Diocese of Venice
Curricular Standards:
Science

Middle School and High School
Grades 6-12

Basic Principles underlying All Standards to be used for the Planning of Curriculum for the Diocese of Venice

Basic principles which inform all Catholic education in the Schools of the Diocese of Venice are:

- All knowledge, in some way, reflects God's Truth, Beauty and Goodness.
- Curriculum and instruction enable deeper incorporation of the children into the Church, the formation of community within the school; and respect for the uniqueness and dignity of each person as created in the image of God.
- Education fosters growth in Christian virtue and contributes to development and formation of the whole person in light of his/her ultimate end and the good of the society of which he/she is a member.
- Each subject is to be examined in the context of the Catholic faith and is to be illuminated by Gospel values.
- Learning and formation occur in the Catholic school without separation as does the development of each student on both the natural and supernatural levels.
- Curriculum and instruction seeks to promote a synthesis of faith, life and culture and to form students as disciples of Jesus.

Diocese Of Venice Catholic School Standards For Science

By the very nature of creation, material being is endowed with its own stability, truth and excellence, its own order and laws. We must respect these truths as we recognize the methods proper to every science and technique.
Gaudium et Spes, #36

Science is a gift of human intellect, which is given to us by God to help us understand His Creation. Science is the study of interdependent relations in our earth's systems and structures that reflect God's truth, beauty, and goodness. These standards are directed toward life, earth, and physical aspects that enable deeper incorporation of children into the Church, the formation of community within the school, and respect for the uniqueness and dignity of each person as created in the image of God recognizing that scientific knowledge is a call to serve.
Life, Earth, and Physical Science foster growth in Christian virtue and develop an appreciation for God's creation and the good of society. Science is developing our stewardship and relationship in all aspects of our faith and Gospel values.

In a Catholic school, curricular formation….

1. Involves the integral formation of the whole person, body, mind and spirit, in light of his or her ultimate end and the good of society. (1)
2. Promotes human virtues and the dignity of human person, as created in the image and likeness of God and modeled on the person of Jesus Christ. 2
3. Seeks to know and understand objective reality which includes transcendent Truth, is knowable by reason and faith, and finds its origin, unity, and end in God.
4. Develops a Catholic worldview and enables a deeper incorporation of the student into the heart of the Catholic Church.
5. Encourages a synthesis of faith, life, and culture.

Science K-6 Catholic Integrated Faith Standards				
SC.K6.IF	K-6 Integration of Faith - Catholic Curricular Standards and Dispositions in Scientific Topics			
	SC.K6.IF.1	Scientific Topics - General Standards		
			SC.K6.IF.1.1	Exhibit care and concern at all stages of life for each human person as an image and likeness of God.
			SC.K6.IF.1.2	Describe the unity of faith and reason with confidence that there exists no contradiction between the God of nature and the God of faith.
			SC.K6.IF.1.3	Value the human body as the temple of the Holy Spirit.
	SC.K6.IF.2	Scientific Topics - Intellectual Standards		
			IS1SC.K6.IF.2.1	Explain what it means to say that God created the world and all matter out of nothing at a certain point in time; how it manifests His wisdom, glory, and purpose; and how He holds everything in existence according to His plan.
			IS1SC.K6.IF.2.2	Describe the relationships, elements, underlying order, harmony, and meaning in God’s creation.
			IS1SC.K6.IF.2.3	Explain how creation is an outward sign of God's love and goodness and, therefore, is ,"sacramental" in nature.
			IS1SC.K6.IF.2.4	Give examples of the beauty evident in God’s creation.
			IS1SC.K6.IF.2.5	Explain the processes of conservation, preservation, overconsumption, and stewardship in relation to caring for that which God has given to sustain and delight us.
			IS1SC.K6.IF.2.6	Describe God’s relationship with man and nature.
			IS1SC.K6.IF.2.7	Describe how science and technology should always be at the service of humanity and, ultimately, to God, in harmony with His purposes.
			IS1SC.K6.IF.2.8	Explain how science properly limits its focus to how things physically exist and is not designed to answer issues of meaning, the value of things, or the mysteries of the human person.

				IS1SC.K6.IF.2.9	Describe how the use of the scientific method to explore and understand nature differs, yet complements, the theological and philosophical questions one asks in order to understand God and His works.
				IS1SC.K6.IF.2.10	Analyze the false assumption that science can replace faith.
				IS1SC.K6.IF.2.11	List the basic contributions of significant Catholics to science such as Galileo, Copernicus, Mendel, and others.
		SC.K6.IF.3	Scientific Topics - Dispositional Standards		
				DS1SC.K6.IF.3.1	Display a sense of wonder and delight about the natural universe and its beauty.
				DS1SC.K6.IF.3.2	Share concern and care for the environment as a part of God'screation.
				DS1SC.K6.IF.3.3	Accept the premise that nature should not be manipulated simply at man'swill or only viewed as a thing to be used, but that man must cooperate with God'splan for himself and for nature.
				DS1SC.K6.IF.3.4	Accept that scientific knowledge is a call to serve and not simply a means to gain power, material prosperity, or success.

6th Grade Science					
SC.6.E	Grade 6 Earth and Space Science				
		SC.6.E.6	Earth Structures		
				SC.6.E.6.1	Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.
				SC.6.E.6.2	Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.
		SC.6.E.7	Earth Systems and Patterns		
				SC.6.E.7.1	Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.
				SC.6.E.7.2	Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.
				SC.6.E.7.3	Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation.
				SC.6.E.7.4	Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.
				SC.6.E.7.5	Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.
				SC.6.E.7.6	Differentiate between weather and climate.
				SC.6.E.7.7	Investigate how natural disasters have affected human life in Florida.
				SC.6.E.7.8	Describe ways human beings protect themselves from hazardous weather and sun exposure.
				SC.6.E.7.9	Describe how the composition and structure of the atmosphere protects life and insulates the planet.
SC.6.L	Grade 6 Life Science				

		SC.6.L.14	Organization and Development of Living Organisms		
				SC.6.L.14.1	Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.
				SC.6.L.14.2	Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi-cellular), all cells come from pre-existing cells, and cells are the basic unit of life.
				SC.6.L.14.3	Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.
				SC.6.L.14.4	Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.
				SC.6.L.14.5	Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.
				SC.6.L.14.6	Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites.
		SC.6.L.15	Diversity and Evolution of Living Organisms		
				SC.6.L.15.1	Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.
SC.6.N	Grade 6 Nature of Science				
		SC.6.N.1	The Practice of Science		
				SC.6.N.1.1	Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments,

					identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
				SC.6.N.1.2	Explain why scientific investigations should be replicable.
				SC.6.N.1.3	Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.
				SC.6.N.1.4	Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
				SC.6.N.1.5	Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.
		SC.6.N.2	The Characteristics of Scientific Knowledge		
				SC.6.N.2.1	Distinguish science from other activities involving thought.
				SC.6.N.2.2	Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.
				SC.6.N.2.3	Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.
		SC.6.N.3	The Role of Theories, Laws, Hypotheses, and Models		
				SC.6.N.3.1	Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.
				SC.6.N.3.2	Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.
				SC.6.N.3.3	Give several examples of scientific laws.
				SC.6.N.3.4	Identify the role of models in the context of the sixth grade science benchmarks.
SC.6.P	Grade 6 Physical Science				
		SC.6.P.11	Energy Transfer and Transformations		

				SC.6.P.11.1	Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.
		SC.6.P.12	Motion of Objects		
				SC.6.P.12.1	Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.
		SC.6.P.13	Forces and Changes in Motion		
				SC.6.P.13.1	Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.
				SC.6.P.13.2	Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.
				SC.6.P.13.3	Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.

Science 7th-12th Grade Catholic Integrated Faith Standards				
SC.712.IF	7th-12th Grade Integration of Faith - Catholic Curricular Standards and Dispositions in Scientific Topics			
	SC.712.IF.1	Scientific Topics - General Standards		
			SC.712.IF.1.1	Exhibit a primacy of care and concern at all stages of life for each human person as an image and likeness of God.
			SC.712.IF.1.2	Explain and promote the unity of faith and reason with confidence that there exists no contradiction between the God of nature and the God of the faith.
			SC.712.IF.1.3	Value the human body as the temple of the Holy Spirit.
			SC.712.IF.1.4	Share how the beauty and goodness of God is reflected in nature and the study of the natural sciences.
	SC.712.IF.2	Scientific Topics - Intellectual Standards		
			SC.712.IF.2.1	Articulate how science properly situates itself within other academic disciplines (e.g., history, theology) for correction and completion in order to recognize the limited material explanation of reality to which it is properly attuned.
			SC.712.IF.2.2	Demonstrate confidence in human reason and in one's ability to know the truth about God's creation and the fundamental intelligibility of the world.
			SC.712.IF.2.3	Analyze how the pursuit of scientific knowledge, for utilitarian purposes alone or for the misguided manipulation of nature, thwarts the pursuit of authentic Truth and the greater glory of God.
			SC.712.IF.2.4	Relate how the search for truth, even when it concerns a finite reality of the natural world or of man, is never-ending and always points beyond to something higher than the immediate object of study.
			SC.712.IF.2.5	Explain the processes of conservation, preservation, overconsumption, and stewardship as it relates to creation and to caring for that which God has given to sustain and delight us.
			SC.712.IF.2.6	Evaluate the relationship between God, man, and nature, and the proper role in the totality of being and creation.

				SC.712.IF.2.7	Describe humanity's natural situation in, and dependence upon, physical reality and how man carries out his role as a cooperator with God in the work of creation.
				SC.712.IF.2.8	Evaluate the errors present in the belief system of scientific naturalism or scientism [2] (which includes materialism [3] and reductionism [4]), which posits that scientific exploration and explanation is the only valid source of meaning.
				SC.712.IF.2.9	Distinguish the difference between the use of the scientific method and the use of theological inquiry to know and understand God's creation and universal truths.
				SC.712.IF.2.10	Articulate the limitations of science (the scientific method and constraints of the physical world) to know and understand God and transcendent reality.
				SC.712.IF.2.11	Identify key Catholic scientists such as Copernicus, Mendel, DaVinci, Bacon, Pasteur, Volta, St. Albert the Great, and others and the witness and evidence they supply against the false claim that Catholicism is not compatible with science.
				SC.712.IF.2.12	Analyze and articulate the Church's approach to the theory of evolution.
				SC.712.IF.2.13	Relate how the human soul is specifically created by God for each human being, does not evolve from lesser matter, and is not inherited from our parents.
				SC.712.IF.2.14	Explain how understanding the physiological properties of a human being does not address the existence of the transcendent spirit of the human person (see Appendix E).
				SC.712.IF.2.15	Explain the supernatural design hypothesis in terms of the Borde-Vilenkin-Guth Proof, the Second Law of Thermodynamics, entropy, and anthropic coincidences (fine tuning of initial conditions and universal constants) (see Appendix E).
				SC.712.IF.2.16	Articulate the details of the Galileo affair to counter the assumption that the Church is anti-science.
				SC.712.IF.2.17	Demonstrate an understanding of the moral issues involving in vitro fertilization, human cloning, human genetic manipulation, and human experimentation and what the Church teaches regarding work in these areas.
		SC.712.IF.3	Scientific Topics - Dispositional Standards		
				SC.712.IF.3.1	Display a deep sense of wonder and delight about the natural universe.

				SC.712.IF.3.2	Share how natural phenomena have more than a utilitarian meaning and purpose and exemplify the handiwork of the Creator.
				SC.712.IF.3.3	Subscribe to the premise that nature should not be manipulated at will, but should be respected for its natural purpose and end as destined by the creator God.
				SC.712.IF.3.4	Share concern and care for the environment as part of God's creation.
				SC.712.IF.3.5	Adhere to the idea of the simultaneous complexity and simplicity of physical reality.

7th Grade Science					
SC.7.E	Grade 7 Earth and Space Science				
		SC.7.E.6	Earth Structures		
				SC.7.E.6.1	Describe the layers of the solid Earth, including the lithosphere, the hot convection mantle, and the dense metallic liquid and solid cores.
				SC.7.E.6.2	Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building).
				SC.7.E.6.3	Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating.
				SC.7.E.6.4	Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.
				SC.7.E.6.5	Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building.
				SC.7.E.6.6	Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.
				SC.7.E.6.7	Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins.
SC.7.L	Grade 7 Life Science				
		SC.7.L.15	Diversity and Evolution of Living Organisms		
				SC.7.L.15.1	Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species.
				SC.7.L.15.2	Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.

				SC.7.L.15.3	Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.
		SC.7.L.16	Heredity and Reproduction		
				SC.7.L.16.1	Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.
				SC.7.L.16.2	Determine the probabilities for genotype and phenotype combinations using Punnett Squares and pedigrees.
				SC.7.L.16.3	Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.
				SC.7.L.16.4	Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on the individual, society and the environment.
		SC.7.L.17	Interdependence		
				SC.7.L.17.1	Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.
				SC.7.L.17.2	Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.
				SC.7.L.17.3	Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.
SC.7.N	Grade 7 Nature of Science				
		SC.7.N.1	The Practice of Science		
				SC.7.N.1.1	Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
				SC.7.N.1.2	Differentiate replication (by others) from repetition (multiple trials).

				SC.7.N.1.3	Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.
				SC.7.N.1.4	Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.
				SC.7.N.1.5	Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.
				SC.7.N.1.6	Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.
				SC.7.N.1.7	Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.
		SC.7.N.2	The Characteristics of Scientific Knowledge		
				SC.7.N.2.1	Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.
		SC.7.N.3	The Role of Theories, Laws, Hypotheses, and Models		
				SC.7.N.3.1	Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.
				SC.7.N.3.2	Identify the benefits and limitations of the use of scientific models.
SC.7.P	Grade 7 Physical Science				
		SC.7.P.10	Forms of Energy		
				SC.7.P.10.1	Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors.
				SC.7.P.10.2	Observe and explain that light can be reflected, refracted, and/or absorbed.
				SC.7.P.10.3	Recognize that light waves, sound waves, and other waves move at different speeds in different materials.\\\\\\\\
		SC.7.P.11	Energy Transfer and Transformations		

				SC.7.P.11.1	Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.
				SC.7.P.11.2	Investigate and describe the transformation of energy from one form to another.
				SC.7.P.11.3	Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another.
				SC.7.P.11.4	Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature.

8th Grade Science					
SC.8.E	Grade 8 Earth and Space Science				
		SC.8.E.5	Earth in Space and Time		
				SC.8.E.5.1	Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance.
				SC.8.E.5.2	Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.
				SC.8.E.5.3	Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.
				SC.8.E.5.4	Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions.
				SC.8.E.5.5	Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness).
				SC.8.E.5.6	Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.
				SC.8.E.5.7	Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.
				SC.8.E.5.8	Compare various historical models of the Solar System, including geocentric and heliocentric.
				SC.8.E.5.9	Explain the impact of objects in space on each other including:
				SC.8.E.5.10	Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.
				SC.8.E.5.11	Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.

				SC.8.E.5.12	Summarize the effects of space exploration on the economy and culture of Florida.
SC.8.L	Grade 8 Life Science				
		SC.8.L.18	Matter and Energy Transformations		
				SC.8.L.18.1	Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.
				SC.8.L.18.2	Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.
				SC.8.L.18.3	Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.
				SC.8.L.18.4	Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.
SC.8.N	Grade 8 Nature of Science				
		SC.8.N.1	The Practice of Science		
				SC.8.N.1.1	Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
				SC.8.N.1.2	Design and conduct a study using repeated trials and replication.
				SC.8.N.1.3	Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.
				SC.8.N.1.4	Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.
				SC.8.N.1.5	Analyze the methods used to develop a scientific explanation as seen in different fields of science.

				SC.8.N.1.6	Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
		SC.8.N.2	The Characteristics of Scientific Knowledge		
				SC.8.N.2.1	Distinguish between scientific and pseudoscientific ideas.
				SC.8.N.2.2	Discuss what characterizes science and its methods.
		SC.8.N.3	The Role of Theories, Laws, Hypotheses, and Models		
				SC.8.N.3.1	Select models useful in relating the results of their own investigations.
				SC.8.N.3.2	Explain why theories may be modified but are rarely discarded.
		SC.8.N.4	Science and Society		
				SC.8.N.4.1	Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.
				SC.8.N.4.2	Explain how political, social, and economic concerns can affect science, and vice versa.
SC.8.P	Grade 8 Physical Science				
		SC.8.P.8	Properties of Matter		
				SC.8.P.8.1	Explore the scientific theory of atoms (also known as atomic theory) by using models to explain the motion of particles in solids, liquids, and gases.
				SC.8.P.8.2	Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass.
				SC.8.P.8.3	Explore and describe the densities of various materials through measurement of their masses and volumes.
				SC.8.P.8.4	Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample.

				SC.8.P.8.5	Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.
				SC.8.P.8.6	Recognize that elements are grouped in the periodic table according to similarities of their properties.
				SC.8.P.8.7	Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of sub-atomic particles (electrons surrounding a nucleus containing protons and neutrons).
				SC.8.P.8.8	Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts.
				SC.8.P.8.9	Distinguish among mixtures (including solutions) and pure substances.
		SC.8.P.9	Changes in Matter		
				SC.8.P.9.1	Explore the Law of Conservation of Mass by demonstrating and concluding that mass is conserved when substances undergo physical and chemical changes.
				SC.8.P.9.2	Differentiate between physical changes and chemical changes.
				SC.8.P.9.3	Investigate and describe how temperature influences chemical changes.

Science 7th-12th Grade Catholic Integrated Faith Standards				
SC.712.IF	7th-12th Grade Integration of Faith - Catholic Curricular Standards and Dispositions in Scientific Topics			
	SC.712.IF.1	Scientific Topics - General Standards		
			SC.712.IF.1.1	Exhibit a primacy of care and concern at all stages of life for each human person as an image and likeness of God.
			SC.712.IF.1.2	Explain and promote the unity of faith and reason with confidence that there exists no contradiction between the God of nature and the God of the faith.
			SC.712.IF.1.3	Value the human body as the temple of the Holy Spirit.
			SC.712.IF.1.4	Share how the beauty and goodness of God is reflected in nature and the study of the natural sciences.
	SC.712.IF.2	Scientific Topics - Intellectual Standards		
			SC.712.IF.2.1	Articulate how science properly situates itself within other academic disciplines (e.g., history, theology) for correction and completion in order to recognize the limited material explanation of reality to which it is properly attuned.
			SC.712.IF.2.2	Demonstrate confidence in human reason and in one's ability to know the truth about God's creation and the fundamental intelligibility of the world.
			SC.712.IF.2.3	Analyze how the pursuit of scientific knowledge, for utilitarian purposes alone or for the misguided manipulation of nature, thwarts the pursuit of authentic Truth and the greater glory of God.
			SC.712.IF.2.4	Relate how the search for truth, even when it concerns a finite reality of the natural world or of man, is never-ending and always points beyond to something higher than the immediate object of study.
			SC.712.IF.2.5	Explain the processes of conservation, preservation, overconsumption, and stewardship as it relates to creation and to caring for that which God has given to sustain and delight us.
			SC.712.IF.2.6	Evaluate the relationship between God, man, and nature, and the proper role in the totality of being and creation.

				SC.712.IF.2.7	Describe humanity's natural situation in, and dependence upon, physical reality and how man carries out his role as a cooperator with God in the work of creation.
				SC.712.IF.2.8	Evaluate the errors present in the belief system of scientific naturalism or scientism[2] (which includes materialism[3] and reductionism[4]), which posits that scientific exploration and explanation is the only valid source of meaning.
				SC.712.IF.2.9	Distinguish the difference between the use of the scientific method and the use of theological inquiry to know and understand God's creation and universal truths.
				SC.712.IF.2.10	Articulate the limitations of science (the scientific method and constraints of the physical world) to know and understand God and transcendent reality.
				SC.712.IF.2.11	Identify key Catholic scientists such as Copernicus, Mendel, DaVinci, Bacon, Pasteur, Volta, St. Albert the Great, and others and the witness and evidence they supply against the false claim that Catholicism is not compatible with science.
				SC.712.IF.2.12	Analyze and articulate the Church's approach to the theory of evolution.
				SC.712.IF.2.13	Relate how the human soul is specifically created by God for each human being, does not evolve from lesser matter, and is not inherited from our parents.
				SC.712.IF.2.14	Explain how understanding the physiological properties of a human being does not address the existence of the transcendent spirit of the human person (see Appendix E).
				SC.712.IF.2.15	Explain the supernatural design hypothesis in terms of the Borde-Vilenkin-Guth Proof, the Second Law of Thermodynamics, entropy, and anthropic coincidences (fine tuning of initial conditions and universal constants) (see Appendix E).
				SC.712.IF.2.16	Articulate the details of the Galileo affair to counter the assumption that the Church is anti-science.
				SC.712.IF.2.17	Demonstrate an understanding of the moral issues involving in vitro fertilization, human cloning, human genetic manipulation, and human experimentation and what the Church teaches regarding work in these areas.
		SC.712.IF.3	Scientific Topics - Dispositional Standards		
				SC.712.IF.3.1	Display a deep sense of wonder and delight about the natural universe.

				SC.712.IF.3.2	Share how natural phenomena have more than a utilitarian meaning and purpose and exemplify the handiwork of the Creator.
				SC.712.IF.3.3	Subscribe to the premise that nature should not be manipulated at will, but should be respected for its natural purpose and end as destined by the creator God.
				SC.712.IF.3.4	Share concern and care for the environment as part of God's creation.
				SC.712.IF.3.5	Adhere to the idea of the simultaneous complexity and simplicity of physical reality.

9th-12th Grade Scienced					
Earth Space Science					
SC.912.E	Grades 9-12 Earth and Space Science				
		SC.912.E.5	Earth in Space and Time		
				SC.912.E.5.1	Cite evidence used to develop and verify the scientific theory of the Big Bang (also known as the Big Bang Theory) of the origin of the universe.
				SC.912.E.5.2	Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.
				SC.912.E.5.3	Describe and predict how the initial mass of a star determines its evolution.
				SC.912.E.5.4	Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.
				SC.912.E.5.5	Explain the formation of planetary systems based on our knowledge of our Solar System and apply this knowledge to newly discovered planetary systems.
				SC.912.E.5.6	Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other.
				SC.912.E.5.7	Relate the history of and explain the justification for future space exploration and continuing technology development.
				SC.912.E.5.8	Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools.
				SC.912.E.5.9	Analyze the broad effects of space exploration on the economy and culture of Florida.
				SC.912.E.5.10	Describe and apply the coordinate system used to locate objects in the sky.

				SC.912.E.5.11	Distinguish the various methods of measuring astronomical distances and apply each in appropriate situations.
		SC.912.E.6	Earth Structures		
				SC.912.E.6.1	Describe and differentiate the layers of Earth and the interactions among them.
				SC.912.E.6.2	Connect surface features to surface processes that are responsible for their formation.
				SC.912.E.6.3	Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.
				SC.912.E.6.4	Analyze how specific geologic processes and features are expressed in Florida and elsewhere.
				SC.912.E.6.5	Describe the geologic development of the present day oceans and identify commonly found features.
				SC.912.E.6.6	Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.
		SC.912.E.7	Earth Systems and Patterns		
				SC.912.E.7.1	Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.
				SC.912.E.7.2	Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the poles and the equator.
				SC.912.E.7.3	Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.
				SC.912.E.7.4	Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.

				SC.912.E.7.5	Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.
				SC.912.E.7.6	Relate the formation of severe weather to the various physical factors.
				SC.912.E.7.7	Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.
				SC.912.E.7.8	Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.
				SC.912.E.7.9	Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.
Life Science					
SC.912.L	Grades 9-12 Life Science				
		SC.912.L.14	Organization and Development of Living Organisms		
				SC.912.L.14.1	Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.
				SC.912.L.14.2	Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).
				SC.912.L.14.3	Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.
				SC.912.L.14.4	Compare and contrast structure and function of various types of microscopes.

				SC.912.L.14.5	Explain the evidence supporting the scientific theory of the origin of eukaryotic cells (endosymbiosis).
				SC.912.L.14.6	Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.
				SC.912.L.14.7	Relate the structure of each of the major plant organs and tissues to physiological processes.
				SC.912.L.14.8	Explain alternation of generations in plants.
				SC.912.L.14.9	Relate the major structure of fungi to their functions.
				SC.912.L.14.10	Discuss the relationship between the evolution of land plants and their anatomy.
				SC.912.L.14.11	Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue.
				SC.912.L.14.12	Describe the anatomy and histology of bone tissue.
				SC.912.L.14.13	Distinguish between bones of the axial skeleton and the appendicular skeleton.
				SC.912.L.14.14	Identify the major bones of the axial and appendicular skeleton.
				SC.912.L.14.15	Identify major markings (such as foramina, fossae, tubercles, etc.) on a skeleton. Explain why these markings are important.
				SC.912.L.14.16	Describe the anatomy and histology, including ultrastructure, of muscle tissue.
				SC.912.L.14.17	List the steps involved in the sliding filament of muscle contraction.
				SC.912.L.14.18	Describe signal transmission across a myoneural junction.
				SC.912.L.14.19	Explain the physiology of skeletal muscle.
				SC.912.L.14.20	Identify the major muscles of the human on a model or diagram.

				SC.912.L.14.21	Describe the anatomy, histology, and physiology of the central and peripheral nervous systems and name the major divisions of the nervous system.
				SC.912.L.14.22	Describe the physiology of nerve conduction, including the generator potential, action potential, and the synapse.
				SC.912.L.14.23	Identify the parts of a reflex arc.
				SC.912.L.14.24	Identify the general parts of a synapse and describe the physiology of signal transmission across a synapse.
				SC.912.L.14.25	Identify the major parts of a cross section through the spinal cord.
				SC.912.L.14.26	Identify the major parts of the brain on diagrams or models.
				SC.912.L.14.27	Identify the functions of the major parts of the brain, including the meninges, medulla, pons, midbrain, hypothalamus, thalamus, cerebellum and cerebrum.
				SC.912.L.14.28	Identify the major functions of the spinal cord.
				SC.912.L.14.29	Define the terms endocrine and exocrine.
				SC.912.L.14.30	Compare endocrine and neural controls of physiology.
				SC.912.L.14.31	Describe the physiology of hormones including the different types and the mechanisms of their action.
				SC.912.L.14.32	Describe the anatomy and physiology of the endocrine system.
				SC.912.L.14.33	Describe the basic anatomy and physiology of the reproductive system.
				SC.912.L.14.34	Describe the composition and physiology of blood, including that of the plasma and the formed elements.
				SC.912.L.14.35	Describe the steps in hemostasis, including the mechanism of coagulation. Include the basis for blood typing and transfusion reactions.
				SC.912.L.14.36	Describe the factors affecting blood flow through the cardiovascular system.
				SC.912.L.14.37	Explain the components of an electrocardiogram.

				SC.912.L.14.38	Describe normal heart sounds and what they mean.
				SC.912.L.14.39	Describe hypertension and some of the factors that produce it.
				SC.912.L.14.40	Describe the histology of the major arteries and veins of systemic, pulmonary, hepatic portal, and coronary circulation.
				SC.912.L.14.41	Describe fetal circulation and changes that occur to the circulatory system at birth.
				SC.912.L.14.42	Describe the anatomy and the physiology of the lymph system.
				SC.912.L.14.43	Describe the histology of the respiratory system.
				SC.912.L.14.44	Describe the physiology of the respiratory system including the mechanisms of ventilation, gas exchange, gas transport and the mechanisms that control the rate of ventilation.
				SC.912.L.14.45	Describe the histology of the alimentary canal and its associated accessory organs.
				SC.912.L.14.46	Describe the physiology of the digestive system, including mechanical digestion, chemical digestion, absorption and the neural and hormonal mechanisms of control.
				SC.912.L.14.47	Describe the physiology of urine formation by the kidney.
				SC.912.L.14.48	Describe the anatomy, histology, and physiology of the ureters, the urinary bladder and the urethra.
				SC.912.L.14.49	Identify the major functions associated with the sympathetic and parasympathetic nervous systems.
				SC.912.L.14.50	Describe the structure of vertebrate sensory organs. Relate structure to function in vertebrate sensory systems.
				SC.912.L.14.51	Describe the function of the vertebrate integumentary system.

				SC.912.L.14.52	Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.
				SC.912.L.14.53	Discuss basic classification and characteristics of plants. Identify bryophytes, pteridophytes, gymnosperms, and angiosperms.
		SC.912.L.15	Diversity and Evolution of Living Organisms		
				SC.912.L.15.1	Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.
				SC.912.L.15.2	Discuss the use of molecular clocks to estimate how long ago various groups of organisms diverged evolutionarily from one another.
				SC.912.L.15.3	Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.
				SC.912.L.15.4	Describe how and why organisms are hierarchically classified and based on evolutionary relationships.
				SC.912.L.15.5	Explain the reasons for changes in how organisms are classified.
				SC.912.L.15.6	Discuss distinguishing characteristics of the domains and kingdoms of living organisms.
				SC.912.L.15.7	Discuss distinguishing characteristics of vertebrate and representative invertebrate phyla, and chordate classes using typical examples.
				SC.912.L.15.8	Describe the scientific explanations of the origin of life on Earth.
				SC.912.L.15.9	Explain the role of reproductive isolation in the process of speciation.
				SC.912.L.15.10	Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans,

					including brain size, jaw size, language, and manufacture of tools.
				SC.912.L.15.11	Discuss specific fossil hominids and what they show about human evolution.
				SC.912.L.15.12	List the conditions for Hardy-Weinberg equilibrium in a population and why these conditions are not likely to appear in nature. Use the Hardy-Weinberg equation to predict genotypes in a population from observed phenotypes.
				SC.912.L.15.13	Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.
				SC.912.L.15.14	Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
				SC.912.L.15.15	Describe how mutation and genetic recombination increase genetic variation.
		SC.912.L.16	Heredity and Reproduction		
				SC.912.L.16.1	Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.
				SC.912.L.16.2	Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.
				SC.912.L.16.3	Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.
				SC.912.L.16.4	Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.
				SC.912.L.16.5	Explain the basic processes of transcription and translation, and how they result in the expression of genes.

				SC.912.L.16.6	Discuss the mechanisms for regulation of gene expression in prokaryotes and eukaryotes at transcription and translation level.
				SC.912.L.16.7	Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.
				SC.912.L.16.8	Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.
				SC.912.L.16.9	Explain how and why the genetic code is universal and is common to almost all organisms.
				SC.912.L.16.10	Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.
				SC.912.L.16.11	Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (RFLP) analysis.
				SC.912.L.16.12	Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).
				SC.912.L.16.13	Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.
				SC.912.L.16.14	Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.
				SC.912.L.16.15	Compare and contrast binary fission and mitotic cell division.

				SC.912.L.16.16	Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.
				SC.912.L.16.17	Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.
		SC.912.L.17	Interdependence		
				SC.912.L.17.1	Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.
				SC.912.L.17.2	Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.
				SC.912.L.17.3	Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.
				SC.912.L.17.4	Describe changes in ecosystems resulting from seasonal variations, climate change and succession.
				SC.912.L.17.5	Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.
				SC.912.L.17.6	Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.
				SC.912.L.17.7	Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.
				SC.912.L.17.8	Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.

				SC.912.L.17.9	Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.
				SC.912.L.17.10	Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.
				SC.912.L.17.11	Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.
				SC.912.L.17.12	Discuss the political, social, and environmental consequences of sustainable use of land.
				SC.912.L.17.13	Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
				SC.912.L.17.14	Assess the need for adequate waste management strategies.
				SC.912.L.17.15	Discuss the effects of technology on environmental quality.
				SC.912.L.17.16	Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.
				SC.912.L.17.17	Assess the effectiveness of innovative methods of protecting the environment.
				SC.912.L.17.18	Describe how human population size and resource use relate to environmental quality.
				SC.912.L.17.19	Describe how different natural resources are produced and how their rates of use and renewal limit availability.
				SC.912.L.17.20	Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.
		SC.912.L.18	Matter and Energy Transformations		

				SC.912.L.18.1	Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.
				SC.912.L.18.2	Describe the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of carbohydrates in living things.
				SC.912.L.18.3	Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes.
				SC.912.L.18.4	Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.
				SC.912.L.18.5	Discuss the use of chemiosmotic gradients for ATP production in chloroplasts and mitochondria.
				SC.912.L.18.6	Discuss the role of anaerobic respiration in living things and in human society.
				SC.912.L.18.7	Identify the reactants, products, and basic functions of photosynthesis.
				SC.912.L.18.8	Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.
				SC.912.L.18.9	Explain the interrelated nature of photosynthesis and cellular respiration.
				SC.912.L.18.10	Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.
				SC.912.L.18.11	Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.

				SC.912.L.18.12	Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.
The Nature of Science					
SC.912.N	Grades 9-12 Nature of Science				
		SC.912.N.1	The Practice of Science		
				SC.912.N.1.1	Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:
				SC.912.N.1.2	Describe and explain what characterizes science and its methods.
				SC.912.N.1.3	Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.
				SC.912.N.1.4	Identify sources of information and assess their reliability according to the strict standards of scientific investigation.
				SC.912.N.1.5	Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.
				SC.912.N.1.6	Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.
				SC.912.N.1.7	Recognize the role of creativity in constructing scientific questions, methods and explanations.
		SC.912.N.2	The Characteristics of Scientific Knowledge		

				SC.912.N.2.1	Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).
				SC.912.N.2.2	Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.
				SC.912.N.2.3	Identify examples of pseudoscience (such as astrology, phrenology) in society.
				SC.912.N.2.4	Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.
				SC.912.N.2.5	Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.
		SC.912.N.3	The Role of Theories, Laws, Hypotheses, and Models		
				SC.912.N.3.1	Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.

				SC.912.N.3.2	Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.
				SC.912.N.3.3	Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.
				SC.912.N.3.4	Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.
				SC.912.N.3.5	Describe the function of models in science, and identify the wide range of models used in science.
		SC.912.N.4	Science and Society		
				SC.912.N.4.1	Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.
				SC.912.N.4.2	Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.
Physical Science					
SC.912.P	Grades 9-12 Physical Science				
		SC.912.P.8	Matter		
				SC.912.P.8.1	Differentiate among the four states of matter.
				SC.912.P.8.2	Differentiate between physical and chemical properties and physical and chemical changes of matter.
				SC.912.P.8.3	Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.
				SC.912.P.8.4	Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in

					terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.
				SC.912.P.8.5	Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.
				SC.912.P.8.6	Distinguish between bonding forces holding compounds together and other attractive forces, including hydrogen bonding and van der Waals forces.
				SC.912.P.8.7	Interpret formula representations of molecules and compounds in terms of composition and structure.
				SC.912.P.8.8	Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.
				SC.912.P.8.9	Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions.
				SC.912.P.8.10	Describe oxidation-reduction reactions in living and non-living systems.
				SC.912.P.8.11	Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.
				SC.912.P.8.12	Describe the properties of the carbon atom that make the diversity of carbon compounds possible.
				SC.912.P.8.13	Identify selected functional groups and relate how they contribute to properties of carbon compounds.
		SC.912.P.10	Energy		
				SC.912.P.10.1	Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.
				SC.912.P.10.2	Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.

				SC.912.P.10.3	Compare and contrast work and power qualitatively and quantitatively.
				SC.912.P.10.4	Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.
				SC.912.P.10.5	Relate temperature to the average molecular kinetic energy.
				SC.912.P.10.6	Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.
				SC.912.P.10.7	Distinguish between endothermic and exothermic chemical processes.
				SC.912.P.10.8	Explain entropy's role in determining the efficiency of processes that convert energy to work.
				SC.912.P.10.9	Describe the quantization of energy at the atomic level.
				SC.912.P.10.10	Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).
				SC.912.P.10.11	Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.
				SC.912.P.10.12	Differentiate between chemical and nuclear reactions.
				SC.912.P.10.13	Relate the configuration of static charges to the electric field, electric force, electric potential, and electric potential energy.
				SC.912.P.10.14	Differentiate among conductors, semiconductors, and insulators.
				SC.912.P.10.15	Investigate and explain the relationships among current, voltage, resistance, and power.
				SC.912.P.10.16	Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and

					electric fields, and their application to modern technologies.
				SC.912.P.10.17	Explore the theory of electromagnetism by explaining electromagnetic waves in terms of oscillating electric and magnetic fields.
				SC.912.P.10.18	Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.
				SC.912.P.10.19	Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are not.
				SC.912.P.10.20	Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.
				SC.912.P.10.21	Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.
				SC.912.P.10.22	Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.
		SC.912.P.12	Motion		
				SC.912.P.12.1	Distinguish between scalar and vector quantities and assess which should be used to describe an event.
				SC.912.P.12.2	Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.
				SC.912.P.12.3	Interpret and apply Newton's three laws of motion.
				SC.912.P.12.4	Describe how the gravitational force between two objects depends on their masses and the distance between them.

				SC.912.P.12.5	Apply the law of conservation of linear momentum to interactions, such as collisions between objects.
				SC.912.P.12.6	Qualitatively apply the concept of angular momentum.
				SC.912.P.12.7	Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.
				SC.912.P.12.8	Recognize that Newton's Laws are a limiting case of Einstein's Special Theory of Relativity at speeds that are much smaller than the speed of light.
				SC.912.P.12.9	Recognize that time, length, and energy depend on the frame of reference.
				SC.912.P.12.10	Interpret the behavior of ideal gases in terms of kinetic molecular theory.
				SC.912.P.12.11	Describe phase transitions in terms of kinetic molecular theory.
				SC.912.P.12.12	Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.
				SC.912.P.12.13	Explain the concept of dynamic equilibrium in terms of reversible processes occurring at the same rates.
Earth Science					
ENG	Energy Transfer				
		ENG-1	Energy can be converted from one form to another.		
				ENG-1.A	Explain how solar energy is acquired and transferred by living organisms.
				ENG-1.B	Explain how energy flows and matter cycles through trophic levels.
				ENG-1.C	Determine how the energy decreases as it flows through ecosystems.
				ENG-1.D	Describe food chains and food webs, and their constituent members by trophic level.

		ENG-2	Most of the Earth's atmospheric processes are driven by input of energy from the sun		
				ENG-2.A	Explain how the sun's energy affects the Earth's surface.
				ENG-2.B	Describe how the Earth's geography affects weather and climate.
				ENG-2.C	Describe the environmental changes and effects that result from El Niño or La Niña events (El Niño–Southern Oscillation).
		ENG-3	Humans use energy from a variety of sources, resulting in positive and negative consequences		
				ENG-3.A	Identify differences between nonrenewable and renewable energy sources.
				ENG-3.B	Describe trends in energy consumption.
				ENG-3.C	Identify types of fuels and their uses.
				ENG-3.D	Identify where natural energy resources occur.
				ENG-3.E	Describe the use and methods of fossil fuels in power generation.
				ENG-3.F	Describe the effects of fossil fuels on the environment.
				ENG-3.G	Describe the use of nuclear energy in power generation.
				ENG-3.H	Describe the effects of the use of nuclear energy on the environment.
				ENG-3.I	Describe the effects of the use of biomass in power generation on the environment.
				ENG-3.J	Describe the use of solar energy in power generation.
				ENG-3.K	Describe the effects of the use of solar energy in power generation on the environment.
				ENG-3.L	Describe the use of hydroelectricity in power generation.

				ENG-3.M	Describe the effects of the use of hydroelectricity in power generation on the environment.
				ENG-3.N	Describe the use of geothermal energy in power generation.
				ENG-3.O	Describe the effects of the use of geothermal energy in power generation on the environment.
				ENG-3.P	Describe the use of hydrogen fuel cells in power generation.
				ENG-3.Q	Describe the effects of the use of hydrogen fuel cells in power generation on the environment.
				ENG-3.R	Describe the use of wind energy in power generation.
				ENG-3.S	Describe the effects of the use of wind energy in power generation on the environment.
				ENG-3.T	Describe methods for conserving energy.
ERT	Interactions Between Earth Systems				
		ERT-1	Ecosystems are the result of biotic and abiotic interactions.		
				ERT-1.A	Explain how the availability of resources influences species interactions.
				ERT-1.B	Describe the global distribution and principal environmental aspects of terrestrial biomes.
				ERT-1.C	Describe the global distribution and principal environmental aspects of aquatic biomes.
				ERT-1.D	Explain the steps and reservoir interactions in the carbon cycle.
				ERT-1.E	Explain the steps and reservoir interactions in the nitrogen cycle.
				ERT-1.F	Explain the steps and reservoir interactions in the phosphorus cycle.

				ERT-1.G	Explain the steps and reservoir interactions in the hydrologic cycle.
		ERT-2	Ecosystems have structure and diversity that change over time		
				ERT-2.A	Explain levels of biodiversity and their importance to ecosystems.
				ERT-2.B	Describe ecosystem services.
				ERT-2.C	Describe the results of human disruptions to ecosystem services.
				ERT-2.D	Describe island biogeography
				ERT-2.E	Describe the role of island biogeography in evolution.
				ERT-2.F	Describe ecological tolerance.
				ERT-2.G	Explain how natural disruptions, both short and long-term, impact an ecosystem.
				ERT-2.H	Describe how organisms adapt to their environment.
				ERT-2.I	Describe ecological succession.
				ERT-2.J	Describe the effect of ecological succession on ecosystems.
		ERT-3	Populations change over time in reaction to a variety of factors		
				ERT-3.A	Identify differences between generalist and specialist species.
				ERT-3.B	Identify differences between K- and r-selected species.
				ERT-3.C	Explain survivorship curves.
				ERT-3.D	Describe carrying capacity.
				ERT-3.E	Describe the impact of carrying capacity on ecosystems.
				ERT-3.F	Explain how resource availability affects population growth.

		ERT-4	Earth's systems interact, resulting in a state of balance over time.		
				ERT-4.A	Describe the geological changes and events that occur at convergent, divergent, and transform plate boundaries.
				ERT-4.B	Describe the characteristics and formation of soil.
				ERT-4.C	Describe similarities and differences between properties of different soil types.
				ERT-4.D	Describe the structure and composition of the Earth's atmosphere.
				ERT-4.E	Explain how environmental factors can result in atmospheric circulation.
				ERT-4.F	Describe the characteristics of a watershed.
EIN	Interactions Between Different Species and the Environment				
		EIN-1	Human populations change in reaction to a variety of factors, including social and cultural factors.		
				EIN-1.A	Explain age structure diagrams.
				EIN-1.B	Explain factors that affect total fertility rate in human populations.
				EIN-1.C	Explain how human populations experience growth and decline.
				EIN-1.D	Define the demographic transition.
		EIN-2	When humans use natural resources, they alter natural systems.		
				EIN-2.A	Explain the concept of the tragedy of the commons.
				EIN-2.B	Describe the effect of clearcutting on forests.

				EIN-2.C	Describe changes in agricultural practices.
				EIN-2.D	Describe agricultural practices that cause environmental damage.
				EIN-2.E	Describe different methods of irrigation.
				EIN-2.F	Describe the benefits and drawbacks of different methods of irrigation.
				EIN-2.G	Describe the benefits and drawbacks of different methods of pest control
				EIN-2.H	Identify different methods of meat production.
				EIN-2.I	Describe the benefits and drawbacks of different methods of meat production.
				EIN-2.J	Describe causes of and problems related to overfishing.
				EIN-2.K	Describe natural resource extraction through mining.
				EIN-2.L	Describe ecological and economic impacts of natural resource extraction through mining.
				EIN-2.M	Describe the effects of urbanization on the environment.
				EIN-2.N	Explain the variables measured in an ecological footprint.
		EIN-3	Pollutants can have both direct and indirect impacts on the health of organisms, including humans.		
				EIN-3.A	Define lethal dose 50% (LD50).
				EIN-3.B	Evaluate dose response curves.
				EIN-3.C	Identify sources of human health issues that are linked to pollution.
				EIN-3.D	Explain human pathogens and their cycling through the environment.
		EIN-4	The health of a species is closely tied to its ecosystem, and minor environmental		

			changes can have a large impact.		
				EIN-4.A	Explain the environmental problems associated with invasive species and strategies to control them.
				EIN-4.B	Explain how species become endangered and strategies to combat the problem.
				EIN-4.C	Explain how human activities affect biodiversity and strategies to combat the problem.
STB	Sustainability				
		STB-1	Humans can mitigate their impact on land and water resources through sustainable use.		
				STB-1.A	Explain the concept of sustainability.
				STB-1.B	Describe methods for mitigating problems related to urban runoff.
				STB-1.C	Describe integrated pest management.
				STB-1.D	Describe the benefits and drawbacks of integrated pest management (IPM).
				STB-1.E	Describe sustainable agricultural and food production practices.
				STB-1.F	Describe the benefits and drawbacks of aquaculture.
				STB-1.G	Describe methods for mitigating human impact on forests.
		STB-2	Human activities have physical, chemical, and biological consequences for the atmosphere.		
				STB-2.A	Identify the sources and effects of air pollutants.
				STB-2.B	Explain the causes and effects of photochemical smog and methods to reduce it.

				STB-2.C	Describe thermal inversion and its relationship with pollution.
				STB-2.D	Describe natural sources of CO2 and particulates.
				STB-2.E	Identify indoor air pollutants.
				STB-2.F	Describe the effects of indoor air pollutants.
				STB-2.G	Explain how air pollutants can be reduced at the source.
				STB-2.H	Describe acid deposition.
				STB-2.I	Describe the effects of acid deposition on the environment.
				STB-2.J	Describe human activities that result in noise pollution and its effects.
		STB-3	Human activities, including the use of resources, have physical, chemical, and biological consequences for ecosystems.		
				STB-3.A	Identify differences between point and nonpoint sources of pollution.
				STB-3.B	Describe the impacts of human activities on aquatic ecosystems.
				STB-3.C	Describe endocrine disruptors.
				STB-3.D	Describe the effects of endocrine disruptors on ecosystems.
				STB-3.E	Describe the impacts of human activity on wetlands and mangroves.
				STB-3.F	Explain the environmental effects of excessive use of fertilizers and detergents on aquatic ecosystems.
				STB-3.G	Describe the effects of thermal pollution on aquatic ecosystems.
				STB-3.H	Describe the effect of persistent organic pollutants (POPs) on ecosystems.

				STB-3.I	Describe bioaccumulation and biomagnification.
				STB-3.J	Describe the effects of bioaccumulation and biomagnification.
				STB-3.K	Describe solid waste disposal methods.
				STB-3.L	Describe the effects of solid waste disposal methods.
				STB-3.M	Describe changes to current practices that could reduce the amount of generated waste and their associated benefits and drawbacks.
				STB-3.N	Describe best practices in sewage treatment.
		STB-4	Local and regional human activities can have impacts at the global level.		
				STB-4.A	Explain the importance of stratospheric ozone to life on Earth.
				STB-4.B	Describe chemicals used to substitute for chlorofluorocarbons (CFCs).
				STB-4.C	Identify the greenhouse gases.
				STB-4.D	Identify the sources and potency of the greenhouse gases.
				STB-4.E	Identify the threats to human health and the environment posed by an increase in greenhouse gases.
				STB-4.F	Explain how changes in climate, both short- and long term, impact ecosystems.
				STB-4.G	Explain the causes and effects of ocean warming.
				STB-4.H	Explain the causes and effects of ocean acidification.