards
Scope and Sequence

Board approved:
Revised May 2012

The Iowa Core Curriculum for Science reflects the belief that ALL students should experience science through a curriculum that is rigorous, relevant, global in its perspective, collaborative in nature, and connected by strong visible links to other areas of study. This document follows the format and content of NSES in which there are eight categories of standards. Four of the categories ù Science as Inquiry, Physical Science, Earth and Space Science, and Life Science ù are content specific, while the remaining categories ù Science and Technology, Science in Personal and Social Perspectives, and the History and Nature of Science ù address the application of knowledge. These remaining standards sets call for students to develop abilities to identify and state a problem, design, implement and evaluate a solution, and they complement the abilities developed in the Science as Inquiry Standards. They also help students develop decision-making skills and understand that science reflects its history and is an ongoing, changing enterprise. As such, these standards should be integrated throughout the four content specific categories stated above. These sets include the following at the 9—12 level: Science and Technology ù abilities of technological design, and understanding about science and technology; Science in Personal and Social Perspectives ù personal and community health, population growth, natural resources, environmental quality, natural and human-induced hazards, and science and technology in local, national, and global changes; History and Nature of Science ù science as a human endeavor, nature of scientific knowledge, and historical perspectives (see appendix). Science as Inquiry and the application standards from the NSES are integrated into the knowledge base by design. The content category of Unifying Concepts and Processes complements the other standards. The concepts and procedures in this category provide students with productive and insightful ways of thinking about and integrating basic ideas that explain the natural and designed world (see appendix for details). These concepts and processes include:

* Systems, order, and organization
* Evidence, models, and explanation
* Constancy, change, and measurement
* Evolution and equilibrium
* Form and function

Science is more than a body of knowledge. It is a way of thinking and a way of investigating. Students must have the opportunity to examine the impact science has had, and will continue to have, on the environment and society. These opportunities are the focus of the integrated standards.

The Iowa Core Curriculum for Science emphasizes student inquiry. The depth of understanding required of our students is not possible with lectures, readings, cookbook labs, and plug-and-chug problem solving. Students must be actively investigating: designing experiments, observing, questioning, exploring, making and testing hypotheses, making and comparing predictions, evaluating data, and communicating and defending conclusions. A district's science curriculum cannot align to the Iowa Core Curriculum for Science without including inquiry as a guaranteed and viable, testable component in every science course. The science instruction should be engaging and relevant for the students. Strong connections between the lessons and the students' daily lives must be made. This core curriculum reflects high standards of science achievement for ALL students and not just those who have traditionally succeeded in science classes. The challenge is to create an educational system that connects students to the scientific world. The broad range of understandings and skills possessed by students when they enter 9th grade will require a system that is clearly articulated and masterfully implemented from kindergarten through grade 12. Teachers will need support and time to prepare for this challenge. This is a first bold step toward a vision of scientific literacy for all.

Standards for Science

6-8

Scientific Inquiry Standards 6-8

Grade 6 students:	Grade 7 students:	Grade 8 students;
Identify and generate questions that can be answered through scientific investigations.		
1. Students should develop the ability to refine and refocus broad and ill-defined questions. An important aspect of this ability consists of clarifying questions and inquiries and directing them toward objects and phenomena that can be described, explained, or predicted by scientific investigations.	1. Students should develop the ability to refine and refocus broad and ill-defined questions. An important aspect of this ability consists of clarifying questions and inquiries and directing them toward objects and phenomena that can be described, explained, or predicted by scientific investigations.	1. Students should develop the ability to refine and refocus broad and ill-defined questions. An important aspect of this ability consists of clarifying questions and inquiries and directing them toward objects and phenomena that can be described, explained, or predicted by scientific investigations.
2. Students should develop the ability to connect their questions with scientific ideas, concepts, and quantitative relations that guide investigations.	2. Students should develop the ability to connect their questions with scientific ideas, concepts, and quantitative relations that guide investigations.	2. Students should develop the ability to connect their questions with scientific ideas, concepts, and quantitative relations that guide investigations.
Design and conduct different kinds of scientific investigations.		
3. Students understand that different kinds of questions suggest different kinds of scientific investigations.	3. Students understand that different kinds of questions suggest different kinds of scientific investigations.	3. Students understand that different kinds of questions suggest different kinds of scientific investigations.
4. Students should develop general abilities such as making systematic observations, taking accurate measurements, and identifying and controlling variables.	4. Students should develop general abilities such as making systematic observations, taking accurate measurements, and identifying and controlling variables.	4. Students should develop general abilities such as making systematic observations, taking accurate measurements, and identifying and controlling variables.
5. Students should develop the ability to clarify ideas that are influencing and guiding their inquiry, and to understand how those ideas compare with current scientific knowledge.	5. Students should develop the ability to clarify ideas that are influencing and guiding their inquiry, and to understand how those ideas compare with current scientific knowledge.	5. Students should develop the ability to clarify ideas that are influencing and guiding their inquiry, and to understand how those ideas compare with current scientific knowledge.
6. Students formulate questions, design investigations, execute investigations, interpret data, use evidence to generate explanations, propose alternative explanations, and critique explanations and procedures.	6. Students formulate questions, design investigations, execute investigations, interpret data, use evidence to generate explanations, propose alternative explanations, and critique explanations and procedures.	6. Students formulate questions, design investigations, execute investigations, interpret data, use evidence to generate explanations, propose alternative explanations, and critique explanations and procedures.
7. Students use appropriate safety procedures when conducting investigations	7. Students use appropriate safety procedures when conducting investigations	7. Students use appropriate safety procedures when conducting investigations
Understand that different kinds of questions suggest different kinds of scientific investigations.		
8. Some investigations involve observing and describing objects, organisms and events; some involve collecting specimens; some involve experiments; some involve seeking more information; some involve discovery of new objects and phenomena; and some involve making models.	8. Some investigations involve observing and describing objects, organisms and events; some involve collecting specimens; some involve experiments; some involve seeking more information; some involve discovery of new objects and phenomena; and some involve making models.	8. Some investigations involve observing and describing objects, organisms and events; some involve collecting specimens; some involve experiments; some involve seeking more information; some involve discovery of new objects and phenomena; and some involve making models.

Grade 6 students:	Grade 7 students:	Grade 8 students;
Select and use appropriate tools and techniques to gather, analyze and interpret data.		
9. The use of tools and techniques, including computers, will be guided by the questions asked and the investigations students design. Students should be able to access, gather, store, retrieve, and organize data, using computer hardware and software designed for these purposes.	9. The use of tools and techniques, including computers, will be guided by the questions asked and the investigations students design. Students should be able to access, gather, store, retrieve, and organize data, using computer hardware and software designed for these purposes.	9. The use of tools and techniques, including computers, will be guided by the questions asked and the investigations students design. Students should be able to access, gather, store, retrieve, and organize data, using computer hardware and software designed for these purposes.
Incorporate mathematics in scientific inquiry.		
10. Mathematics is used to gather, organize and present data and to construct convincing explanations.	10. Mathematics is used to gather, organize and present data and to construct convincing explanations.	10. Mathematics is used to gather, organize and present data and to construct convincing explanations.
Use evidence to develop descriptions, explanations, predictions, and models.		
11. Students should base their explanations on observations and they should be able to differentiate between description and explanation.	11. Students should base their explanations on observations and they should be able to differentiate between description and explanation.	11. Students should base their explanations on observations and they should be able to differentiate between description and explanation.
12. Developing explanations establishes connections between the content of science and the contexts in which students develop new knowledge.	12. Developing explanations establishes connections between the content of science and the contexts in which students develop new knowledge.	12. Developing explanations establishes connections between the content of science and the contexts in which students develop new knowledge.
13. Models are often used to think about processes that happen too slowly, too quickly, or on too small a scale to observe directly, or are too vast to be changed deliberately, or are potentially dangerous.	13. Models are often used to think about processes that happen too slowly, too quickly, or on too small a scale to observe directly, or are too vast to be changed deliberately, or are potentially dangerous.	13. Models are often used to think about processes that happen too slowly, too quickly, or on too small a scale to observe directly, or are too vast to be changed deliberately, or are potentially dangerous.
14. Different models can be used to represent the same thing.	14. Different models can be used to represent the same thing.	14. Different models can be used to represent the same thing.
Think critically and logically to make the relationships between evidence and explanations.		
15. Students decide what evidence should be used and develop the ability to account for anomalous data.	15. Students decide what evidence should be used and develop the ability to account for anomalous data.	15. Students decide what evidence should be used and develop the ability to account for anomalous data.
16. Students should be able to review data from an experiment, summarize the date, and form a logical argument between cause and effect relationships.	16. Students should be able to review data from an experiment, summarize the date, and form a logical argument between cause and effect relationships.	16. Students should be able to review data from an experiment, summarize the date, and form a logical argument between cause and effect relationships.
17. Students should begin to state some explanations in terms of relationships between two or more variables.	17. Students should begin to state some explanations in terms of relationships between two or more variables.	17. Students should begin to state some explanations in terms of relationships between two or more variables.
Recognize and analyze alternative explanations and predictions.		
18. Students should develop the ability to listen to and respect the explanations proposed by other students. They should remain open to and acknowledge different ideas and explanations, be able to accept the skepticism of others, and consider alternative explanations.	18. Students should develop the ability to listen to and respect the explanations proposed by other students. They should remain open to and acknowledge different ideas and explanations, be able to accept the skepticism of others, and consider alternative explanations.	18. Students should develop the ability to listen to and respect the explanations proposed by other students. They should remain open to and acknowledge different ideas and explanations, be able to accept the skepticism of others, and consider alternative explanations.

Communicate and defend procedures and explanations.		
19. Students should become competent in communicating experimental methods, describing observations and summarizing the results of investigations. Explanations can be communicated through various methods.	19. Students should become competent in communicating experimental methods, describing observations and summarizing the results of investigations. Explanations can be communicated through various methods.	19. Students should become competent in communicating experimental methods, describing observations and summarizing the results of investigations. Explanations can be communicated through various methods.
Use appropriate safety procedures when conducting investigations.		

Earth and Space Standards 6-8

Earth and space science is the field of study concerned with the planet Earth or one or more of its parts. Earth and space science includes the science used to study the lithosphere (the solid portion of the earth), the atmosphere (the gaseous envelope surrounding the earth), the hydrosphere (the ice, water, and water vapor at or near the earth's surface), the biosphere (the zone at or near the earth's surface that supports life), and space beyond the atmosphere. It is the interactions between these parts, how they impact life on the planet and how we can use observations today to discover what forces created the surface features of the planet centuries ago that form a central portion of this study. Climate, weather, environmental issues, soil science and water quality are all open areas of inquiry in this field.

Earth and space science instruction must include the inquiry knowledge and skills described in the inquiry section of the Iowa Core Curriculum for Science. Instruction should be engaging and relevant and strong connections must be made to students' lives.

Grade 6 students:	Grade 7 students:	Grade 8 students:
Understand and apply knowledge of the structure and processes of the earth system and the processes that change the earth and its surface.		
1. The solid earth consists of layers including a lithosphere; a hot, convecting mantle and a dense metallic core.	1. The solid earth consists of layers including a lithosphere; a hot, convecting mantle and a dense metallic core.	1. The solid earth consists of layers including a lithosphere; a hot, convecting mantle and a dense metallic core.
2. Tectonic plates constantly move at rates of centimeters per year in response to movements in the mantle. Major geological events, such as earthquakes, volcanic eruptions, and mountain building, are results of these plate motions.	2. Tectonic plates constantly move at rates of centimeters per year in response to movements in the mantle. Major geological events, such as earthquakes, volcanic eruptions, and mountain building, are results of these plate motions.	2. Tectonic plates constantly move at rates of centimeters per year in response to movements in the mantle. Major geological events, such as earthquakes, volcanic eruptions, and mountain building, are results of these plate motions.
3. Landforms are the result of a combination of constructive and destructive forces. Constructive forces include crustal deformation, volcanic eruption, and deposition of sediment, while destructive forces include weathering and erosion.	3. Landforms are the result of a combination of constructive and destructive forces. Constructive forces include crustal deformation, volcanic eruption, and deposition of sediment, while destructive forces include weathering and erosion.	3. Landforms are the result of a combination of constructive and destructive forces. Constructive forces include crustal deformation, volcanic eruption, and deposition of sediment, while destructive forces include weathering and erosion.
4. Some changes in the earth can be described as the "rock cycle." Rocks at the earth's surface weather, forming sediments that are buried, then compacted, heated, and often re-crystallized into new rock. Eventually, those new rocks may be brought to the surface by the forces that drive plate motions, and the rock cycle continues.	4. Some changes in the earth can be described as the "rock cycle." Rocks at the earth's surface weather, forming sediments that are buried, then compacted, heated, and often re-crystallized into new rock. Eventually, those new rocks may be brought to the surface by the forces that drive plate motions, and the rock cycle continues.	4. Some changes in the earth can be described as the "rock cycle." Rocks at the earth's surface weather, forming sediments that are buried, then compacted, heated, and often re-crystallized into new rock. Eventually, those new rocks may be brought to the surface by the forces that drive plate motions, and the rock cycle continues.
5. Soil consists of weathered rocks and decomposed organic matter from dead plants, animals, and bacteria. Soils are often found in layers, with each having a different chemical composition and texture.	5. Soil consists of weathered rocks and decomposed organic matter from dead plants, animals, and bacteria. Soils are often found in layers, with each having a different chemical composition and texture.	5. Soil consists of weathered rocks and decomposed organic matter from dead plants, animals, and bacteria. Soils are often found in layers, with each having a different chemical composition and texture.
6. Living organisms have played many roles in the earth system, including affecting the composition of the atmosphere, producing some types of rocks and contributing to the weather of rocks.	6. Living organisms have played many roles in the earth system, including affecting the composition of the atmosphere, producing some types of rocks and contributing to the weather of rocks.	6. Living organisms have played many roles in the earth system, including affecting the composition of the atmosphere, producing some types of rocks and contributing to the weather of rocks.

Understand and apply knowledge of the water cycle, including consideration of events that impact groundwater quality.		
7. Water, which covers the majority of the earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the "water cycle." Water evaporates from the earth's surface, rises and cools as it rises to higher elevations, condenses as rain or snow, and falls to the surface where it collects in lakes, oceans, soil and in soil and rocks underground.	7. Water, which covers the majority of the earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the "water cycle." Water evaporates from the earth's surface, rises and cools as it rises to higher elevations, condenses as rain or snow, and falls to the surface where it collects in lakes, oceans, soil and in soil and rocks underground.	7. Water, which covers the majority of the earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the "water cycle." Water evaporates from the earth's surface, rises and cools as it rises to higher elevations, condenses as rain or snow, and falls to the surface where it collects in lakes, oceans, soil and in soil and rocks underground.
8. Water is a solvent. As it passes through the water cycle, especially as it moves on the earth's surface and underground, it dissolves minerals and gases and carries them to the oceans, rivers, and other surface water.	8. Water is a solvent. As it passes through the water cycle, especially as it moves on the earth's surface and underground, it dissolves minerals and gases and carries them to the oceans, rivers, and other surface water.	8. Water is a solvent. As it passes through the water cycle, especially as it moves on the earth's surface and underground, it dissolves minerals and gases and carries them to the oceans, rivers, and other surface water.
9. Natural and human forces can contribute to contamination of surface water and groundwater.	9. Natural and human forces can contribute to contamination of surface water and groundwater.	9. Natural and human forces can contribute to contamination of surface water and groundwater.
Understand and apply knowledge of earth history based on physical evidence.		
10. The earth processes we see today, including erosion, movement of tectonic plates, and changes in atmospheric composition are similar to those that occurred in the past.	10. The earth processes we see today, including erosion, movement of tectonic plates, and changes in atmospheric composition are similar to those that occurred in the past.	10. The earth processes we see today, including erosion, movement of tectonic plates, and changes in atmospheric composition are similar to those that occurred in the past.
11. Earth history is also influenced by occasional catastrophes such as the impact of an asteroid or a comet.	11. Earth history is also influenced by occasional catastrophes such as the impact of an asteroid or a comet.	10. Earth history is also influenced by occasional catastrophes such as the impact of an asteroid or a comet.
12. Fossils provide important evidence of how life and environmental conditions have changed.	12. Fossils provide important evidence of how life and environmental conditions have changed.	12. Fossils provide important evidence of how life and environmental conditions have changed.
Understand and apply knowledge of the earth's atmospheric properties and how they influence weather and climate.		
13. The atmosphere is a mixture of nitrogen, oxygen, and trace gasses that include water vapor. The atmosphere has different properties at different elevations.	13. The atmosphere is a mixture of nitrogen, oxygen, and trace gasses that include water vapor. The atmosphere has different properties at different elevations.	13. The atmosphere is a mixture of nitrogen, oxygen, and trace gasses that include water vapor. The atmosphere has different properties at different elevations.
14. Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate because water in the oceans holds a large amount of heat.	14. Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate because water in the oceans holds a large amount of heat.	14. Global patterns of atmospheric movement influence local weather. Oceans have a major effect on climate because water in the oceans holds a large amount of heat.
15. Clouds, formed by the condensation of water vapor, affect weather and climate.	15. Clouds, formed by the condensation of water vapor, affect weather and climate.	15. Clouds, formed by the condensation of water vapor, affect weather and climate.
Understand and apply knowledge of the components of our solar system.		
16. The earth is the third planet from the sun in a system that includes the moon, the sun, seven other planets and their moons, and smaller objects,	16. The earth is the third planet from the sun in a system that includes the moon, the sun, seven other planets and their moons, and smaller objects,	16. The earth is the third planet from the sun in a system that includes the moon, the sun, seven other planets and their moons, and smaller objects,

such as asteroids and comets. The sun, an average star, is the central and largest body in the solar system.

17. Gravity is the force that keeps planets in orbit around the sun and governs the rest of the motion in the solar system. Gravity alone holds us to the earth's surface and explains the phenomena of the tides.
18. The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle. Seasons result from variations in the amount of the sun's energy hitting the surface, due to the tilt of the earth's rotation on its axis and the length of the day.
19. Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses.

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19. Most objects in the solar system are in regular and predictable motion. Those motions explain such phenomena as the day, the year, phases of the moon, and eclipses.

Life Science Standards 6-8

Life science is concerned with the study of living organisms and their interactions with each other and their environments. Life science examines the structure, function, growth, origin, evolution, distribution and classification of living things. Specialized disciplines of life sciences are grouped by the type of organism being studied: botany is the study of plants, zoology the study of animals, microbiology the study of microscopic organisms.

Life science instruction must include the inquiry knowledge and skills described in the inquiry section of the Science ore Curriculum Instruction should be engaging and relevant and strong connections must be made to students' lives.

Grade 6 students:	Grade 7 students:	Grade 8 students:
Understand and apply knowledge of the basic components and functions of cells, tissues, organs, and organ systems.		
1. Living systems at all levels of organization demonstrate the complementary nature of structure and function. Important levels of organization for structure and function include cells, organs, tissues, organ systems, whole organisms, and ecosystems.	1. Living systems at all levels of organization demonstrate the complementary nature of structure and function. Important levels of organization for structure and function include cells, organs, tissues, organ systems, whole organisms, and ecosystems.	1. Living systems at all levels of organization demonstrate the complementary nature of structure and function. Important levels of organization for structure and function include cells, organs, tissues, organ systems, whole organisms, and ecosystems.
2. All organisms are composed of cells. Most organisms are single cells; other organisms, including humans are multi-cellular.	2. All organisms are composed of cells. Most organisms are single cells; other organisms, including humans are multi-cellular.	2. All organisms are composed of cells. Most organisms are single cells; other organisms, including humans are multi-cellular.
3. Cells carry on the many functions needed to sustain life. They grow and divide, thereby producing more cells. This requires that they take in nutrients, which they use to provide energy for the work that cells do and to make the materials that a cell or an organism needs.	3. Cells carry on the many functions needed to sustain life. They grow and divide, thereby producing more cells. This requires that they take in nutrients, which they use to provide energy for the work that cells do and to make the materials that a cell or an organism needs.	3. Cells carry on the many functions needed to sustain life. They grow and divide, thereby producing more cells. This requires that they take in nutrients, which they use to provide energy for the work that cells do and to make the materials that a cell or an organism needs.
4. Specialized cells perform specialized functions in multi-cellular organisms. Groups of specialized cells cooperate to form a tissue, such as muscle. Different tissues are, in turn, grouped together to form larger functional units, called organs. Each type of cell, tissue, and organ has a distinct structure and set of functions that serve the organism as a whole.	4. Specialized cells perform specialized functions in multi-cellular organisms. Groups of specialized cells cooperate to form a tissue, such as muscle. Different tissues are, in turn, grouped together to form larger functional units, called organs. Each type of cell, tissue, and organ has a distinct structure and set of functions that serve the organism as a whole.	4. Specialized cells perform specialized functions in multi-cellular organisms. Groups of specialized cells cooperate to form a tissue, such as muscle. Different tissues are, in turn, grouped together to form larger functional units, called organs. Each type of cell, tissue, and organ has a distinct structure and set of functions that serve the organism as a whole.

Understand and apply knowledge of how different organisms pass on traits (heredity).

5. Every organism requires a set of instructions for specifying its traits. Heredity is the passage of these instructions from one generation to another.
6. Heredity information is contained in genes, located in the chromosomes of each cell. Each gene carries a single unit of information. An inherited trait of an individual can be determined by one or by many genes, and a single gene can influence more than one trait. A human cell contains many thousands of different genes.
7. The characteristics of an organism can be described in terms of a combination of traits. Some traits are inherited and others result from interactions with the environment.

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6. Heredity information is contained in genes, located in the chromosomes of each cell. Each gene carries a single unit of information. An inherited trait of an individual can be determined by one or by many genes, and a single gene can influence more than one trait. A human cell contains many thousands of different genes.
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6. Heredity information is contained in genes, located in the chromosomes of each cell. Each gene carries a single unit of information. An inherited trait of an individual can be determined by one or by many genes, and a single gene can influence more than one trait. A human cell contains many thousands of different genes.
7. The characteristics of an organism can be described in terms of a combination of traits. Some traits are inherited and others result from interactions with the environment.

Understand and apply knowledge of the complementary nature of structure and function and the commonalities among organisms.

8. Living systems at all levels of organization demonstrate the complementary nature of structure and function. Important levels of organization for structure and function include cells, organs, tissues, organ systems, whole organisms, and ecosystems.

8. Living systems at all levels of organization demonstrate the complementary nature of structure and function. Important levels of organization for structure and function include cells, organs, tissues, organ systems, whole organisms, and ecosystems.

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Understand and apply knowledge of interdependency of organisms, changes in environmental conditions, and survival of individuals and species. Understand and apply knowledge of the cycling of matter and energy in ecosystems.

9. All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.
10. Regulation of an organism's internal environment involves sensing the internal environment and changing the physiological activities to keep conditions within the range required to survive.
11. Behavior is one kind of response an organism can make to an internal or environmental stimulus. A behavioral response requires coordination and communication on many levels, including cells, organ systems, and whole organisms. Behavioral response is a set of actions determined in part by heredity and in part from experience.
12. Species acquire many of their unique characteristics through biological adaptation that involves the selection of naturally occurring

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12. Species acquire many of their unique characteristics through biological adaptation that involves the selection of naturally occurring

variations in populations.	variations in populations.	variations in populations.
13. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.	13. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.	13. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.
14. For ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis. That energy then passes from organism to organism in food webs.	14. For ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis. That energy then passes from organism to organism in food webs.	14. For ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis. That energy then passes from organism to organism in food webs.
Understand and demonstrate knowledge of the social and personal implications of environmental issues.		
15. Chapter 12 of the Iowa Administrative Code states that science instruction shall include conservation of natural resources; and environmental awareness.	15. Chapter 12 of the Iowa Administrative Code states that science instruction shall include conservation of natural resources; and environmental awareness.	15. Chapter 12 of the Iowa Administrative Code states that science instruction shall include conservation of natural resources; and environmental awareness.
16. The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition. Given adequate biotic and abiotic resources and no disease or predators, populations (including humans) increase in rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.	16. The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition. Given adequate biotic and abiotic resources and no disease or predators, populations (including humans) increase in rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.	16. The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition. Given adequate biotic and abiotic resources and no disease or predators, populations (including humans) increase in rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.
Understand and apply knowledge of the functions and interconnections of the major human body systems including the breakdown in structure or function that disease causes.		
17. The human organism has systems for digestion, respiration, reproduction, circulation, excretion, movement, control, and coordination, and for protection from disease. These systems interact with one another.	17. The human organism has systems for digestion, respiration, reproduction, circulation, excretion, movement, control, and coordination, and for protection from disease. These systems interact with one another.	17. The human organism has systems for digestion, respiration, reproduction, circulation, excretion, movement, control, and coordination, and for protection from disease. These systems interact with one another.
18. Disease is a breakdown in structures or functions of an organism. Some diseased are the result of intrinsic failures of the system. Others are the result of damage by infection by other organisms.	18. Disease is a breakdown in structures or functions of an organism. Some diseased are the result of intrinsic failures of the system. Others are the result of damage by infection by other organisms.	18. Disease is a breakdown in structures or functions of an organism. Some diseased are the result of intrinsic failures of the system. Others are the result of damage by infection by other organisms.

Physical Science Standards 6-8

Physical science is the term for the study of non-living systems, and includes physics and chemistry. The foundations of physical science rest upon key concepts and theories, each of which explain and/or model a particular aspect of the behavior of nature.

Physics includes describing and measuring motion: the theory of gravity; energy, work, and power; energy forms; kinetic molecular theory; the principals of waves and sound; the principles of electricity, magnetism, and electromagnetism; and the principles, sources, and properties of light.

Chemistry is the science of matter. Its studies include atomic theory; water and its properties; chemical elements, chemical reactions, and energy transformations; nuclear chemistry; and organic chemistry. In all areas of physical science the focus is on the application of the knowledge to solve real life problems. It is the use of the conceptual knowledge and not simply the knowledge itself that should form the core of this discipline. Physical science instruction must include the inquiry knowledge and skills described in the inquiry section of the Science Core Curriculum. Instruction should be engaging and relevant and strong connections must be made to students' lives.

Grade 6 students:	Grade 7 students:	Grade 8 students:
Understand and apply knowledge of elements, compounds, mixtures, and solutions based on the nature of their physical and chemical properties and physical and chemical changes and their relationship to the conservation of matter and energy.		
1. A substance has characteristic properties, such as density, a boiling point, and solubility, all of which are independent of the amount of the sample. A mixture of substances often can be separated into the original substances using one or more of the characteristic properties.	1. A substance has characteristic properties, such as density, a boiling point, and solubility, all of which are independent of the amount of the sample. A mixture of substances often can be separated into the original substances using one or more of the characteristic properties.	1. A substance has characteristic properties, such as density, a boiling point, and solubility, all of which are independent of the amount of the sample. A mixture of substances often can be separated into the original substances using one or more of the characteristic properties.
2. Substances react chemically in characteristic ways with other substances to form new substances (compounds) with different characteristic properties. In chemical reactions, the total mass is conserved. Substances often are placed in categories or groups if compounds, which account for the living and nonliving substances that we encounter.	2. Substances react chemically in characteristic ways with other substances to form new substances (compounds) with different characteristic properties. In chemical reactions, the total mass is conserved. Substances often are placed in categories or groups if compounds, which account for the living and nonliving substances that we encounter.	2. Substances react chemically in characteristic ways with other substances to form new substances (compounds) with different characteristic properties. In chemical reactions, the total mass is conserved. Substances often are placed in categories or groups if compounds, which account for the living and nonliving substances that we encounter.
3. Chemical elements do not break down during normal laboratory reactions involving such treatments as heating, exposure to electric current, or reaction with acids. There are more than 100 known elements that combine in a multitude of ways to produce compounds, which account for the living and nonliving substances that we encounter.	3. Chemical elements do not break down during normal laboratory reactions involving such treatments as heating, exposure to electric current, or reaction with acids. There are more than 100 known elements that combine in a multitude of ways to produce compounds, which account for the living and nonliving substances that we encounter.	3. Chemical elements do not break down during normal laboratory reactions involving such treatments as heating, exposure to electric current, or reaction with acids. There are more than 100 known elements that combine in a multitude of ways to produce compounds, which account for the living and nonliving substances that we encounter.

Understand and apply knowledge of forms of energy and energy transfer.		
4. Energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, nuclei, and the nature of a chemical. Energy is transferred in many ways.	4. Energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, nuclei, and the nature of a chemical. Energy is transferred in many ways.	4. Energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, nuclei, and the nature of a chemical. Energy is transferred in many ways.
5. Heat moves in predictable ways, flowing from warmer objects to cooler ones, until both reach the same temperature.	5. Heat moves in predictable ways, flowing from warmer objects to cooler ones, until both reach the same temperature.	5. Heat moves in predictable ways, flowing from warmer objects to cooler ones, until both reach the same temperature.
6. Light interacts with matter by transmission (including refraction), absorption, or scattering (including refection). To see an object, light from that object-emitted by or scattered fro it-must enter the eye.	6. Light interacts with matter by transmission (including refraction), absorption, or scattering (including refection). To see an object, light from that object-emitted by or scattered fro it-must enter the eye.	6. Light interacts with matter by transmission (including refraction), absorption, or scattering (including refection). To see an object, light from that object-emitted by or scattered fro it-must enter the eye.
7. Electrical circuits provide a means of transferring electrical energy when heat, light, sound, and chemical changes are produced.	7. Electrical circuits provide a means of transferring electrical energy when heat, light, sound, and chemical changes are produced.	7. Electrical circuits provide a means of transferring electrical energy when heat, light, sound, and chemical changes are produced.
8. In most chemical and nuclear reactions, energy is transferred into or out of a system. Heat, light, mechanical motion, or electricity might all be involved in such transfers.	8. In most chemical and nuclear reactions, energy is transferred into or out of a system. Heat, light, mechanical motion, or electricity might all be involved in such transfers.	8. In most chemical and nuclear reactions, energy is transferred into or out of a system. Heat, light, mechanical motion, or electricity might all be involved in such transfers.
9. The sun is a major source of energy for changes on the earth's surface. The sun loses energy by emitting light. A tiny fraction of that light reaches the earth, transferring energy from the sun to the earth. The sun's energy arrives as light with a range of wavelengths, consisting of visible light, infrared, and ultraviolet radiation.	9. The sun is a major source of energy for changes on the earth's surface. The sun loses energy by emitting light. A tiny fraction of that light reaches the earth, transferring energy from the sun to the earth. The sun's energy arrives as light with a range of wavelengths, consisting of visible light, infrared, and ultraviolet radiation.	9. The sun is a major source of energy for changes on the earth's surface. The sun loses energy by emitting light. A tiny fraction of that light reaches the earth, transferring energy from the sun to the earth. The sun's energy arrives as light with a range of wavelengths, consisting of visible light, infrared, and ultraviolet radiation.
Understand and apply knowledge of motions and forces.		
10. The motion of an object can be described by its position, direction of motion, and speed. That motion can be measured and represented on a graph.	10. The motion of an object can be described by its position, direction of motion, and speed. That motion can be measured and represented on a graph.	10. The motion of an object can be described by its position, direction of motion, and speed. That motion can be measured and represented on a graph.
11. An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.	11. An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.	11. An object that is not being subjected to a force will continue to move at a constant speed and in a straight line.
12. If more than one force acts on an object along a straight line, then the forces will reinforce or cancel one another, depending on their direction and magnitude. Unbalanced forces will cause changes in speed or direction of an object's motion.	12. If more than one force acts on an object along a straight line, then the forces will reinforce or cancel one another, depending on their direction and magnitude. Unbalanced forces will cause changes in speed or direction of an object's motion.	12. If more than one force acts on an object along a straight line, then the forces will reinforce or cancel one another, depending on their direction and magnitude. Unbalanced forces will cause changes in speed or direction of an object's motion.

College and Career Readiness Anchor Standards for Reading

Key Ideas and Details

1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
3. Analyze how and why individuals, events, or ideas develop and interact over the course of a text.

Craft and Structure

4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
5. Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.
6. Assess how point of view or purpose shapes the content and style of a text.

Integration of Knowledge and Ideas

7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.*
8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.
9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

Range of Reading and Level of Text Complexity

10. Read and comprehend complex literary and informational texts independently and proficiently.

Note on range and content of student reading

Content area literacy is critical to students' post secondary success in higher education and the workplace. To prepare students for these challenges, literacy skills must to be developed across all content areas. Students expand their range when applying literacy skills to a variety of content areas because the academic discourses and disciplinary concepts in those require different approaches to reading, writing, speaking, viewing, and listening. It is through applying literacy skills in a number of content areas that students learn to integrate these skills and strategies into life experience. Teachers in all content areas who make literacy a priority understand that

* Please see "Research to Build Knowledge" in Writing and "Comprehension and Collaboration" in Speaking and Listening for additional standards relevant to gathering, assessing, and applying information from print and digital sources.

Reading Standards for Literacy in Science and Technical Subjects 6-12

Grade 6-8 students:	Grade 9-10 students:	Grade 11-12 students:
Key Ideas and Details		
1. Cite specific textual evidence to support analysis of science and technical texts.	1. Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.	1. Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
2. Determine the central ideas or conclusions of a distinct from prior knowledge or opinions.	2. Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.	2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.	3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
Craft and Structure		
4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6–8 texts and topics.*	4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics.*	4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics.*
5. Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.	5. Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*).	5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.	6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
Integration of Knowledge and Ideas		
7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).	7. Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
8. Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.	8. Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or	8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or

	technical problem.	challenging conclusions with other sources of information.
9. Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.	9. Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
Range of Reading and Level of Text Complexity		
10. By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.	10. By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.	10. By the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently.

College and Career Readiness Anchor Standards for Writing

Text Types and Purposes

1. Write arguments to support claims in an analysis of substantive topics or texts using valid reasoning and relevant and sufficient evidence.
2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details and well-structured event sequences.

Production and Distribution of Writing

4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

Research to build and Present Knowledge

7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.
8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

Range of Writing

10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

Note on range and content of student writing

For students, writing is a key means of asserting and defending claims, showing what they know about a subject, and conveying what they have experienced, imagined, thought, and felt. To be college and career ready writers, students must take task, purpose, and audience into careful consideration, choosing words, information, structures, and formats deliberately. They need to be able to use technology strategically when creating, refining, and collaborating on writing. They have to become adept at gathering information, evaluating sources, and citing material accurately, reporting findings from their research and analysis of sources in a clear and cogent manner. They must have the flexibility, concentration, and fluency to produce high-quality first draft text under a tight deadline and the capacity to revisit and make improvements to a piece of writing over multiple drafts when circumstances encourage or require it. To meet these goals, students must devote significant time and effort to writing, producing numerous pieces over short and long time frames throughout the year.

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12

Grade 6-8 students:	Grade 9-10 students:	Grade 11-12 students:
Text Types and Purposes		
1. Write arguments focused on *discipline-specific content.* a. Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b. Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources. c. Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d. Establish and maintain a formal style. e. Provide a concluding statement or section that follows from and supports the argument presented.	1. Write arguments focused on *discipline-specific content.* a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.	1. Write arguments focused on *discipline-specific content.* a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases. c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.

Grade 6-8 students:	Grade 9-10 students:	Grade 11-12 students:
2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples. c. Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to inform about or explain the topic. e. Establish and maintain a formal style and objective tone. f. Provide a concluding statement or section that follows from and supports the information or explanation presented.	2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).	2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers. e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).
3. (See note; not applicable as a separate requirement)	3. (See note; not applicable as a separate requirement)	3. (See note; not applicable as a separate requirement)

Note: Students' narrative skills continue to grow in these grades. The Standards require that students be able to incorporate narrative elements effectively into arguments and informative/explanatory texts. In history/social studies, students must be able to incorporate narrative accounts into their analyses of individuals or events of historical import. In science and technical subjects, students must be able to write precise enough descriptions of the step-by-step procedures they use in their investigations or technical work that others can replicate them and (possibly) reach the same results.

Grade 6-8 students:	Grade 9-10 students:	Grade 11-12 students:
Production and Distribution of Writing		
4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
5. With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.	5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
6. Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.	6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.
Research to Build and Present Knowledge		
7. Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.	7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
8. Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.	8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.	8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
9. Draw evidence from informational texts to support analysis, reflection, and research.	9. Draw evidence from informational texts to support analysis, reflection, and research.	9. Draw evidence from informational texts to support analysis, reflection, and research.
Range of Writing		
10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.