

GR	ST.	BM	IND.	A.	Title	Description
12	1				Science as Inquiry	The student will develop the abilities necessary to do scientific inquiry and develop an understanding of scientific inquiry.
12	1	1				The student will demonstrate the abilities necessary to do scientific inquiry.
12	1	1	1			The student actively engages in asking and evaluating research questions.
12	1	1	2	**		The student actively engages in investigations, including developing questions, gathering and analyzing data, and designing and conducting research.
12	1	1	3	**		The student actively engages in using technological tools and mathematics in their own scientific investigations.
12	1	1	4			The student actively engages in conducting an inquiry, formulating and revising his or her scientific explanations and models (physical, conceptual, or mathematical) using logic and evidence, and recognizing that potential alternative explanations and models should be considered.
12	1	1	5			The student actively engages in communicating and defending the design, results, and conclusion of his/her investigation.
12	2A				Chemistry	The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.
12	2A	1				The student will understand the structure of the atom.
12	2A	1	1	**		The student understands atoms, the fundamental organizational unit of matter, are composed of subatomic particles. Chemists are primarily interested in the protons, electrons, and neutrons found in the atom.

12	2A	1	2		The student understands isotopes are atoms with the same atomic number (same number of protons) but different numbers of neutrons. The nuclei of some atoms are radioactive isotopes that spontaneously decay, releasing radioactive energy.
12	2A	2			The student will understand the states and properties of matter.
12	2A	2	1	**	The student understands chemists use kinetic and potential energy to explain the physical and chemical properties of matter on earth that may exist in any of these three states: solids, liquids, and gases.
12	2A	2	2	**	The student understands the periodic table lists elements according to increasing atomic number. This table organizes physical and chemical trends by groups, periods, and sub-categories.
12	2A	2	3	**	The student understands chemical bonds result when valence electrons are transferred or shared between atoms. Breaking a chemical bond requires energy. Formation of a chemical bond releases energy. Ionic compounds result from atoms transferring electrons. Molecular compounds result from atoms sharing electrons. For example, carbon atoms can bond to each other in chains, rings, and branching networks. Branched network and metallic solids also result from bonding.
12	2A	3			The student will gain a basic of chemical reactions.
12	2A	3	1	**	The student understands a chemical reaction occurs when one or more substances (reactants) react to form a different chemical substance(s) (products). There are different types of chemical reactions all of which demonstrate the Law of Conservation of Matter and Energy.
12	2A	3	2		The student understands how to perform mathematical calculations regarding the Law of Conservation of Matter, i.e., through stoichiometric relationships.
12	2A	3	3		The student understands the differences and reactions between acids, bases, and salts. Perform calculations to determine the concentration of ions in solutions.
12	2B				Physics The student will develop an understanding of the structure of atoms, compounds, chemical reactions, and the interactions of energy and matter.
12	2B	1			The student will understand the relationships between force and motion.
12	2B	1	1	**	The student understands Newton's Laws and the variables of time, position, velocity, and acceleration can be used to describe the position and motion of particles.

12	2B	1	2		The student understands physicists use conservation laws to analyze the motion of objects.
12	2B	2			The student will understand the conservation of mass and energy, and the First and Second Laws of Thermodynamics.
12	2B	2	1		The student understands matter has energy. Mass and energy can be interchanged. The total energy in the universe is constant, but the type of energy may vary.
12	2B	2	2 **		The student understands the first law of thermodynamics states the total internal energy of a substance (the sum of all the kinetic and potential energies of its constituent molecules) will change only if heat is exchanged with the environment or work is done on or by the substance. In any physical interaction, the total energy in the universe is conserved.
12	2B	2	3		The student understands the second law of thermodynamics that states the entropy of the universe is increasing.
12	2B	3			The student will understand the nature of the fundamental interactions of matter and energy.
12	2B	3	1		There are four fundamental forces in nature: strong nuclear force, weak nuclear force, electromagnetic force, and gravitational force.
12	2B	3	2 **		The student understands waves have energy and can transfer energy when they interact with matter.
12	2B	3	3		The student understand interference - how waves interact with other waves.
12	2B	3	4		The student will understand the principles of reflection and refraction.
12	2B	3	5 **		The student understands electromagnetic waves result when a charged particle is accelerated or decelerated.
12	2B	3	6		The student understands basic electrostatics and circuits.
12	3			Life Science	The student will develop an understanding of the cell, molecular basis of heredity, biological evolution, interdependence of organisms, matter, energy, and organization in living systems, and the behavior of organisms.
12	3	1			The student will demonstrate an understanding of the structure and function of the cell.

12	3	1	1	The student understands cells are composed of a variety of specialized structures that carry out specialized structures that carry out specific functions.
12	3	1	2 **	The student understands cell functions involve specific chemical reactions.
12	3	1	3	The student understands cells function and replicate as a result of information stored in DNA and RNA molecules.
12	3	1	4	The student understands some plant cells contain chloroplasts, which are the sites of photosynthesis.
12	3	1	5	The student understands cells can differentiate, thereby enabling complex multicellular organisms to form.
12	3	2		The student will demonstrate an understanding of chromosomes, genes, and the molecular basis of heredity.
12	3	2	1 **	The student understands living organisms contain DNA or RNA as their genetic material, which provides the instructions that specify the characteristics of organisms.
12	3	2	2	The student understands organisms usually have a characteristic number of chromosomes; one pair of these may determine the sex of individuals.
12	3	2	3 **	The student understands hereditary information is contained in genes, located in the chromosomes of each cell.
12	3	2	4	The student understands gametes carry the genetic information to the next generation.
12	3	2	5	The student understands expressed mutations occur in DNA at very low rates.
12	3	3		The student will understand biological evolution.
12	3	3	1 **	The student understands biological evolution, descent with modification, is a scientific explanation for the history of the diversification of organisms from common ancestors.
12	3	3	2	The student understands populations of organisms adapt to environmental challenges and changes as a result of natural selection, genetic drift and various mechanisms of genetic change.

12	3	3	3 **	The student understands biological evolution is used to explain the earth's present day biodiversity: the number, variety and variability of organisms.
12	3	3	4 **	The student understands organisms vary widely within and between populations. Variation allows for natural selection to occur.
12	3	3	5	The student understands the primary mechanism acting on variation is natural selection.
12	3	3	6	The student understands biological evolution is used as a broad, unifying theoretical framework for biology.
12	3	4		The student will understand the interdependence of organisms and their interaction with the physical environment.
12	3	4	1 **	The student understands atoms and molecules on the earth cycle among the living and nonliving components of the biosphere.
12	3	4	2	The student understands energy is received, transformed and expended in ecosystems.
12	3	4	3 **	The student understands the distribution and abundance of organisms and populations in ecosystems are limited by the carrying capacity.
12	3	4	4	The student understands organisms cooperate and compete in complex, interdependent relationships.
12	3	4	5	The student understands human beings live within and impact ecosystems.
12	3	5		The student will develop an understanding of matter, energy, and organization in living systems.
12	3	5	1	The student understands living systems require a continuous input of energy to maintain their chemical and physical organization.
12	3	5	2 **	The student understands the sun is the primary source of energy for life through the process of photosynthesis.
12	3	5	3 **	The student understands food molecules contain biochemical energy, which is then available for cellular respiration.

12	3	5	4	The student understands the structure and function of an organism serve to acquire, transform, transport, release, and eliminate the matter and energy used to sustain the organism.
12	3	6		The student will understand the behavior of animals.
12	3	6	1 **	The student understands animals have behavioral responses to internal changes and to external stimuli.
12	3	6	2	The student understands most multicellular animals have nervous systems that underlie behavior.
12	3	6	3	The student understands behaviors are often adaptive when viewed in terms of survival and reproductive success.
12	3	7		The student will demonstrate an understanding of the diversity of structure and function in organisms.
12	3	7	1	The student understands differences in structure and function among organisms and can identify the characteristics of relevant organisms and can identify the characteristics of relevant life forms.
12	3	7	2 **	The student understands that homeostasis is the dynamic regulation and balance of an organisms internal environment to maintain conditions suitable for survival.
12	3	7	3 **	The student understands that living things change following a specific pattern of developmental stages called life cycles.
12	3	7	4	The student understands that in complex organisms there is a division of labor into specific body systems i.e., respiration, digestions, nervous endocrine, excretion, circulatory, reproductive, immune, skeletal and muscle.
12	3	7	5	The student understands taxonomy is the systematic way in which organisms are placed into a hierarchical classification system, according to their physical and genetic characteristics and their evolutionary history.

12	4			Earth and Space Science	The student will develop an understanding of energy in the earth system, geochemical cycles, the formation and organization of earth system, the dynamics of the earth/moon/sun system, and the organization and development of the
12	4	1			The student will develop an understanding of the sources of energy that power the subsystems and cycles of the dynamic earth: the geosphere, hydrosphere, atmosphere and biosphere.
12	4	1	1		The student understands constructive and destructive processes, including weathering, erosion and deposition, dynamically reshape the surface of the earth.
12	4	1	2 **		The student understands the theory of Plate Tectonics explains that internal energy drives the earth's ever changing structure.
12	4	1	3		The ultimate source of atmospheric and oceanic energy comes from the sun. Energy flow drives global climate and weather. Climate and weather are influenced by geographic features, cloud cover, and the earth's rotation.
12	4	1	4		The student understands the processes of water cycling through surface water (oceans, lakes, streams, glaciers), ground water (aquifers), and the atmosphere. (hydrological cycle)
12	4	2			The student will develop an understanding of the origin and development of the dynamic earth system.
12	4	2	1 **		The student understands geological time is used to understand the earth's past.
12	4	3			The student will develop an understanding of dynamics of our solar system.
12	4	3	1		The student understands gravitational attraction of objects in the solar system keeps solar system objects in orbit.
12	4	3	2 **		The student understands the relationship between the earth, moon, and sun explains the seasons, tides and moon phases.
12	4	3	3		The student understands the relative sizes and distances of objects in the solar system.
12	4	3	4		The student understands the sun, earth, and other objects in the solar system formed from a nebular cloud of dust and gas.
12	4	4			The student will develop an understanding of the organization of the universe, and its development.
12	4	4	1 **		The student understands stellar evolution.
12	4	4	2		The student understands the current scientific explanation of the origin and structure of the universe.
12	4	4	3		The student understand how the tools of astronomy have revolutionized the study of the universe.

12	5				Science and Technology	The student will develop understandings about the relationship between science and technology.
12	5	1				The student will develop an understanding that technology is applied science.
12	5	1	1	**		The student understands technology is the application of scientific knowledge for functional purposes.
12	5	1	2			The student understands creativity, imagination, and a broad scientific knowledge base are required to produce useful results.
12	5	1	3			The student understands science advances new technologies. New technologies open new areas for scientific inquiry.

12	6			Science in Personal and Environmental Perspectives	The student will develop an understanding of personal and community health, population growth, natural resources, environmental quality, natural and human-induced hazards, and science and technology in local, national, and global settings.
12	6	1			The student will develop an understanding of the overall functioning of human systems and their interaction with the environment in order to understand specific mechanisms and processes related to health issues.
12	6	1	1		The student understands some chemical and physical hazards and accidents can be avoided through safety education.
12	6	1	2		The student understands the severity of disease symptoms is dependent on many factors.
12	6	1	3		The student understands informed personal choices concerning fitness and health involve an understanding of chemistry and biology.
12	6	1	4		The student understands selection of foods and eating patterns determine nutritional balance which affects emotional and physical well-being.
12	6	2			The student will demonstrate an understanding of population growth.
12	6	2	1		The student understands the rate of change in populations is determined by the combined effects of birth, death, emigration, and immigration.
12	6	2	2		The student understands a variety of factors influence birth rates and fertility rates.
12	6	2	3		The student understands populations have limits to growth.
12	6	3			The student will understand that human populations use natural resources and influence environmental quality.
12	6	3	1 **		The student understands natural resources from the lithosphere and ecosystems are required to sustain human populations.
12	6	3	2		The student understands earth does not have infinite resources.
12	6	4			The student will understand the effect of natural and human-influenced hazards.
12	6	4	1		The student understands natural processes of earth may be hazardous for humans.
12	6	4	2		The student understands there is a need to assess potential risk and danger from natural and human-induced hazards.
12	6	5			The student will develop an understanding of the relationship between science, technology, and society.
12	6	5	1		The student understands progress in science and technology can be affected by social issues and challenges. Science and technology indicate what can happen, not what should happen.

12	7			History and Nature of Science	The student will develop understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives.
12	7	1			The student will develop an understanding that science is a human endeavor that uses models to describe and explain the physical universe.
12	7	1	1		The student demonstrates an understanding of science as both vocation and avocation.
12	7	1	2		The student explains how science uses peer review, replication of methods, and norms of honesty.
12	7	1	3		The student recognizes the universality of basic science concepts and the influence of personal and cultural beliefs that embed science in society.
12	7	1	4		The student recognizes that society helps create the ways of thinking (mindsets) required for scientific advances, both toward training scientists and educating a populace to utilize benefits of science (e.g., standards of hygiene, attitudes toward forces of nature, etc.).
12	7	1	5		The student understands there are many issues which involve morals, ethics, values or spiritual beliefs that go beyond what science can explain, but for which solid scientific literacy is useful.
12	7	1	6		The student recognizes society's role in supporting topics of research and determining institutions where research is conducted.
12	7	2			The student will develop an understanding of the nature of scientific knowledge.
12	7	2	1		The student understands scientific knowledge describes and explains the physical world in terms of matter, energy, and forces. Scientific knowledge is provisional and is subject to change as new evidence becomes available.
12	7	2	2		The student understands scientific knowledge begins with empirical observations, which are the data (also called facts or evidence) upon which further scientific knowledge is built.
12	7	2	3		The student understands scientific knowledge consists of hypotheses, inferences, laws, and theories.
12	7	2	4		The student understands a testable hypothesis or inference must be subject to confirmation by empirical evidence.
12	7	3			The student will understand science from historical perspectives.
12	7	3	1		The student demonstrates an understanding of the history of science.
12	7	3	2		The student demonstrates a knowledge that scientific method historically proceeded from an inductive approach rather than a deductive approach.