Nevada Science Standards

Introduction

Science is the component of the school curriculum in which student inquiry and discovery can develop and flourish. Science seeks to make sense of the natural world by describing its complexity, explaining its systems and events, and finding patterns that allow for predictions. It is the basis for the design of technologies that solve real-world problems and occupies an increasingly important place in our everyday lives. As citizens, we are asked to make decisions about social issues that involve science and technology. As workers, we have occupations that increasingly involve science and technology. In the twenty-first century, adults will need to be comfortable and competent in a complex scientific and technological world. Schools have the responsibility of preparing students for the future. Schools must prepare all students to be scientifically literate.

The study of science involves exploration using a variety of technologies. Current technology tools for communication, research, problem solving, and decision making provide students with opportunities to apply scientific concepts in project-based activities. Use of video, the Internet, and other print and non-print sources enhances students' learning experiences and helps make those experiences meaningful.

The *Nevada Science Standards* represent a common core for curriculum throughout Nevada's schools. Many people may recognize, however, that as in many human endeavors the process is at least as important as the product. These content standards are the result of an invaluable process of dialogue and consensus-building among educators, scientists, industry representatives, and parents from throughout Nevada about what all students should know and be able to do in science. The content standards are essential to accomplishing the goals for science education listed below.

Goals of Science Education in Nevada

All graduates of Nevada schools should:

- Demonstrate the processes of science by posing questions and investigating phenomena through language, methods, and instruments of science;
- Acquire scientific knowledge by applying concepts, theories, principles, and laws from life, physical, and Earth/space science;
- Demonstrate ways of thinking and acting inherent in the practice of science and exhibit an awareness of the historical and cultural contribution to the enterprise of science; and
- Demonstrate an ability to solve problems and make personal decisions about issues affecting the individual, society, and the environment.

Content Organization

All of the sciences connect with each other. However, it has been necessary, for ease of use, to divide this document into an ordered hierarchy. This organizational scheme should in no way be interpreted as a mandate for structuring academic courses or curriculum.

The complete domain of what students should know and be able to do is organized in this document as six strands: physical science; life science; earth and space sciences; environmental sciences; the nature and history of science; and scientific inquiry: processes and skills. Each of the six strands is further divided into content standards which constitute the "big ideas" of science. For example, Physical Science is divided into five content standards, beginning with Forces and Motion. Specific grade-level benchmarks further define student expectations relative to this content standard. These benchmarks are specific enough to provide a common content core for local curriculum but broad enough to allow school districts many diverse curricular paths to meet the standards. The order in which concepts are listed from top to bottom on any given page is not meant to imply an order in which concepts should be taught. Curriculum designers and teachers are encouraged to build units of study that address standards from multiple strands, to emphasize interdisciplinary study.

Knowledge and processes are both important in the area of science. It is even more important that students be able to combine their scientific knowledge and the processes of science to develop their own understanding of science. For example, students should be encouraged to engage in such activities as asking questions, planning and conducting their own investigations, and using tools and technology to gather data. Therefore, the *Nevada Science Standards* frequently use verb combinations to describe what a student is expected to know and be able to do. For example, at the third grade, students are expected to "investigate and describe the ways that different objects may balance or topple in various situations."

The *Nevada Science Standards* are intended to provide Nevada students with a rich, thorough, and varied science education to prepare them for the challenges, discoveries, and demands of life in the twenty-first century.

Physical Science

Content Standard 1.0: Forces and Motion—*Students understand that forces such as gravitational, electrical, and magnetic influence the motion of objects.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
1.K.1 Investigate and describe how objects move.		1.2.1 Observe and describe objects moving at different speeds.	1.3.1 Apply unbalanced **forces** (a push or pull) to cause objects to change their motion (e.g., speed, direction or both).		Description of Motion
			1.3.2 Investigate and describe the ways that different objects may balance or topple in various situations.	1.4.2 Investigate and describe balance points of different objects.	Gravity
		1.2.3 Assemble, take apart, and reassemble constructions using interlocking blocks, erector sets, and the like.	1.3.3 Manipulate hammers and nails, screwdrivers and screws, scissors, and other simple tools.		Machines

Force – Any push or a pull

Content Standard 1.0: Forces and Motion

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
K.4. 1 Observe and describe how objects behave when placed in water.				1.4.4 Investigate and describe how objects can sink or float in water.	Pressure, Density, and Buoyancy
	1.1.5 Observe and describe how magnets can be used to make objects move without being touched.				Electrical and Magnetic Forces

Physical Science

Content Standard 2.0: Structure and Properties of Matter—*Students understand that materials have distinct properties which depend on the amount of matter present, its chemical composition, and structure.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		2.2.1 Describe objects in terms of their observable **properties** (e.g., state of matter, size, shape, color, texture).	2.3.1 Describe objects in terms of their observable properties (e.g., state of matter, size, shape, color, texture).	2.4.1 Investigate and describe properties of materials when they are combined (mixtures).	Physical Properties
			2.3.2 Sort and classify objects according to observable properties (e.g., size, weight, shape, color).		Chemical Analysis
		2.2.3 Put small objects together to form bigger objects.			Chemical Bonding
					Atomic Theory

Properties – Characteristics unique to a set of particular living or non-living things. (see 6.2).

Content Standard 2.0: Structure and Properties of Matter

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
				2.4.5 Observe and describe that different objects and materials may be composed of parts that are too small to be seen without magnification.	System of Particles
					Properties and Composition

Physical Science

Content Standard 3.0: Energy and Matter: Interactions and Forms—*Students understand that changes in temperature and pressure can alter states of matter. Energy exists in many forms, and one form can change into another.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		3.2.1 Describe an object as hot or cold.	3.3.1 Describe how hot or cold an object is by expressing its temperature.		Heat and Temperature
	3.1.2 Observe and describe materials in different states (i.e. solids and liquids).	3.2.2 Investigate and describe how objects can change state (e.g., melting ice cube).	3.3.2 Investigate and describe how solid ice can melt and liquid water will disappear if allowed to stand in an open container.		Changes of State
		3.2.3 Investigate and describe how sound can be produced by vibrating objects and how it has different properties (e.g., high-low, soft-loud).			Waves

Content Standard 3.0: Energy and Matter: Interactions and Forms

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
				3.4.4 Investigate and describe how **circuits** can produce light, heat, sound, and magnetic effects.	Circuits
					Changes in Energy

					Descriptions of Energy and Order

Circuit – (electrical circuit) – an assembly of electrical parts.

Physical Science

Content Standard 4.0: Chemical Reaction—*Students understand that chemical reactions change substances into different substances.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Conservation of Matter
					Rates of Chemical Reactions
					Transformation of Matter and Energy
					Chemical Properties

Physical Science

Content Standard 5.0: Nuclear and Electromagnetic Energy—*Students understand that nuclear energy and electromagnetic energy are produced from both natural and human-made sources in many forms.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Behaviors of Light
					Nuclear Applications
					Nuclear Wastes
					Electromagnetic Energy
					Nuclear Structures and Processes
					Nuclear Energy

Life Science

Content Standard 6.0: Structure and Function—*Students understand that all life forms, at all levels of organization, use specialized structures and similar processes to meet life's needs.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:

		in earlier grades and:			
6.K.1 Observe and describe animal attributes.	6.1.1 Observe and describe plant attributes.	6.2.1 Investigate and describe how living things grow and change.	6.3.1 Investigate and describe how plants and animals have life cycles and require food, water, air, and space.		Life Cycles and Disruptions
6.K.2 Compare and contrast how humans and animals use their senses.	6.1.2 Use the five senses to investigate the natural world.	6.2.2 Distinguish living from non-living things using established criteria.	6.3.2 Investigate, compare, and contrast identifiable characteristics of plants and animals.	6.4.2 Investigate, compare, and contrast identifiable structures of plants and animals.	Structures, Functions, and Systems
			6.3.3 Investigate and describe how plants and animals require certain conditions to survive.		Environment, Energy, and Cellular Functions
					Control of Cellular Functions

Life Science

Content Standard 7.0: Internal and External Influences on Organisms—*Students understand that organisms respond to internal and external influences.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
			7.3.1 Investigate and describe how various living things behave differently under diverse conditions.	7.4.1 Investigate and describe the behavior of individual organisms when influenced by internal cues (e.g. hunger) and by external cues (e.g. environment).	Influences on Behavioral Patterns
					Origins of Behavioral Patterns

					Stimulus and Behavior
		7.2.4 Explain that some diseases are caused by **germs** and some are not; diseases caused by germs may be spread by people who have them.	7.3.4 Explain that if germs are able to get inside one's body, they may keep it from working properly.		Disease

Germs – A microscopic disease-causing organism.

Life Science

Content Standard 8.0: Heredity and Diversity—*Students understand that life forms are diverse, and that they pass some characteristics to their offspring.*

By the end of **Kindergarten,** students know and are able to:By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:					
8.K.1 Observe and describe how animals have offspring that are the same kind of animal.	8.1.1 Investigate and describe how particular plants have seeds that produce the same kind of plant.	8.2.1 Investigate and describe how particular animals have offspring that are the same kind of animal.	8.3.1 Investigate and describe how offspring may resemble parents and siblings may resemble each other.		Inherited Traits
8.K.2 Sort animals by observable characteristics.	8.1.2 Sort plants by observable characteristics.	8.2.2 Investigate and describe how some living things look alike and others do not.	8.3.2 Investigate and describe how some living things are alike in their appearance and behaviors; others are not.		Variation and Classification of Organisms
				8.4.3 Observe and describe variations among individuals within the human population.	Variation

Content Standard 8.0: Heredity and Diversity

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Diversity of Species
					Mutations

Life Science

Content Standard 9.0: Evolution – The Process of Biological Change—*Students understand that life forms change over time.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
			9.3.1 Explain that many different kinds of living things exist on Earth.		Common Ancestry
			9.3.2 Explain how particular features of plants and animals help them live in different kinds of places.		Natural Selection
					Adaptation
					Evidence for the Theory of Evolution

Content Standard 9.0: Evolution

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Influences on Evolution
					Life Origins

Earth and Space Sciences

Content Standard 10.0: Earth Structures and Composition—*Students understand that the Earth is composed of interrelated systems of rocks, water, air, and life.*

By the end of **Kindergarten,** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		10.2.1 Describe that rocks come in many sizes and shapes and have interesting textures, colors, and patterns.	10.3.1 Investigate and describe how the Earth is composed of different kinds of materials (e.g., rocks and soils, water, and the atmosphere).	10.4.1 Investigate, compare, and contrast the properties of rocks and minerals.	Rocks and Minerals
			10.3.2 Describe how the Earth is composed of different **landforms**.	10.4.2 Compare and contrast the location of landforms.	Landforms
			10.3.3 Investigate and describe how the Earth is nearly spherical and covered with more water than land.		Earth's Structure and Composition

Landform – A large feature on the surface of the Earth, including mountains, volcanoes, canyons, etc.

Content Standard 10.0: Earth Structures and Composition

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	

				10.4.4 Investigate and describe the composition of different soils.	Soil
					Earth's Atmosphere
					Geologic Processes and Features

Earth and Space Sciences

Content Standard 11.0: Earth Models—*Students understand that the Earth may be represented by a variety of maps and models.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
			11.3.1 Describe that directions on the Earth can be represented by north, south, east, and west.		Locating Positions on the Earth
			11.3.2 Locate the state of Nevada on a national map and their own city on a Nevada state map.		Nevada and the Earth
					Models of the Earth
					Time and Location on the Earth

Earth and Space Sciences

Content Standard 12.0: Earth History—*Students understand that Earth systems (such as weather and mountain formation) change or vary.*

By the end of **Kindergarten** students	By the end of **Grade 1**, students know and are	By the end of **Grade 2**, students know and are	By the end of **Grade 3**, students know and	By the end of **Grade 4**, students know and are able to do everything

know and are able to:	able to do everything required in the earlier grade and:	able to do everything required in earlier grades and:	are able to do everything required in earlier grades and:	required in earlier grades and:	
		12.2.1 Investigate and describe how changes happen to many things (e.g., weather).	12.3.1 Investigate and describe how some changes are so slow (e.g., seasons) or so fast (e.g., lightening strikes) that they are hard to see.		Change Over Time
					Relative Geologic Time and the Fossil Record
					Geologic Time
					Age of the Earth and Solar System

Earth and Space Sciences

Content Standard 13.0: Cycles of Matter and Energy—*Students understand that Earth systems have a variety of cycles through which energy and matter continually flow.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		13.2.1 Investigate and describe how the sun warms the land, air, and water.	13.3.1 Investigate and describe how things that give off light also often give off heat.		Earth Energy Sources
13.K.2 Observe and record weather from day to day.	13.1.2 Observe and record seasonal changes.	13.2.2 Investigate and describe how weather changes from day to day and throughout the year.	13.3.2 Observe, record, and describe seasonal differences using words, numbers, and drawings.	13.4.2 Identify and describe various meteorological phenomena (e.g. floods, drought)	Weather
			13.3.3	13.4.3	Water

			Investigate and describe how water can be a liquid or a solid and can go back and forth from one form to the other.	Investigate and describe the forms and uses of water.	

Content Standard 13.0: Cycles of Matter and Energy

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Climate
					The Nature of Change
					Bio-Geochemical Cycles
				13.4.7 Identify the components of our solar system (i.e. planets, moon, asteroids, comets, sun)	Energy Transfer and Transformation in the Earth System
					Earth's Internal Energy

Earth and Space Sciences

Content Standard 14.0: The Solar System and the Universe—*Students understand that the Earth is part of a planetary system within the Milky Way Galaxy, which is part of the known universe*.

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		14.2.1 Observe and describe the sun, moon, planets, and stars.	14.3.1 Identify the sun, moon, and the Earth as components of our solar system.	14.4.1 Observe and describe properties, locations, and movements of the sun, moon, stars, clouds, birds, and planes.	The Solar System
		14.2.2 Describe the movement of some of the objects in the sky.		14.4.2 Observe and describe the changes of the moon's appearance over time.	Celestial Motion
			14.3.3 Explain that there are more stars in the sky than anyone can easily count.	14.4.3 Investigate and describe how distance affects the brightness of any light source.	Stars and Galaxies

Content Standard 14.0: The Solar System and the Universe

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Origin of the Universe
					Tools and Methods of Astronomy
					Universality of Physical Laws

Environmental Sciences

Content Standard 15.0: Ecosystems—*Students will demonstrate an understanding that ecosystems display patterns of organization, change, and stability as a result of the interactions and interdependencies among the life forms and the physical components of the Earth.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
15.K.1 Recognize that animals live in different places.	15.1.1 Recognize that plants grow in different places.	15.2.1 Investigate and describe the roles of plants as producers and animals as consumers and how living things may depend on each other.	15.3.1 Investigate and describe how animals and plants that live in different places have similarities and differences.		Stability and Change in Ecosystems
		15.2.2 Investigate and describe how animals eat plants or other animals for food and may also use plants or even other animals (for shelter and nesting).	15.3.2 Investigate and describe the interactions of organisms within an **ecosystem**.	15.4.2 Investigate and describe the variables that affect the survival of organisms within an ecosystem.	Relationships and Interactions in Ecosystems
					Cycles of Matter and Energy in Ecosystems
					Characteristics of Ecosystems

Ecosystem – A system of relationships between organisms in an environment, and between organisms and the environment.

Environmental Sciences

Content Standard 16.0: Natural Resources—*Students demonstrate and understand that natural resources include renewable and non-renewable materials and energy. All organisms, including human, use resources to maintain and improve their existence, and the use of resources can have positive and negative consequences.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		16.2.1 Investigate and describe how some resources can be used and reused.	16.3. Explain that natural resources are used for many purposes.	16.4.1 Identify the natural resources of Nevada.	Renewable and Nonrenewable Resources
		16.2.2	16.3.2	16.4.2	Acquisition and Use of Natural

		Describe the various resources that provide the necessary things that are used by people in their daily lives.	Describe how humans have obtained natural resources for thousands of years through farming, mining, and hunting and gathering.	Investigate and describe resources which can be used and reused or renewed.	Resources
					Traditional and Innovative Uses of Natural Resources

Content Standard 16.0: Natural Resources

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Environmental Consequences of Natural Resource Use
					Technology and Human Population

Environmental Sciences

Content Standard 17.0: Conservation—*Students understand that humans have the unique ability to change personal and societal behavior based on ethical considerations regarding other organisms, the planet as a whole and future generations.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		17.2.1 Describe how people live in different places in different ways.	17.3.1 Explain that many materials can be recycled and used again, sometimes in different forms.		Conservation
		17.2.2 Describe how some things in students' daily lives	17.3.2	17.4.2 Observe, investigate, and describe how some	Systems and Equilibrium

		change and other things stay the same.	Investigate and describe how patterns of change may be observable and predictable.	environmental changes occur quickly and some occur slowly.	
					The Scientific Nature of Environmental Issues
					Responsible Behavior

The Nature and History of Science

Content Standard 18.0: Scientific, Historical, and Technological Perspectives—*Students understand that humans have the unique ability to change personal and societal behavior based on ethical considerations regarding other organisms, the planet as a whole and future generations.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		18.2.1 Explain that everybody can invent things and ideas.	18.3.1 Explain that science is a process that involves observing and asking questions about the natural world and seeking answers to those questions.		The Nature of Science
			18.3.2 Explain that accurate descriptions in science are important because they enable people to compare their observations with those of others.	18.4.2 Identify the components of scientific investigation (e.g. observing, collecting data, classifying)	Attributes of Scientific Research
			18.3.3 Recognize that science engages men and women of all ages and backgrounds.		The History of Science and Invention

Content Standard 18.0: Scientific, Historical, and Technological Perspectives

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
			18.3.4 Give examples of the benefits of working with a team and sharing findings.	18.4.4 Exchange scientific observations and ideas.	Science as a Collaborative Process
			18.3.5 Explain that tools are used to do things better or more easily (e.g. observe, measure, and make things) and to do some things that could not be done at all (e.g. see things that are too small to be seen unaided.	18.4.5 Explain that measuring instruments can be used to gather information for making scientific comparisons of objects and events for designing and constructing things that will work properly.	Technology
					The Dynamic Character of Scientific Knowledge
					Scientific Ethics

The Nature and History of Science

Content Standard 19.0: Reasoning and Critical Response Skills—*Students understand that many decisions require critical consideration of scientific evidence*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Evaluating

					Data
					Analyzing and Evaluating Benefits and Risks
					Analyzing Systems
					Critical Analysis
					Critical Evaluation

The Nature and History of Science

Content Standard 20.0: Systems, Models, Risk, and Predictions--*Students understand that a variety of models can be used to describe or predict things and events.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
	20.1.1 Use toy models (e.g. miniature cars, toy animals) to explain the things they represent.		20.3.1 Compare a **model** with what it represents (e.g., a model of the Earth to the Earth itself).		Models
			20.3.2 Identify observable patterns and predict future events based on those patterns (e.g. seasonal weather patterns.)		Models and Predictions
		20.2.3 Explain that something may not work if some of its parts are missing.	20.3.3 Demonstrate that when parts are put together, they can do things together they couldn't have done by themselves.		Systems
					Statistical Modeling

					Risk Analysis

Model – A physical, graphical, or mathematical representation of a thing or event.

Scientific Inquiry: Processes and Skills

Content Standard 21.0: Scientific Values and Attitudes—*Students understand that science is an active process of systematically examining the natural world.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
21.K.1 Ask questions about the world.	21.1.1 Make observations and give descriptions.	21.2.1 Make observations and give descriptions using words, numbers, and drawings.	21.3.1 Observe and raise questions about the world, then seek answers through investigation.	21.4.1 Conduct fair tests to make observations.	Scientific Investigations
		21.2.2 Record observations of investigations over time in a notebook or journal. (e.g., growth of a plant, changes in weather)	21.3.2 Record observations of investigations over time in a notebook or journal. (e.g., changes in an aquarium or terrarium)		Repeating Scientific Trials
					Generating Multiple Explanations

Scientific Inquiry: Processes and Skills

Content Standard 22.0: Communication Skills—*Students understand that a variety of communication methods can be used to share scientific information.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
		22.2.1 Follow verbal instructions accurately.	22.3. Follow verbal and written instructions to complete a procedure.		Writing and Following Instructions
	22.1.2	22.2.2	22.3		

	Draw pictures that describe observations.	Produce simple pictographs to describe observations.	Create illustrations, graphs, and charts to convey ideas and record observations.		Working With Graphical Models
22.K.3 Share information and ideas with others.	22.1.3 Respect ideas and contributions of others.	22.2.3 Cooperate and contribute ideas within a group.	22.3.3 Cooperate and contribute ideas within a group.		Working With Others

Scientific Inquiry: Processes and Skills

Standard 23.0: Scientific Applications of Mathematics—*Students understand that scientific inquiry is enhanced and often communicated by using mathematics.*

By the end of **Kindergarten** students know and are able to:By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:					
					Variables
					Computing
		23.2.3 Give rough estimates of numerical answers to problems before calculating.	23.3.3 Give rough estimates of numerical answers to problems before calculating.		Estimating

Standard 23.0: Scientific Applications of Mathematics

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
					Working With Measurements
	23.1.5	23.2.5 Recognize unexpected or unusual results in	23.3.5 Determine whether measurements and		Evaluating Measurements

	Make predictions based on observed patterns.	activities.	descriptions are reasonably accurate.		
					Analyzing Data and Solving Problems
					Validity of Samples

Scientific Inquiry: Processes and Skills

Content Standard 24.0 Laboratory Skills and Safety—*Students can appropriately and safely apply the tools and techniques of scientific inquiry.*

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
			24.3.1 Use equipment properly and safely in all science activities.		Working Safely
					Working With Chemicals
			24.3.3 Identify and gather tools and materials needed in an investigation.		Using Experimental Apparatus

Content Standard 24.0 Laboratory Skills and Safety

By the end of **Kindergarten** students know and are able to:	By the end of **Grade 1**, students know and are able to do everything required in the earlier grade and:	By the end of **Grade 2**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 3**, students know and are able to do everything required in earlier grades and:	By the end of **Grade 4**, students know and are able to do everything required in earlier grades and:	
	24.1.4 Record observations.	24.2.4 Keep a record of observations and measurements taken over time.	24.3.4 Keep a record of observations and measurements taken over		Recording Data

			time.		
					Writing and Following Laboratory Procedures
					Designing and Conducting Experiments

Physical Science

Content Standard 1.0: **Forces and Motion**—*Students understand that forces such as gravitational, electrical, and magnetic influence the motion of objects.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
1.5.1 Investigate and describe the relationship that exists between the size of a change in motion of an object to the size of a push or pull on that object.	1.6.1 Investigate and describe the concept that some objects move so slowly or so rapidly that their motion is difficult to detect.	1.7.1 Investigate and describe the effect of retarding forces such as friction on the motion of objects.	1.8.1 Investigate and describe that multiple forces acting on an object along a straight line affect the motion of an object.	1.12.1 Investigate and describe how changes in motion are based on the **laws of motion.**	Description of Motion
1.5.2 Investigate and describe that objects usually move downward when they fall or are released in the air or on ramps.		1.7.2 Investigate and describe the gravitational relationship that exists between the masses of objects and how far apart they are.	1.8.2 Describe the force (**gravity**) which makes objects fall and planets move in their orbits.	1.12.2 Explain that the **force of attraction** that exists between two masses is inversely proportional to the square of the distance between them.	Gravity

Law –A statement about a natural event or series of events that is always true under certain conditions; can be used to make reliable predictions about nature.

Laws of Motion –A set of laws that describe relationships among force and motion;

Gravity – The attractive force between any two objects;

Force of Attraction – A pull between two objects (i.e., gravity and electrostatic attraction).

Content Standard 1.0: Forces and Motion

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
1.5.3	1.6.3		1.8.3	1.12.3	

Investigate and describe that objects may move in a variety of ways (e.g., straight lines or by rotating, rolling, or revolving).	Investigate and describe how machines can use motion to do work.		Investigate and describe that certain physical principles are used in the design and function of simple machines.	Investigate and describe that the usefulness of a simple machine such as a wheel or axle is based on its function, **mechanical advantage**, and **efficiency.**	Machines
1.5.4 Classify objects by whether they sink or float in air or water.	1.6.4 Investigate and describe the relationship between the mass and the volume of various objects.	1.7.4 Investigate and describe the **density** of solids, liquids, and gases.	1.8.4 Investigate and describe that buoyancy changes the apparent weight of an object immersed in a fluid.	1.12.4 Investigate and describe the relationship that exists between force, **pressure,** and area in general, and between pressure and depth in liquids.	Pressure, Density, and Buoyancy

Mechanical Advantage – The degree to which a machine makes work easier by decreasing either the force or distance needed to move something.

Efficiency- Determines how close a machine is to operating without the loss of energy due to friction.

Density –The relationship that exists between mass and volume of an object. A cube of styrofoam has less density than an equal–size cube of rock.

Pressure – Force per unit of area.

Content Standard 1.0: Forces and Motion

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
1.5.5 Investigate and describe the ways that magnets attract and repel each other and certain kinds of other materials.			1.8.5 Investigate and explain that electric current produces magnetic forces, and moving magnets produce electric forces in **conductors**.	1.12.5 Investigate and explain that magnetic forces are related to electric forces and can be thought of as different aspects of a single **electromagnetic force**. (e.g., electric motors, generators, radios).	Electrical and Magnetic Forces

Conductor – A material that carries a force such as metal carries heat or electricity.

Electromagnetic Force – The unified force of electricity and magnetism.

Physical Science

Content Standard 2.0: **Structure and Properties of Matter**—*Students understand that materials have distinct properties which depend on the amount of matter present, its chemical composition, and structure.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
2.5.1 Separate mixtures based		2.7.1	2.8.1 Use simple models to	2.12.1	Physical Properties

on their properties.		Investigate and describe the differences between **homogeneous and heterogeneous mixtures**.	explain observed properties of matter (e.g., use a particle model to account for the states of matter).	Investigate and describe **intrinsic** (color, odor, density) and **extrinsic** (e.g., size, mass, volume) physical properties of matter.	
2.5.2 Describe and classify matter in terms of elements, compounds, and mixtures.			2.8.2 Separate **substances** based on their physical and chemical properties (e.g., color, solubility, **chemical reactivity,** melting point, boiling point).	2.12.2 Explain that substances can be identified on the basis of specific energies given off or taken in by that substance.	Chemical Analysis

Homogeneous Mixtures – A mixture in which all of the components are evenly distributed, with no visible distinct parts; examples include salt water and air.

Heterogeneous Mixtures – A mixture in which the components are unevenly distributed, and may be seen to separate into two or more distinct parts; examples include salad dressing, sand and iron filings, and smoke in air.

Intrinsic Property – A characteristic of a sample of material related only to the quality of the material itself and not on the amount of material present; examples include density, color, odor, and hardness.

Extrinsic Property – A property of material that depends on the amount of material present, for example, mass, length, and volume.

Substance - The class of homogeneous matter made up of elements and compounds.

Chemical Reactivity – Indicates how likely a substance is to undergo change to a new substance.

Content Standard 2.0: **Structure and Properties of Matter**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
2.5.3 Investigate and describe the ways that solids remaining after a solvent has been evaporated may form distinctive patterns of crystals.			2.8.3 Use models or drawings to explain how atoms may join together to form molecules or large groups of molecules.	2.12.3 Explain how atoms may bond with one another by transferring or sharing electrons that are farthest from the nucleus.	Chemical Bonding
	2.6.4 Explain that all **matter** is composed of atoms, and atoms are composed of smaller particles.	2.7.4 Describe atomic structure by using various historic models of the atom.	2.8.4 Explain that all atoms are made up of protons, neutrons, and electrons.	2.12.4 Explain that the electromagnetic force between the nucleus and electrons holds the atom together.	Atomic Theory

Matter – Anything that has mass and takes up space.

Content Standard 2.0: **Structure and Properties of Matter**

By the end of **Grade 5,** students know and are able	By the end of **Grade 6,** students know and are	By the end of **Grade 7,** students know and are	By the end of **Grade 8,** students know and are	By the end of **Grade 12,** students know and are able to do everything required in

to do everything required in previous grades and:	able to do everything required in previous grades and:	able to do everything required in previous grades and:	able to do everything required in previous grades and:	previous grades and:	
2.5.5 Investigate and describe how materials can be broken down physically into smaller and smaller pieces, and that each piece may retain its same properties.			2.8.5 Explain that liquids, solids, and gases are systems of particles.	2.12.5 Explain the properties of phases of matter in terms of the **kinetic molecular theory** and forces of attraction between particles.	System of Particles

Kinetic Molecular Theory – A theory stating that all material is made of tiny particles that are in constant motion; this provides a model that is useful for describing why states of matter have their particular properties and behaviors.

Theory – An explanation or model based on observation, experimentation, and reasoning; especially one that has been tested and confirmed as a general principle helping to explain and predict natural events.

Content Standard 2.0: **Structure and Properties of Matter**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
2.5.6 Investigate and describe how the observable properties of a material depend on its composition.	2.6.6 Investigate and describe how elements can combine to form new substances which often have different properties.		2.8.6 Explain that various elements combine in a multitude of ways to produce all known living and non-living substances.	2.12.6 Explain that carbon atoms can bond to one another to form a large variety of structures, including the molecules essential to life.	Properties and Composition

Physical Science

Content Standard 3.0: **Energy and Matter: Interactions and Forms**—*Students understand that changes in temperature and pressure can alter states of matter. Energy exists in many forms, and one form can change into another.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
3.5.1 Investigate and describe how warm objects cool and cool objects warm when they are put together, until they reach the same temperature.			3.8.1 Investigate and describe how heat moves from one object to another at different rates, depending on what the objects are made of and whether they are touching each other.	3.12.1 Explain that the transformation of energy usually results in some energy in the form of heat, which spreads by radiation, conduction, and sometimes convection into cooler places.	Heat and Temperature
3.5.2					Changes of

Investigate and describe how energy can be used to bring about changes in matter (e.g., melting an ice cube).			3.8.2 Investigate and describe how all phase changes are accompanied by changes in energy.	3.12.2 Investigate and describe how pressure may affect changes of state.	State

Content Standard 3.0: **Energy and Matter: Interactions and Forms**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:		
3.5.3 Investigate and describe how vibrations produce sound.		3.7.3 Investigate and describe that forms of energy can travel in waves (e.g. seismic, light, radio, tv).	3.8.3 Investigate and describe how waves transfer energy and move at different speeds in different materials.	3.12.3 Investigate and describe how waves can **superimpose** on one another, bend around corners, reflect off surfaces, be absorbed by materials they enter, and change direction when entering a new material.	Waves

Superimpose – To place or lay over or above something.

Content Standard 3.0: **Energy and Matter: Interactions and Forms**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
3.5.4 Describe how electrical components are utilized in the design of simple electrical circuits.	3.6.4 Investigate and describe how electrical energy can be transferred through various materials.		3.8.4. Investigate, create, and describe parallel, series, and combination circuits.	3.12.4 Describe the properties of electrical circuits in terms of moving electrons, conductivity, resistance, and electrical potential energy.	Electrical Circuits
	3.6.5 Investigate and describe how energy exists in different forms (e.g. heat, light, chemical, electrical, and others).		3.8.5 Investigate and describe how energy may be transferred into or out of a system or object in many ways and readily changes forms.	3.12.5 Investigate and describe how matter and energy may be changed and energy can be transferred in many ways, but the entire **mass-energy budget** of the universe remains constant.	Changes in Energy

Mass-Energy Budget – The total amount of energy in the universe.

Content Standard 3.0: **Energy and Matter: Interactions and Forms**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			3.8.6 Identify the energy involved in a particular process as potential (energy of position and stored chemical energy) or kinetic (energy of motion).	3.12.6 Investigate and describe how systems tend to become less ordered over time.	Descriptions of Energy and Order

Physical Science

Content Standard 4.0: **Chemical Reaction**—*Students understand that chemical reactions change substances into different substances.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
4.5.1 Investigate and describe how observable changes in matter may occur when different materials are heated, mixed, or cooled.			4.8.1 Investigate and describe how in **chemical reactions**, the total mass is conserved and the elements involved do not change into other elements.	4.12.1 Investigate and describe how, in chemical reactions, elements combine in predictable ratios, and the numbers of **atoms** of each element do not change.	Conservation of Matter
	4.6.2 Investigate and describe how chemical reactions may be fast or slow.		4.8.2 Investigate and describe how the rate of a chemical reaction can be influenced by variables such as temperature**, pH**, and light.	4.12.2 Investigate and describe how chemical reaction rates depend on conditions in the reacting system, the properties of reacting materials, and the presence of certain rate-regulating chemicals.	Rates of Chemical Reactions

Chemical Reaction – The process in which substances change into other substances. This occurs at the level of atoms and molecules.

Atom – The smallest part of a chemical element which can take part in a chemical reaction.

pH – A measure of the degree to which a substance is an acid or a base.

Content Standard 4.0 Chemical Reaction

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			4.8.3 Investigate and describe how materials may give off heat or light when they react chemically with each other.	4.12.3 Investigate and describe how chemical reactions may release or consume energy.	Transformation of Matter and Energy
			4.8.4 Predict common properties of elements using the Periodic Table.	4.12.4 Relate the chemical properties of an element to the outermost electrons of an element.	Chemical Properties

Physical Science

Content Standard 5.0: **Nuclear Energy and Electromagnetic Energy**—*Students understand that nuclear energy and electromagnetic energy are produced from both natural and human-made sources in many forms.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
	5.6.1 Describe light in terms of simple properties (e.g. color, brightness).		5.8.1 Investigate and describe how light interacts with matter by moving through the matter, being absorbed by matter, or being scattered by the matter.	5.12.1 Predict how light interacts with matter (e.g., reflection and refraction).	Behaviors of Light
			5.8.2 Describe some applications of **radioactive isotopes** including using nuclear energy to produce heat.	5.12.2 Simulate how the predictable rates of **nuclear reactions** can be used to estimate the age of some materials.	Nuclear Applications

Radioactive Isotopes – Very large atoms of elements that are unstable and undergo nuclear reactions to form new elements.

Nuclear Reaction – A change in the nucleus of an atom. Some nuclear reactions can result in the transfer of a tremendous amount of energy.

Content Standard 5.0: **Nuclear Energy and Electromagnetic Energy**

By the end of **Grade 5,**	By the end of **Grade 8,**	By the end of **Grade 12,**		

students know and are able to do everything required in previous grades and:By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	students know and are able to do everything required in previous grades and:	students know and are able to do everything required in previous grades and:			
			5.8.3 Compare and contrast between high and low level nuclear wastes and their associated hazards.	5.12.3 Describe the different disposal techniques used for high and low level nuclear wastes.	Nuclear Wastes

Content Standard 5.0: **Nuclear Energy and Electromagnetic Energy**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			5.8.4 Investigate and describe how the sun produces energy in a range of wavelengths within the **electromagnetic spectrum.**	5.12.4 Describe electromagnetic waves including a wide range of forms and varying wavelengths.	Electromagnetic Energy
			5.8.5 Compare and contrast the nuclear processes that occur in the sun and stars as well as in nuclear reactors.	5.12.5 Explain how the forces that hold the **nucleus** of an atom together are usually stronger than other forces that could make the nucleus fly apart.	Nuclear Structure and Processes

Electromagnetic Spectrum- The entire range of different types of electromagnetic waves, including visible light, X-rays, and radiowaves.

Nucleus (atomic) - The central region of an atom which contains more than 99% of the atom's mass.

Content Standard 5.0: **Nuclear Energy and Electromagnetic Energy**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			5.8.6 Explain how nuclear reactions convert small amounts of matter into a relatively large amount of energy.	5.12.6 Explain how energy is released when the nuclei of very heavy atoms (e.g., uranium or plutonium), split into middleweight ones, or when very light	Nuclear Energy

				nuclei (e.g., hydrogen and helium), combine into heavier ones.	

Life Science

Content Standard 6.0: Structure and Function—*Students understand that all life forms, at all levels of organization, use specialized structures and similar processes to meet life's needs.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
6.5.1 Investigate, compare, and contrast the different life cycles of different living things.			6.8.1 Explain how disease is a breakdown in structures or functions of an organism due to intrinsic system failures or damage caused by infection.	6.12.1 Explain how disease disrupts the **equilibrium** that exists in a healthy organism.	Life Cycles and Disruptions
6.5.2 Investigate, compare, and contrast the different structures of organisms that serve different functions for growth, reproduction, and survival.			6.8.2 Investigate and describe how multicellular living things have tissues, organs, and organ systems that are specialized to perform life functions.	6.12.2 Explain how the human body has a specialized anatomy and physiology composed of an hierarchical arrangement of **differentiated cells**.	Structures, Functions, and Systems

Equilibrium – Balance, as between two opposing forces**.**

Differentiated Cells – Cells which have become modified and specialized within an organism.

Content Standard 6.0: **Structure and Function**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
6.5.3 Investigate and describe how plants and animals have features that help them live in various environments.			6.8.3 Investigate and describe how cells, grow, divide, and take in nutrients, which they use to provide energy for cellular functions.	6.12.3 Investigate and describe how food molecules are broken down through a series of chemical reactions to provide energy and the material to make new molecules.	Environment, Energy, and Cellular Functions
			6.8.4	6.12.4	

			Investigate and describe how most organisms are comprised of a single cell and others are multicellular.	Investigate and describe how every cell is covered by a cell membrane and most cells also have specialized parts for the transport of materials, energy, transfer, protein building, waste disposal, information feedback, and movement.	Cellular Organization

Content Standard 6.0: **Structure and Function**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			6.8.5 Investigate and describe how plants have specialized structures and systems for a variety of functions.	6.12.5 In **photosynthesis**, plants and many microorganisms use solar energy to combine molecules of carbon dioxide and water to form energy rich compounds and oxygen.	Plant Structures and Functions
			6.8.6 Explain how information used to guide cellular functions is stored in **DNA**.		Control of Cellular Functions

Photosynthesis – The process by which plants make their food from air and water using energy from the sun.

DNA –The genetic material of all cells and many viruses; DNA stands for deoxyribonucleic acid.

Life Science

Content Standard 7.0: Internal and External Influences on Organisms—*Students understand that organisms respond to internal and external influences.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
7.5.1 Investigate and describe how clues for behavior may be detected by the senses in humans and other living things.			7.8.1 Explain how behavior may be innate or learned.	7.12.1 Investigate and describe how some broad patterns of behavior exhibited by animals have evolved to ensure survival of the species.	Influences on Behavioral Patterns
7.5.2 Investigate and describe how some organisms can			7.8.2 Explain how an organism's behavior is	7.12.2	Origins of Behavioral Patterns

learn from their experiences.			based on experience and on the species' evolutionary history.	Investigate and describe how plant and animals have mechanisms that allow them to respond to changes in their environment.	
7.5.3 Investigate and describe how some environmental conditions are more favorable than others to living things.			7.8.3 Investigate and describe how behavior is one kind of response an organism can make to an internal or environmental stimulus.	7.12.3 Investigate and describe how multicellular animals have nervous systems that receive input through sensory organs and generate behavioral responses.	Stimulus and Behavior

Content Standard 7.0: Internal and External Influences on Organisms

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			7.8.4 Explain how various **viruses, bacteria, fungi**, and **parasites** may infect the human body and interfere with normal body functions.	7.12.4 Explain how certain **viral diseases** make the body vulnerable to multiple infectious agents and cancerous cells by destroying critical cells of the immune system.	Disease

Virus – Any of a large group of disease-producing agents that are smaller than bacteria, are composed of DNA and an outer core of protein, and are dependent upon living cells for their reproduction and growth.

Bacteria – A large group of microscopic organisms that multiply by splitting or by growing from spores. They come in a variety of forms and though some may cause diseases, many are important in human processes .

Fungi – Plantlike organisms that lack chlorophyll and absorb their food from dead or living organisms (i.e., yeast, mushrooms, and molds).

Parasites – An organism that lives on another "host" organism from which it gets its food, examples include ticks and tapeworms.

Viral Disease – Diseases caused by viruses including AIDS, rabies, measles, polio, chicken pox, and the common cold.

Life Science

Content Standard 8.0: **Heredity and Diversity**—*Students understand that life forms are diverse, and that they pass some characteristics to their offspring.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
8.5.1 Investigate and describe how some characteristics between offspring and			8.8.1 Explain how heredity is	8.12.1 Explain how all body cells in an organism are developed from a single	Inherited Traits

parents are inherited, but other characteristics are learned.			the passage of genetic instructions from one generation to another.	cell and contain essentially identical genetic instructions. Explain how different parts of the instruction are used in different kinds of cells.	
8.5.2 Explain how living things may be classified on the basis of similar features, behaviors, and/or habits.			8.8.2 Classify organisms on the basis of similar characteristics, and explain the basis for such a classification system.	8.12.2 Explain how relatedness among organisms can be estimated from the similarity of their DNA sequences.	Variation and Classification of Organisms

Content Standard 8.0: **Heredity and Diversity**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
8.5.3 Describe how there are variations among individuals within a population of a certain species.			8.8.3 Explain how new varieties of cultivated plants and domestic animals have resulted from **selective breeding** for particular traits.	8.12.3 Investigate and describe how sorting and recombination of genes in sexual reproduction results in a great variety of possible gene combinations.	Variation

Selective Breeding – An artificial process by which only organisms possessing a particular characteristic are allowed to breed and produce offspring with that trait.

Content Standard 8.0: **Heredity and Diversity**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
8.5.4 Reproduction is a characteristic essential to the continuation of every species.			8.8.4 Explain how genetic information coded in DNA is passed through sexual or asexual reproduction.	8.12.4 Explain how genetic information from parents is encoded in DNA molecules and provides instruction for assembling protein molecules.	Reproduction
			8.8.5 Explain how some patterns of inheritance can be explained by pairs of genes that separate when sex cells are formed.	8.12.5 Investigate and describe how patterns of inheritance are described by laws of segregation and independent assortment.	Patterns of Inheritance

			8.8.6 Identify that the basic level of biological classification is the species, which comprises all organisms that can mate with each other and produce fertile offspring.	8.12.6 Explain how diversity of species and variation among organisms within a species increase the chances for survival of life when large changes occur in the environment.	Diversity of Species

Content Standard 8.0: **Heredity and Diversity**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
		8.7.7 Explain how the experiences an organism has during its lifetime can affect it.	8.8.7 Explain how changes in the genes of sex cells can affect offspring.	8.12.7 Explain how gene **mutations** may be caused by a variety of influences, when mutations occur in sex cells, they can be passed on to offspring.	Mutations

Mutation – A change within a gene of an organism that results in a new characteristic that can be passed on to offspring.

Life Science

Content Standard 9.0: **Evolution:** The Process of Biological Change—*Students understand that life forms change over time.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:By the end of **Grade 12,** students know and are able to do everything required in previous grades and:					
9.5.1 Classify animals and plants according to their physical characteristics.			9.8.1 Explain that millions of species of animals, plants, and microorganisms are alive today.	9.12.1 Investigate and describe the basic idea of the theory of biological **evolution** is that through genetic and/or environmental influences the Earth's present-day species developed from earlier, distinctly different, but common ancestors.	Common Ancestry
9.5.2 Investigate and describe how environmental changes allow some plants and animals to survive and reproduce, but others may die.			9.8.2 Investigate and describe how biological evolution provides a scientific explanation for the differences and many similarities between	9.12.2 Explain the **fossil** record of ancient life forms by applying the idea of natural selection and its	Natural Selection

			species.	evolutionary consequences.	

Evolution – The process by which all living organisms have developed from earlier forms through modification of characteristics in successive generations.

Fossil –Any evidence of life from a previous geological age, including petrified bones or plant parts, and imprints.

Content Standard 9.0: **Evolution**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
9.5.3 Investigate and describe how individuals of the same kind differ in their characteristics and sometimes the differences give an advantage in surviving and reproducing.			9.8.3 Investigate and describe how biological adaptations include changes that enhance survival and reproductive success in a particular environment.	9.12.3 Simulate and explain how the adaptation of a species can occur over many generations because of the unique characteristics that favor those individuals in an environment.	Adaptation

Content Standard 9.0: **Evolution**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			9.8.4 Investigate and describe how unity among organisms is found in similarities of internal structures, chemical processes, and modern evidence of common ancestry.	9.12.4 Explain how the classification of species is based on similarities (e.g., structural, genetic, molecular) which indicate evolutionary relationships.	Evidence for the theory of Evolution
			9.8.5 Explain how extinction of a species occurs when the adaptive characteristics of a species are insufficient to allow it to survive environmental change.	9.12.5. Explain how the extinction of species is a common occurrence and fossil records indicate that most species that have lived on the earth no longer exist.	Extinction
				9.12.6. Investigate and describe how the process of evolution is driven by genetic and	Influences on Evolution

				environmental influences.	

Content Standard 9.0: Evolution

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
				9.12.7 Explain how there is evidence that at least a billion years ago, cells with nuclei existed allowing the evolution of increasingly complex multicellular organisms.	Life Origins

Earth and Space Sciences

Content Standard 10.0: Earth Structures and Composition —*Students understand that the Earth is composed of interrelated systems of rocks, water, air, and life.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
10.5.1 Investigate and describe how rocks are composed of different combinations of minerals.			10.8.1 Investigate and describe how rocks and minerals have different properties and characteristics.	10.12.1 Investigate and describe how rocks and minerals have different characteristics that reflect their origins and use.	Rocks and Minerals
10.5.2 Investigate and describe how erosion and deposition rates can be affected by the slope of the land and by human activities.			10.8.2 Investigate and describe how the combination of **constructive and destructive forces** result in the formation of landforms.	10.12.2 Investigate and describe how landforms are the result of a combination of constructive and destructive forces resulting from weathering, erosion, and the movement of **lithosphere** plates.	Landforms

Constructive Forces – Processes such as the collection of lithosphere plates or volcanic eruptions which raise the surface of the Earth.

Destructive Forces – Processes such as blowing wind or running water that lower the surface of the Earth.

Lithosphere – The solid portion of the Earth, including the crust and upper mantle.

Content Standard 10.0: Earth Structures and Composition

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous	By the end of **Grade 7,** students know and are able to do everything required in previous	By the end of **Grade 8,** students know and are able to do everything required in previous	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:

	grades and:	grades and:	grades and:		
10.5.3 Investigate and describe how the surface of the Earth, including the ocean floor has a varied topography.			10.8.3 Explain, using models, how the Earth is layered with a crust, both continental and oceanic, hot, convecting mantle, and dense, metallic core.	10.12.3 Explain how there is a relationship between the relative densities and states (phases) of Earth materials and the layering on, in, and above the Earth.	Earth's Structure and Composition

Content Standard 10.0: Earth Structures and Composition

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
10.5.4 Investigate and describe how soil is made of many different biological and mineral materials, and varies from place to place.			10.8.4 Investigate and describe how soils have properties of color, texture, and capacity to retain water and provide nutrients for life.	10.12.4 Investigate and describe how soil is derived from weathered rocks and decomposed organic material, and is found in layers.	Soil
			10.8.5 Explain how the atmosphere is a mixture of particular gases, whose properties vary with elevation.	10.12.5 Explain how the composition of the Earth's atmosphere has changed in the past and continues to change.	Earth's Atmosphere
			10.8.6 Explain that earthquakes, landslides, volcanoes, and floods are geologic phenomena.	10.12.6 Compare and contrast the **geologic features** of Nevada and local geological features.	Geologic Processes and Features

Geological Features – Something found on the surface or interior of the Earth which has formed from geologic processes such as mountains, canyons, earthquakes, faults, rocks, minerals, etc.

Earth and Space Sciences

Content Standard 11.0: **Earth Models**—*Students understand that the Earth may be represented by a variety of maps and models.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
11.5.1			11.8.1		

Identify compass directions on a map.			Describe how positions on the Earth's surface can be located using latitude and longitude.		Locating Positions on the Earth
11.5.2 Explain how the Nevada state road map is a tool that can be used to navigate from one location to another.			11.8.2 Compare a variety of map types, and locate Nevada and Nevada features on each.		Nevada and the Earth
11.5.3 Explain how many things can be represented by two-dimensional maps and three-dimensional models.	11.6.3 Investigate, design, and use various kinds of maps.		11.8.3 Use a color-coded map to compare and contrast various geological features such as temperature, population density, geology, or precipitation.	11.12.3 Investigate, design, and use contour maps.	Models of the Earth

Content Standard 11.0: **Earth Models**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			11.8.4 Identify the time of day in various places throughout the world, given the local time of day.	11.12.4 Define location on the Earth in terms of latitude, longitude, and time zones.	Time and Location on the Earth

Earth and Space Sciences

Content Standard 12.0: **Earth History**—*Students understand that Earth systems (such as weather and mountain formation) change on variety.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
12.5.1 Explain that the surface of the Earth changes due to a variety of factors (e.g., some are abrupt volcanoes and earthquakes, and others happen very slowly, such as the wearing down of mountains).			12.8.1 Explain how some changes on the Earth's surface are due to slow processes, and others due to rapid processes.	12.12.1 Explain how catastrophic events have occurred and greatly influenced Earth's history.	Change Over Time

12.5.2 Investigate and describe how fossils are evidence of past life.			12.8.2 Investigate and describe how fossils provide important evidence of how life and environmental conditions have changed throughout geologic time.	12.12.2 Simulate and explain how relative geologic time can be estimated by observing rock sequences and using fossils to correlate the sequences at various locations.	Relative Geologic Time and the Fossil Record

Content Standard 12.0: **Earth History**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			12.8.3 Explain how the Earth's processes we observe today are similar to those that occurred in the past.	12.12.3 Compare and contrast the variety of methods by which geologic time is determined, including **radioactive dating**.	Geologic Time

Radioactive Dating – The use of clock-like rate of decay of radioactive isotopes to determine the age of something.

Earth and Space Sciences

Content Standard 13.0: **Cycles of Matter and Energy –** *Students understand that Earth systems have a variety of cycles through which energy and matter continually flow.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
13.5.1 Explain that the sun is the main source of energy for people, which they use in many ways (e.g., **fossil fuels** derive their energy indirectly from the sun).			13.8.1 Investigate and describe how the sun is the major source of energy for phenomena on Earth's surface (e.g., growth of plants, winds, ocean currents, and the water cycle).	13.12.1 Explain how Earth systems have two major internal sources of energy (decay of radioactive isotopes and the gravitational energy from Earth's original formation) and one major external sources (the sun), all of which create heat.	Earth Energy Sources
13.5.2 Investigate and describe various meteorological phenomena (e.g., flooding, thunderstorms, and drought).			13.8.2 Explain how global patterns of atmospheric movement, topography, and proximity to bodies of water influence local weather, and seasons are caused by variations in the amount of the sun's	13.12.2 Explain how uneven heating of the Earth's surface by the sun forms convection currents within the atmosphere and ocean, producing wind and ocean currents that are modified by the Earth's rotation.	Weather

			energy hitting the surface due to the tilt of the Earth's axis.		

Fossil Fuels – A fossil material that can be burned, including coal, petroleum, and natural gas.

Content Standard 13.0: **Cycles of Matter and Energy**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and: 13.5.3 Investigate and describe the factors which affect the processes such as evaporation and condensation.			13.8.3 Explain how water, which covers the majority of the Earth's surface, circulates through the crust, oceans, and atmosphere.	13.12.3 Investigate and describe how water is a solvent, (e.g., how it dissolves minerals and gases as it passes through the water cycle and carries them to oceans and lakes)	Water

Content Standard 13.0: Cycles of Matter and Energy

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			13.8.4 Simulate and describe how clouds, latitude, altitude, topographical features, and proximity to large bodies of water affect weather and climate.	13.12.4 Simulate and describe how global climate is determined primarily by energy transfer from the sun at and near the Earth's surface, and fluctuations in solar output may have contributed to large changes in the Earth's climate in the past.	Climate
13.5.5 Investigate and describe how change is an ongoing process that can be seen throughout the natural world.			13.8.5 Investigate and describe some changes that are reversible and others that are not.	13.12.5 Explain how large-scale, long-term equilibrium can accommodate small-scale changes.	The Nature of Change

Content Standard 13.0: Cycles of Matter and Energy.

By the end of **Grade 5,** students know and are able to do everything required	By the end of **Grade 6,** students know and are able to do everything	By the end of **Grade 7,** students know and are able to do everything	By the end of **Grade 8,** students know and are able to do everything	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	

in previous grades and:	required in previous grades and:	required in previous grades and:	required in previous grades and:		
				13.12.6 Investigate and describe how elements necessary for life on Earth pass through both living and non-living cycles in a series of changes that form a global system.	Bio-Geochemical Cycles

Content Standard 13.0: **Cycles of Matter and Energy**

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			13.8.7 Explain that the energy that the Earth receives over geologic time approximately equals the energy that it loses.	13.12.7 Compare and contrast the relationships between the **greenhouse effect** and the idea of global warming.	Energy Transfer and Transformation in the Earth System
			13.8.8 Describe the relationships among **geothermal** and **tectonic** processes.	13.12.8 Model and explain how the energy that propels the Earth's lithosphere plates is dominantly a result of nuclear processes deep in the Earth.	Earth's Internal Energy

Greenhouse Effect – Heat insulating effect that some gases such as carbon dioxide, water vapor, and methane have on the Earth's atmosphere.

Geothermal – Relates to the internal heat of the Earth.

Tectonic – Relates to the action of forces that cause deformities in the Earth's crust.

Earth and Space Sciences

Content Standard 14.0: The Solar System and the Universe—*Students understand that the Earth is part of a planetary system within the Milky Way Galaxy, which is part of the known universe.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
14.5.1 Investigate and describe the basic components of our solar system (e.g., planets, moons, asteroids, comets, and the sun).			14.8.1 Investigate and describe the size, composition, and surface features of the planets in our solar system.	14.12.1 Investigate and describe how the Earth's atmosphere, water, temperature, and composition compare with conditions on other planets.	The Solar System

14.5.2 Describe the apparent motion of celestial objects across the sky.			14.8.2 Investigate and describe how seasons, eclipses, moon phases, and tides are caused by the effects of relative motion and positions of the sun, Earth, and moon.	14.12.2 Explain how most objects in the solar system are in regular and predictable motion which explains such phenomena as the day, the year, phases of the moon, and eclipses.	Celestial Motion
14.5.3 Describe how the stars in the sky are not scattered evenly, and they are not all the same in brightness or color.			14.8.3 Explain that billions of galaxies form most of the visible mass in the universe.	14.12.3 Explain how stars produce energy and elements heavier than hydrogen from nuclear reactions.	Stars and Galaxies

Content Standard 14.0: The Solar System and the Universe

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
				14.12.4 Explain that on the basis of scientific evidence, the universe is estimated to be about ten billion years old.	Origin of the Universe
			14.8.5 Explain how various tools (e.g., optical and radio telescopes, unmanned robotic spacecraft) allow us to investigate objects in the sky that are too distant, faint, or bright to observe directly from Earth.	14.12.5 Describe how increasingly sophisticated technology (e.g., mathematical models and computer simulations) is used to learn about the universe.	Tools and Methods of Astronomy

Content Standard 14.0: The Solar System and the Universe

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			14.8.6 Investigate and describe the laws of motion and gravity and their	14.12.6 Explain that the physical laws, such as laws of Newton, Kepler, thermodynamics, relativity, and quantum	Universality of Physical Laws

			development.	physics, appear to apply to all bodies in the universe.	

Environmental Sciences

Content Standard 15.0: Ecosystems—*Students will demonstrate an understanding that ecosystems display patterns of organization, change, and stability as a result of the interactions and interdependencies among the life forms and the physical components of the Earth.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:		
15.5.1 Investigate and describe how organisms interact with each other and with non-living parts of their habitats.			15.8.1 Investigate and describe how living and non-living components of ecosystems interact in various ways.	15.12.1 Investigate and describe how changes in an ecosystem can affect **bio-diversity** and bio-diversity contributes to an ecosystem's stability.	Stability and Change in Ecosystems
15.5.2 Investigate and describe how, for any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.			15.8.2 Characterize organisms in any ecosystems by their function.	15.12.2 Investigate and describe how ecosystems change or remain the same in response to different kinds of influences.	Relationships and Interactions in Ecosystems

Bio-diversity – The number and variety of different organisms in the region in which they occur.

Content Standard 15.0: Ecosystems

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
15.5.3 Explain how the sun is the primary source of energy for nearly every ecosystem and that living things get what they need to survive from their environments.			15.8.3 Investigate and describe how the major energy source in most ecosystems is sunlight which is converted by producers into chemical energy.	15.12.3 Investigate and describe how materials and energy are cycled and recycled through ecosystems via pathways known as food webs.	Cycles of Matter and Energy in Ecosystems
15.5.4 Investigate and describe how the local ecosystem			15.8.4 Describe how geographically distinct	15.12.4	Characteristics of Ecosystems

has unique characteristics.			ecosystems on the Earth have similarities and differences.	Describe the unique geologic, hydrologic, climatic, and biological characteristics of Nevada's **bioregions.** (e.g. Northern NV cold desert, Southern low warm desert, Mountain).	

Bioregion – A geographical region that is characterized by very general shared ecological qualities.

Environmental Sciences

Content Standard 16.0: Natural Resources—*Students demonstrate and understand that natural resources include renewable and non-renewable materials and energy. All organisms, including human, use resources to maintain and improve their existence, and the use of resources can have positive and negative consequences.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
16.5.1 Investigate and describe how resources have distinct properties which determine their usefulness.			16.8.1 Investigate and describe the identifying characteristics of renewable and non-renewable resources.	16.12.1 Evaluate the consequences of changing patterns of resources use.	Renewable and Nonrenewable Resources
16.5.2 Investigate and describe how technology can be used to extend resources (e.g., recycling).			16.8.2 Explain how some natural resources are limited in their abundance and/or accessible location (e.g. water in the desert).	16.12.2 Investigate and describe the various processes involved in obtaining, using, and recycling materials such as wood products, minerals, food, and manufactured objects.	Acquisition and Use of Natural Resources

Content Standard 16.0: Natural Resources

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
16.5.3 Explain how Earth materials, including those found in Nevada, provide many of the resources that humans use.			16.8.3 Investigate and describe the location and distribution of various natural resources.	16.12.3 Investigate and describe the career opportunities associated with the study, exploration, extraction, utilization, protection, and restoration of natural resources.	Traditional and Innovative Uses of Natural Resources
16.5.4 Explain that humans tend to use resources to meet more than their minimal			16.8.4 Investigate and describe how organisms alter their local environment through	16.12.4 Analyze and describe the limitations of the Earth's ability to respond to	Environmental Consequences of Natural

needs for food, shelter and warmth.			their use of natural resources.	stresses produced by human or natural activities.	Resource Use

Content Standard 16.0: Natural Resources

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			16.8.5 Describe how unintended consequences of technologies can cause resource depletion and environmental degradation, but technology can also increase resource availability, mitigate environmental degradation, and make new resources economical.	16.12.5 Analyze and evaluate the effects that increases in human populations can cause (e.g., resource depletion and environmental degradation).	Technology and Human Population

Environmental Sciences

Content Standard 17.0: Conservation—*Students understand that humans have the unique ability to change personal and societal behavior based on ethical considerations regarding other organisms, the planet as a whole and future generations.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
17.5.1 Investigate and describe how consumptive patterns of people vary in different places.		17.7.1 Investigate and explain that Nevada has a variety of useful resources.	17.8.1 Analyze different conservation options for Nevada's resources.	17.12.1 Analyze and evaluate how consumption patterns, conservation efforts, and cultural or social practices in countries have varying environmental impacts.	Conservation
17.5.2 Investigate and describe that ecosystems have components that can be observed to change, while other components appear to stay the same.			17.8.2 Investigate and describe how in some ecosystems, populations of organisms are in **dynamic equilibrium**, and in other ecosystems they are not.	17.12.2 Investigate and describe how human actions may impact the dynamic equilibrium of global systems (e.g., global warming, ozone depletion).	Systems and Equilibrium
17.5.3 Explain that changes in environments can be natural events or			17.8.3 Evaluate how changes in	17.12.3 Explain that there is scientific uncertainty regarding many	The Scientific Nature of Environmental Issues

influenced by human activities.			environments can be beneficial or harmful.	environmental issues.	

Dynamic Equilibrium - A state of balance in which two opposing processes are occurring at equal rates.

Content Standard 17.0: Conservation

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
			17.8.4 Investigate and describe how actions which might affect Nevada's environment can be evaluated in terms of trade-offs that may have regional, national, or global effects.	17.12.4 Evaluate and describe actions which affect the global environment in terms of trade-offs that may have effects on local environments or economics.	Responsible Behavior

The Nature and History of Science

Content Standard 18.0: Scientific, Historical, and Technological Perspectives—*Students understand that humans have the unique ability to change personal and societal behavior based on ethical considerations regarding other organisms, the planet as a whole and future generations.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
18.5.1 Explain that science is a systematic way of exploring the world.			18.8.1 Explain that scientific investigations involve the use of logic, respect for the rules of evidence, openness to criticism, and public reporting of methods and procedures.	18.12.1 Explain that the scientific way of knowing uses a critique and consensus process (e.g., peer review, openness to criticism, logical argument, skepticism).	The Nature of Science
18.5.2 Develop explanations using observations (evidence) from investigations.			18.8.2 Explain that scientific inquiry done in a school setting is similar to what scientists do.	18.12.2 Investigate and explain how research emphasis is influenced by economic and public policy.	Attributes of Scientific Research

Content Standard 18.0: Scientific, Historical, and Technological Perspectives

By the end of **Grade 5,**	By the end of **Grade 6,**	By the end of **Grade 7,**	By the end of **Grade 8,**	By the end of **Grade 12,** students know

students know and are able to do everything required in previous grades and:	students know and are able to do everything required in previous grades and:	students know and are able to do everything required in previous grades and:	students know and are able to do everything required in previous grades and:	and are able to do everything required in previous grades and:	
18.5.3 Describe key scientists, classical experiments in science, and technological inventions that lead to a better understanding of the impact of science on society.		18.7.3 Investigate and describe how people create models to explain the world as scientific knowledge has increased, and that these models are modified or discarded.	18.8.3 Explain, using examples, that ancient peoples provided knowledge about the natural world that is still regarded as valid today, even though that knowledge may not have originated by scientific methods.	18.12.3 Investigate and explain how scientific innovations that were originally challenged are now widely accepted.	The History of Science and Invention
18.5.4 Recognize and explain that science is an activity done by more than one person working together.			18.8.4 Explain that scientists may work in teams and some may work alone, but all communicate extensively with each other.	18.12.4 Explain that scientists work with others to resolve differences in interpretation of observations.	Science as a Collaborative Process

Content Standard 18.0: Scientific, Historical, and Technological Perspectives

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
18.5.5 Explain that technology enables scientists and others to study the motion of objects that are moving rapidly or that are hardly moving at all.	18.6.5 Identify and describe various technological tools that scientists use to help them do their work.		18.8.5 Explain that scientific inquiry and technological design have similarities and differences. Scientists propose explanations for questions about the natural world and engineers propose solutions relating to human problems, needs, and aspirations.	18.12.5 Explain that technological problems create a demand for new scientific knowledge and new technologies which make it possible for scientists to extend their research in new ways or to undertake entirely new lines of research.	Technology

Content Standard 18.0: Scientific, Historical, and Technological Perspectives

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
18.5.6 Explain that science is an ongoing process of			18.8.6 Explain that scientific knowledge is revised	18.12.6	The Dynamic Character of Scientific

investigation (inquiry).			through a process of incorporating new evidence gained through continual investigation.	Explain that scientific knowledge builds on previous information, and rarely are entire theories completely discarded in favor of new ones.	Knowledge
			18.8.7 Identify and describe how science is subject to strengths and limitations related to other human social and intellectual activities.	18.12.7 Explain that scientists have ethical procedures, violations of which have consequences.	Scientific Ethics

The Nature and History of Science

Content Standard 19.0: Reasoning and Critical Response Skills—*Students understand that many decisions require critical consideration of scientific evidence.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:By the end of **Grade 12,** students know and are able to do everything required in previous grades and:					
			19.8.1 Identify and evaluate critically the use of statistics, data, and graphs.	19.12.1 Identify and determine the credibility of sources of information based on the techniques used to gather that information.	Evaluating Data
			19.8.2 Give examples of human activities with their associated benefits, costs and risks.	19.12.2 Apply cost benefit and risk analyses in decision-making processes.	Analyzing and Evaluating Benefits and Risks
	19.6.3 Investigate and describe the components of systems (including processes or parts).	19.7.3 Identify and describe how the parts of a system relate to one another and/or to other systems.	19.8.3 Analyze and describe a system for efficiency, optimal function, and possible sources of malfunction.	19.12.3 Recognize and describe situations in which a system is qualitatively different from the parts which comprise it (e.g., how a population differs from an individual).	Analyzing Systems

Content Standard 19.0: Reasoning and Critical Response Skills

By the end of **Grade 5,** students know and are able to do everything required	By the end of **Grade 6,** students know and are able to do everything	By the end of **Grade 7,** students know and are able to do everything	By the end of **Grade 8,** students know and are able to do everything	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:

in previous grades and:	required in previous grades and:	required in previous grades and:	required in previous grades and:		
19.5.4 Explain that claims must be supported by evidence and logical argument.	19.6.4 Distinguish between fact and opinion when responding to information.		19.8.4 Critically evaluate information to distinguish between fact and opinion when responding to information.	19.12.4 Distinguish between hypotheses, laws, theories and rules, and explain the level of their limitations.	Critical Analysis
				19.12.5 Determine the limits of generalizations, assumptions, analogies, and models.	Critical Evaluation

Scientific Inquiry: Processes and Skills

Content Standard 20.0: Systems, Models, Risk, and Predictions—*Students understand that a variety of models can be used to describe or predict things and events.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
20.5.1 Develop a physical model to explain how something works or how something is constructed.			20.8.1 Investigate and describe how different models can be used to demonstrate the same thing.	20.12.1 Use mathematical symbols and formulas to express relationships that behave in the same ways as the objects or processes under investigation.	Models
20.5.2 Predict that some events are more likely to happen than others.	20.6.2 Analyze data to predict likely outcomes (e.g., how temperature range can affect the survival rate of a species).		20.8.2 Use a model to predict change (e.g., stream table).	20.12.2 Use models to identify and predict cause-effect relationships (e.g., effect of temperature on gas volume, effect of carbon dioxide level on the greenhouse effect).	Models and Predictions

Content Standard 20.0: Systems, Models, Risk, and Predictions

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
20.5.3 Describe and compare the components and interrelationships of a simple system (e.g., trace the flow of water through an aquarium, a filter, and a pump).			20.8.3 Identify and illustrate natural cycles within systems (e.g., water, planetary motion, climate, geological changes).	20.12.3 Identify and describe how systems are often different from their components. (e.g., aquaria or automobiles)	Systems

			20.8.4 Analyze data from two groups, comparing both their middles and ranges.	20.12.4 Compare groups of data, taking into account both percentages and actual numbers.	Statistical Modeling
			20.8.5 Use a systematic approach to thinking critically about risks and benefits.	20.12.5 Identify the type of hazard, estimate the extent and consequences of exposure, and determine the options for reducing or eliminating risks.	Risk Analysis

Scientific Inquiry: Processes and Skills

Content Standard 21.0: Scientific Values and Attitudes—*Students understand that science is an active process of systematically examining the natural world.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
21.5.1 Keep records of investigations and observations, without changing those records later.			21.8.1 Explain why it is important to keep honest, clear, and accurate records.	21.12.1 Demonstrate curiosity, honesty, and skepticism in doing science.	Scientific Investigations
21.5.2 Make careful observations and test things more than once.			21.8.2 Explain that hypotheses are valuable even if they turn out to be incorrect, if they lead to fruitful investigations.	21.12.2 Repeat experimentation for statistical analysis and to produce conclusions that are without bias.	Repeating Scientific Trials
21.5.3 Offer reasons for findings and consider the reasons suggested by others.			21.8.3 Describe how different explanations can often be given for the same evidence, and it is not always possible to tell which one is correct.	21.12.3 Evaluate multiple explanations for the same evidence.	Generating Multiple Explanations

Scientific Inquiry: Processes and Skills

Content Standard 22.0: Communication Skills—*Students understand that a variety of communication methods can be used to share scientific information.*

By the end of **Grade 5,** students know and are able	By the end of **Grade 6,** students know and are	By the end of **Grade 7,** students know and are	By the end of **Grade 8,** students know and are	By the end of **Grade 12,** students know and are able to do everything required in

to do everything required in previous grades and:	able to do everything required in previous grades and:	able to do everything required in previous grades and:	able to do everything required in previous grades and:	previous grades and:	
22.5.1 Give written or oral instructions that others are able to follow.			22.8.1 Write clear, step-by-step instructions for a procedure.	22.12.1 Analyze experimental procedures and suggest appropriate revisions for improvement.	Writing and Following Instructions
22.5.2 Organize information into charts, tables, and graphs.			22.8.2 Organize information in tables and graphs and describe the relationships they reveal.	22.12.2 Use tables, charts, and graphs in making arguments and claims in oral and written presentations.	Working With Graphical Models
22.5.3 Collaborate on a group project.			22.8.3 Discuss scientific topics by paraphrasing, asking for clarification or elaboration, and expressing alternative positions using available multimedia resources.	22.12.3 Discuss scientific topics by restating or summarizing accurately what others have said; ask for clarifications or elaborations, and express alternative positions using available multimedia resources.	Working With Others

Scientific Inquiry: Processes and Skills

Content Standard 23.0: Scientific Applications of Mathematics—*Students understand that scientific inquiry is enhanced and often communicated by using mathematics.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
23.5.1 Explain that sometimes changing one thing causes changes in another.			23.8.1 Explain that quantities can vary in proportion to one another. (e.g., the ratio of mass to volume in the calculation of density).	23.12.1 Determine if the correlation between variables is high or low.	Variables
23.5.2 Explain to other students how to go about solving numerical problems .			23.8.2 State the purpose of each step in a calculation.	23.12.2 Use algebraic equations when appropriate.	Computing
23.5.3 Make quantitative estimates of familiar lengths, weights, and time intervals, and check them by measurements.			23.8.3 Estimate probabilities of outcomes in familiar situations.	23.12.3 Estimate answers to the correct order of magnitude.	Estimating

Scientific Inquiry: Processes and Skills

Content Standard 23.0: Scientific Applications of Mathematics

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
23.5.4 Recognize the appropriate unit for a particular measurement (e.g., meters for length, seconds for time, and kilograms for mass). *(aligns with grade 3 math standard)*			23.8.4 Select and use the appropriate SI unit for a particular measurement (e.g., meters for length, seconds for time, and kilograms for mass).	23.12.4 Use derived quantities, ratios, proportions, and constants.	Working With Measurements
23.5.5 Recognize that repeated measurements of the same thing are likely to vary slightly.			23.8.5 Judge whether repeated measurements and computations of quantities are reasonably precise and accurate.	23.12.8 Trace the source of differences between an estimate and the calculated answer that exceeds agreed-upon standards for precision.	Evaluating Measurements
			23.8.6 Make predictions based on all known data from similar conditions.	23.12.6 Select samples by some random system to avoid bias.	Validity of Samples

Scientific Inquiry: Processes and Skills

Content Standard 24.0: Laboratory Skills and Safety—*Students can appropriately and safely apply the tools and techniques of scientific inquiry.*

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
24.5.1 Use safety equipment and attire.	24.6.1 Use safety equipment and attire.	24.7.1 Use safety equipment and attire.	24.8.1 Use instruments and laboratory safety equipment properly.	24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.	Working Safely
24.5.2 Measure and mix dry and liquid materials safely in prescribed amounts.			24.8.2 Handle and dispose of chemicals according to established standards.	24.12.2 Use the information found in materials safety data sheets to handle, store, and dispose of chemicals properly.	Working With Chemicals

24.5.3 Use provided materials to construct objects for a particular task.			24.8.3 Choose appropriate common materials for making and repairing simple mechanical constructions.	24.12.3 Inspect, manipulate, and describe the functions of various parts of technical and scientific equipment.	Using Experimental Apparatus

Content Standard 24.0: Laboratory Skills and Safety

By the end of **Grade 5,** students know and are able to do everything required in previous grades and:	By the end of **Grade 6,** students know and are able to do everything required in previous grades and:	By the end of **Grade 7,** students know and are able to do everything required in previous grades and:	By the end of **Grade 8,** students know and are able to do everything required in previous grades and:	By the end of **Grade 12,** students know and are able to do everything required in previous grades and:	
24.5.4 Label measurements and diagrams properly.			24.8.4 Keep an organized record of scientific investigations.	24.12.4 Maintain a permanent record of procedures, data, analyses, decisions, and understandings of scientific investigations.	Recording Data
24.5.5 Use appropriate technology in lab procedures for measuring and recording.			24.8.5 Use appropriate technology in laboratory procedures for measuring, recording, and analyzing data (e.g., computers, graphing calculators, and probes).	24.12.5 Write procedures for the investigation of delegated or original scientific problems.	Writing and Following Laboratory Procedures and Problem Solving
24.5.6 Manipulate objects and observe events in an experiment.			24.8.6 Design a controlled experiment.	24.12.6 Carry out an independent scientific investigation.	Designing and Conducting Experiments

Glossary for Science

Atom The smallest part of a chemical element which can take part in a chemical reaction.

Bacteria A large group of microscopic organisms that multiply by splitting or by growing from spores. They come in a variety of forms and though some may cause diseases, many are important in human processes.

Bio-diversity The number and variety of different organisms in the region in which they occur.

Bioregion A geographical region that is characterized by very general shared ecological qualities.

Chemical Reaction The process in which substances change into other substances. This occurs at the level of atoms and molecules.

Chemical Reactivity How likely a substance is to undergo change to a new substance.

Circuit (electrical circuit) An assembly of electrical parts.

Conductor A material that carries a force such as metal carries heat or electricity.

Constructive Forces Processes such as the collection of lithosphere plates or volcanic eruptions which raise the surface of the Earth.

Density The relationship that exists between mass and volume of an object (i.e., cube of styrofoam has less density than an equal –size cube of rock).

Destructive Forces Processes such as blowing wind or running water that lower the surface of the Earth.

Differentiated Cells Cells which have become modified and specialized within an organism.

DNA The genetic material of all cells and many viruses; DNA stands for deoxyribonucleic acid.

Dynamic Equilibrium A state of balance in which two opposing processes are occurring at equal rates.

Ecosystem A system of relationships between organisms in an environment, and between organisms and the environment.

Efficiency How close a machine is to operating without the loss of energy due to friction.

Electromagnetic Force The unified force of electricity and magnetism.

Electromagnetic Spectrum The entire range of different types of electromagnetic waves, including visible light, X-rays, and radiowaves.

Electron Negatively charged particle in an atom.

Equilibrium ***Balance, as between two opposing forces.***

Evolution Biological evolution – the process by which all living organisms have developed from earlier forms through modification of characteristics in successive generations.

Extrinsic Property A property of material that depends on the amount of material present, for example, mass, length, volume.

Force Any push or pull.

Force of Attraction A pull between two objects (i.e., gravity and electrostatic attraction).

Fossil Any evidence of life from a previous geological age, including petrified bones or plant parts, and imprints.

Fossil Fuels A fossil material that can be burned such as coal, petroleum, and natural gas.

Fungi Plantlike organisms that lack chlorophyll and absorb their food from dead or living organisms (i.e., yeast, mushrooms, and molds).

Germs A microscopic organism which can cause disease.

Gravity The attractive force between any two objects.

Greenhouse Effect Heat insulating effect that some gases such as carbon dioxide, water vapor, and methane have on the Earth's atmosphere.

Geological Features Something found on the surface or interior of the Earth which has formed from geologic processes such as mountains, canyons, earthquakes, faults, rocks, minerals, etc.

Geothermal Relates to the internal heat of the Earth.

Heterogeneous Mixtures A mixture in which the components are unevenly distributed and may be seen to separate into two or more distinct parts; examples include salad dressing, sand and iron filings, and smoke in the air.

Homogeneous Mixtures A mixture in which all of the components are evenly distributed, with no visible distinct parts; examples include salt water and air.

Intrinsic Property A characteristic of a sample of material related only to the quality of the material itself and not on the amount of material present; examples include density, color, odor, and hardness.

Kinetic Molecular Theory A theory that all material is made of tiny particles that are in constant motion; this provides a model that is useful for describing why states of matter have their particular properties and behaviors.

Landform A large feature on the surface of the Earth, including mountains, volcanoes, and canyons, etc.

Laws of Motion Also called Newton's Laws of Motion; a set of laws that describe relationships among force and motion.

Lithosphere The solid portion of the Earth, including the crust and upper mantle.

Mass-Energy Budget The total amount of energy in the universe.

Matter Anything that has mass and takes up space.

Mechanical Advantage The degree to which a machine makes work easier by decreasing either the force or distance needed to move something.

Model A physical, graphical, or mathematical representation of a thing or event.

Mutation A change within a gene of an organism that results in a new characteristic that can be passed on to offspring.

Nuclear Reaction A change in the nucleus of an atom. Some nuclear reactions can result in the transfer of a tremendous amount of energy.

Nucleus (atomic) The central region of an atom which contains more than 99% of the atom’s mass.

Parasites An organism that lives on another "host" organism from which it gets its food, examples include ticks and tapeworms.

pH A measure of the degree to which a substance is an acid or a base.

Photosynthesis The process by which plants make their food from air and water using energy from the sun.

Pressure Force applied per unit of area.

Properties Characteristics unique to a particular set of living or nonliving things.

Radioactive Dating The use of clock-like rate of decay of radioactive isotopes to determine the age of something.

Radioactive Isotopes Very large atoms of elements that are unstable and undergo nuclear reactions to form new elements.

Selective Breeding An artificial process by which only organisms possessing a particular characteristic are allowed to breed and produce offspring with that trait.

Substance The class of homogeneous matter made up of elements and compounds.

Superimpose To place or lay over or above something.

Tectonic Relates to the action of forces that cause deformities in the Earth's crust.

Theory An explanation or model based on observation, experimentation, and reasoning; especially one that has been tested and confirmed as a general principle helping to explain and predict natural events.

Viral Disease Diseases caused by viruses including AIDS, rabies, measles, polio, chicken pox, and the common cold.

Virus Any of a large group of disease-producing agents that are smaller than bacteria, are composed of DNA and an outer core of protein, and are dependent upon living cells for their reproduction and growth.