

Content Area: Science	Introduced	Practiced	Mastered
Grade Level Expectations: High School			
Standard: 1. Physical Science			
Prepared Graduates: Observe, explain, and predict natural phenomena governed by Newton's laws of motion, acknowledging the limitations of their application to very small or very fast objects			
Concepts and skills students master: 1. Newton's laws of motion and gravitation describe the relationships among forces acting on and between objects, their masses, and changes in their motion - but have limitations			
Evidence Outcomes			
Students Can: a. Gather, analyze and interpret data and create graphs regarding position, velocity and acceleration of moving objects (DOK 1-3) b. Develop, communicate and justify an evidence-based analysis of the forces acting on an object and the resultant acceleration produced by a net force (DOK 1-3) c. Develop, communicate and justify an evidence-based scientific prediction regarding the effects of the action-reaction force pairs on the motion of two interacting objects (DOK 1-3) d. Examine the effect of changing masses and distance when applying Newton's law of universal gravitation to a system of two bodies (DOK 1-2) e. Identify the limitations of Newton's laws in extreme situations (DOK 1)			
Prepared Graduates: Apply an understanding of atomic and molecular structure to explain the properties of matter, and predict outcomes of chemical and nuclear reactions			
Concepts and skills students master: 2. Matter has definite structure that determines characteristic physical and chemical properties			
Evidence Outcomes			
Students Can: a. Develop, communicate, and justify an evidence-based scientific explanation supporting the current model of an atom (DOK 1-3) b. Gather, analyze and interpret data on chemical and physical properties of elements such as density, melting point, boiling point, and conductivity (DOK 1-2) c. Use characteristic physical and chemical properties to develop predictions and supporting claims about elements' positions on the periodic table (DOK 1-2) d. Develop a model that differentiates atoms and molecules, elements and compounds, and pure substances and mixtures (DOK 2-3)			
Prepared Graduates: Apply an understanding of atomic and molecular structure to explain the properties of matter, and predict outcomes of chemical and nuclear reactions			
Concepts and skills students master: 3. Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy			
Evidence Outcomes			
Students Can: a. Recognize, analyze, interpret, and balance chemical equations (synthesis, decomposition, combustion, and replacement) or nuclear equations (fusion and fission) (DOK 1-2) b. Predict reactants and products for different types of chemical and nuclear reactions (DOK 1-2) c. Predict and calculate the amount of products produced in a chemical reaction based on the amount of reactants (DOK 1-2) d. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate the conservation of mass and energy (DOK 1-2)			
Prepared Graduates: Apply an understanding of atomic and molecular structure to explain the properties of matter, and predict outcomes of chemical and nuclear reactions			
Concepts and skills students master: 4. Atoms bond in different ways to form molecules and compounds that have definite properties			
Evidence Outcomes			
Students Can: a. Develop, communicate, and justify an evidence-based scientific explanation supporting the current models of chemical bonding (DOK 1-3) b. Gather, analyze, and interpret data on chemical and physical properties of different compounds such as density, melting point, boiling point, pH, and conductivity (DOK 1-2) c. Use characteristic physical and chemical properties to develop predictions and supporting claims about compounds' classification as ionic, polar or covalent (DOK 1-2) d. Describe the role electrons play in atomic bonding (DOK 1) e. Predict the type of bonding that will occur among elements based on their position in the periodic table (DOK 1-2)			
Prepared Graduates: Apply an understanding that energy exists in various forms, and its transformation and conservation occur in processes that are predictable and measurable			
Concepts and skills students master: 5. Energy exists in many forms such as mechanical, chemical, electrical, radiant, thermal, and nuclear, that can be quantified and experimentally determined			

Evidence Outcomes			
Students Can: a. Develop, communicate, and justify an evidence-based scientific explanation regarding the potential and kinetic nature of mechanical energy (DOK 1-3) b. Use appropriate measurements, equations and graphs to gather, analyze, and interpret data on the quantity of energy in a system or an object (DOK 1-3) c. Use direct and indirect evidence to develop predictions of the types of energy associated with objects (DOK 2-3) d. Identify different energy forms, and calculate their amounts by measuring their defining characteristics (DOK 1-2)			
Prepared Graduates: Apply an understanding that energy exists in various forms, and its transformation and conservation occur in processes that are predictable and measurable			
Concepts and skills students master: 6. When energy changes form, it is neither created nor destroyed; however, because some is necessarily lost as heat, the amount of energy available to do work decreases			
Evidence Outcomes			
Students Can: a. Use direct and indirect evidence to develop and support claims about the conservation of energy in a variety of systems, including transformations to heat (DOK 1-3) b. Evaluate the energy conversion efficiency of a variety of energy transformations (DOK 1-2) c. Describe energy transformations both quantitatively and qualitatively (DOK 1-2) d. Differentiate among the characteristics of mechanical and electromagnetic waves that determine their energy (DOK 2) e. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate energy conservation and loss (DOK 1-2)			
Standard: 2. Life Science			
Explain and illustrate with examples how living systems interact with the biotic and abiotic environment			
Concepts and skills students master: ecosystem			
Evidence Outcomes			
Students Can: a. Analyze how energy flows through trophic levels (DOK 1-2) b. Evaluate the potential ecological impacts of a plant-based or meat-based diet (DOK 2) c. Analyze and interpret data from experiments on ecosystems where matter such as fertilizer has been added or withdrawn such as through drought (DOK 1-3) d. Develop, communicate, and justify an evidence-based scientific explanation showing how ecosystems follow the laws of conservation of matter and energy (DOK 1-3) e. Define and distinguish between matter and energy, and how they are cycled or lost through life processes (DOK 1-2) f. Describe how carbon, nitrogen, phosphorus, and water cycles work (DOK 1) g. Use computer simulations to analyze how energy flows through trophic levels (DOK 1-2)			
Prepared Graduates: <i>(Click on a Prepared Graduate Competency to View Articulated Expectations)</i> Explain and illustrate with examples how living systems interact with the biotic and abiotic environment			
Concepts and skills students master: 2. The size and persistence of populations depend on their interactions with each other and on the abiotic factors in an ecosystem			
Evidence Outcomes			
Students Can: a. Analyze and interpret data about the impact of removing keystone species from an ecosystem or introducing non-native species into an ecosystem (DOK 1-3) b. Describe or evaluate communities in terms of primary and secondary succession as they progress over time (DOK 1-2) c. Evaluate data and assumptions regarding different scenarios for future human population growth and their projected consequences (DOK 1-3) d. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate ecosystem interactions (DOK 1-2)			
Prepared Graduates: <i>(Click on a Prepared Graduate Competency to View Articulated Expectations)</i> Analyze the relationship between structure and function in living systems at a variety of organizational levels, and recognize living systems' dependence on natural selection			
Concepts and skills students master: 3. Cellular metabolic activities are carried out by biomolecules produced by organisms			
Evidence Outcomes			
Students Can: a. Identify biomolecules and their precursors/building blocks (DOK 1) b. Develop, communicate, and justify an evidence-based explanation that biomolecules follow the same rules of chemistry as any other molecule (DOK 1-3) c. Develop, communicate, and justify an evidence-based explanation regarding the optimal conditions required for enzyme activity (DOK 1-3) d. Infer the consequences to organisms of suboptimal enzyme function - such as altered blood pH or high fever - using direct and indirect evidence (DOK 1-3) e. Analyze and interpret data on the body's utilization of carbohydrates, lipids, and proteins (DOK 1-2)			
Prepared Graduates: <i>(Click on a Prepared Graduate Competency to View Articulated Expectations)</i>			

Analyze the relationship between structure and function in living systems at a variety of organizational levels, and recognize living systems' dependence on natural selection			
Concepts and skills students master: 4. The energy for life primarily derives from the interrelated processes of photosynthesis and cellular respiration. Photosynthesis transforms the sun's light energy into the chemical energy of molecular bonds. Cellular respiration allows cells to utilize chemical energy when these bonds are broken.			
Evidence Outcomes			
Students Can: a. Develop, communicate, and justify an evidence-based scientific explanation the optimal environment for photosynthetic activity (DOK 1-3) b. Discuss the interdependence of autotrophic and heterotrophic life forms such as depicting the flow of a carbon atom from the atmosphere, to a leaf, through the food chain, and back to the atmosphere (DOK 1-2) c. Explain how carbon compounds are gradually oxidized to provide energy in the form of adenosine triphosphate (ATP), which drives many chemical reactions in the cell (DOK 1-2)			
Prepared Graduates: <i>(Click on a Prepared Graduate Competency to View Articulated Expectations)</i> Analyze the relationship between structure and function in living systems at a variety of organizational levels, and recognize living systems' dependence on natural selection			
Concepts and skills students master: 5. Cells use passive and active transport of substances across membranes to maintain relatively stable intracellular environments			
Evidence Outcomes			
Students Can: a. Analyze and interpret data to determine the energy requirements and/or rates of substance transport across cell membranes (DOK 1-2) b. Compare organisms that live in freshwater and marine environments, and identify the challenges of osmotic regulation for these organisms (DOK 2) c. Diagram the cell membrane schematically, and highlight receptor proteins as targets of hormones, neurotransmitters, or drugs that serve as active links between intra and extracellular environments (DOK 1) d. Use tools to gather, view, analyze, and interpret data produced during scientific investigations that involve passive and active transport (DOK 1-2) e. Use computer simulations and models to analyze cell transport mechanisms (DOK 1-2)			
Prepared Graduates: <i>(Click on a Prepared Graduate Competency to View Articulated Expectations)</i> Analyze the relationship between structure and function in living systems at a variety of organizational levels, and recognize living systems' dependence on natural selection			
Concepts and skills students master: 6. Cells, tissues, organs, and organ systems maintain relatively stable internal environments, even in the face of changing external environments			
Evidence Outcomes			
Students Can: a. Discuss how two or more body systems interact to promote health for the whole organism (DOK 1-2) b. Analyze and interpret data on homeostatic mechanisms using direct and indirect evidence to develop and support claims about the effectiveness of feedback loops to maintain homeostasis (DOK 1-2) c. Distinguish between causation and correlation in epidemiological data, such as examining scientifically valid evidence regarding disrupted homeostasis in particular diseases (DOK 2) d. Use computer simulations and models of homeostatic mechanisms (DOK 1-2)			
Prepared Graduates: <i>(Click on a Prepared Graduate Competency to View Articulated Expectations)</i> Analyze how various organisms grow, develop, and differentiate during their lifetimes based on an interplay between genetics and their environment			
Concepts and skills students master: 7. Physical and behavioral characteristics of an organism are influenced to varying degrees by heritable genes, many of which encode instructions for the production of proteins			
Evidence Outcomes			
Students Can: a. Analyze and interpret data that genes are expressed portions of DNA. (DOK 1-2) b. Analyze and interpret data on the processes of DNA replication, transcription, translation, and gene regulation, and show how these processes are the same in all organisms (DOK 1-2) c. Recognize that proteins carry out most cell activities and mediate the effect of genes on physical and behavioral traits in an organism (DOK 1) d. Evaluate data showing that offspring are not clones of their parents or siblings due to the meiotic processes of independent assortment of chromosomes, crossing over, and mutations (DOK 1-2) e. Explain using examples how genetic mutations can benefit, harm, or have neutral effects on an organism (DOK 1-2)			
Prepared Graduates: <i>(Click on a Prepared Graduate Competency to View Articulated Expectations)</i> Analyze how various organisms grow, develop, and differentiate during their lifetimes based on an interplay between genetics and their environment			
Concepts and skills students master: 8. Multicellularity makes possible a division of labor at the cellular level through the expression of select genes, but not the entire genome.			

Evidence Outcomes			
Students Can:			
a. Develop, communicate, and justify an evidence-based scientific explanation of how cells form specialized tissues due to the expression of some genes and not others (DOK 1-3)			
b. Analyze and interpret data that show most eukaryotic deoxyribonucleic acid (DNA) does not actively code for proteins within cells (DOK 1-2)			
c. Develop, communicate, and justify an evidence-based scientific explanation for how a whole organism can be cloned from a differentiated - or adult - cell (DOK 1-3)			
d. Analyze and interpret data on medical problems using direct and indirect evidence in developing and supporting claims that genetic mutations and cancer are brought about by exposure to environmental toxins, radiation, or smoking (DOK 1-3)			
Prepared Graduates: (<i>Click on a Prepared Graduate Competency to View Articulated Expectations</i>) Explain how biological evolution accounts for the unity and diversity of living organisms			
Concepts and skills students master:			
9. Evolution occurs as the heritable characteristics of populations change across generations and can lead populations to become better adapted to their environment			
Evidence Outcomes			
Students Can:			
a. Develop, communicate, and justify an evidence-based scientific explanation for how Earth's diverse life forms today evolved from common ancestors (DOK 1-3)			
b. Analyze and interpret multiple lines of evidence supporting the idea that all species are related by common ancestry such as molecular studies, comparative anatomy, biogeography, fossil record and embryology (DOK 2-3)			
c. Analyze and interpret data suggesting that over geologic time, discrete bursts of rapid genetic changes and gradual changes have resulted in speciation (DOK 1-3)			
d. Analyze and interpret data on how evolution can be driven by three key components of natural selection - heritability, genetic variation, and differential survival and reproduction (DOK 1-3)			
e. Generate a model - an evolutionary tree - showing how a group of organisms is most likely diverged from common ancestry (DOK 2-3)			
Standard: 3. Earth Systems Science			
Prepared Graduates: (<i>Click on a Prepared Graduate Competency to View Articulated Expectations</i>) Describe and interpret how Earth's geologic history and place in space are relevant to our understanding of the processes that have shaped our planet			
Concepts and skills students master:			
1. The history of the universe, solar system and Earth can be inferred from evidence left from past events			
Evidence Outcomes			
Students Can:			
a. Develop, communicate, and justify an evidence-based scientific explanation addressing questions about Earth's history (DOK 1-3)			
b. Analyze and interpret data regarding Earth's history using direct and indirect evidence (DOK 1-2)			
c. Analyze and interpret data regarding the history of the universe using direct and indirect evidence (DOK 1-2)			
d. Seek, evaluate, and use a variety of specialized resources available from libraries, the Internet, and the community to find scientific information on Earth's history (DOK 1-2)			
e. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate the history of the universe, solar system and Earth (DOK 1-2)			
Prepared Graduates: (<i>Click on a Prepared Graduate Competency to View Articulated Expectations</i>) Describe and interpret how Earth's geologic history and place in space are relevant to our understanding of the processes that have shaped our planet			
Concepts and skills students master:			
2. As part of the solar system, Earth interacts with various extraterrestrial forces and energies such as gravity, solar phenomena, electromagnetic radiation, and impact events that influence the planet's geosphere, atmosphere, and biosphere in a variety of ways			
Evidence Outcomes			
Students Can:			
a. Develop, communicate, and justify an evidence-based scientific explanation addressing questions around the extraterrestrial forces and energies that influence Earth (DOK 1-3)			
b. Analyze and interpret data regarding extraterrestrial forces and energies (DOK 1-2)			
c. Clearly identify assumptions behind conclusions regarding extraterrestrial forces and energies and provide feedback on the validity of alternative explanations (DOK 2-3)			
d. Use specific equipment, technology, and resources such as satellite imagery, global positioning systems (GPS), global information systems (GIS), telescopes, video and image libraries, and computers to explore the universe) (DOK 1-2)			
Prepared Graduates: (<i>Click on a Prepared Graduate Competency to View Articulated Expectations</i>) Evaluate evidence that Earth's geosphere, atmosphere, hydrosphere, and biosphere interact as a			
Concepts and skills students master:			
3. The theory of plate tectonics helps explain geological, physical, and geographical features of Earth			
Evidence Outcomes			
Students Can:			

a. Develop, communicate, and justify an evidence-based scientific explanation about the theory of plate tectonics and how it can be used to understand geological, physical, and geographical features of Earth (DOK 1-3)			
b. Analyze and interpret data on plate tectonics and the geological, physical, and geographical features of Earth (DOK 1-2)			
c. Understand the role plate tectonics has had with respect to long-term global changes in Earth's systems such as continental buildup, glaciations, sea-level fluctuations, and climate change (DOK 1-2)			
d. Investigate and explain how new conceptual interpretations of data and innovative geophysical technologies led to the current theory of plate tectonics (DOK 2-3)			
Prepared Graduates: <i>(Click on a Prepared Graduate Competency to View Articulated Expectations)</i> Evaluate evidence that Earth's geosphere, atmosphere, hydrosphere, and biosphere interact as a			
Concepts and skills students master: 4. Climate is the result of energy transfer among interactions of the atmosphere, hydrosphere, geosphere, and biosphere			
Evidence Outcomes			
Students Can: a. Develop, communicate, and justify an evidence-based scientific explanation that shows climate is a result of energy transfer among the atmosphere, hydrosphere, geosphere and biosphere (DOK 1-3)			
b. Analyze and interpret data on Earth's climate (DOK 1-2)			
c. Explain how a combination of factors such as Earth's tilt, seasons, geophysical location, proximity to oceans, landmass location, latitude, and elevation determine a location's climate (DOK 1-3)			
d. Identify mechanisms in the past and present that have changed Earth's climate (DOK 1)			
e. Analyze the evidence and assumptions regarding climate change (DOK 1-3)			
f. Interpret evidence from weather stations, buoys, satellites, radars, ice and ocean sediment cores, tree rings, cave deposits, native knowledge, and other sources in relation to climate change (DOK 1-3)			
Prepared Graduates: <i>(Click on a Prepared Graduate Competency to View Articulated Expectations)</i> Describe how humans are dependent on the diversity of resources provided by Earth and Sun			
Concepts and skills students master: 5. There are costs, benefits, and consequences of exploration, development, and consumption of renewable and nonrenewable resources			
Evidence Outcomes			
Students Can: a. Develop, communicate, and justify an evidence-based scientific explanation regarding the costs and benefits of exploration, development, and consumption of renewable and nonrenewable resources (DOK 1-3)			
b. Evaluate positive and negative impacts on the geosphere, atmosphere, hydrosphere, and biosphere in regards to resource use (DOK 2-3)			
c. Create a plan to reduce environmental impacts due to resource consumption (DOK 2-4)			
d. Analyze and interpret data about the effect of resource consumption and development on resource reserves to draw conclusions about sustainable use (DOK 1-3)			
Prepared Graduates: <i>(Click on a Prepared Graduate Competency to View Articulated Expectations)</i> Evaluate evidence that Earth's geosphere, atmosphere, hydrosphere, and biosphere interact as a			
Concepts and skills students master: 6. The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes			
Evidence Outcomes			
Students Can: a. Develop, communicate, and justify an evidence-based scientific explanation addressing questions regarding the interaction of Earth's surface with water, air, gravity, and biological activity (DOK 1-3)			
b. Analyze and interpret data, maps, and models concerning the direct and indirect evidence produced by physical and chemical changes that water, air, gravity, and biological activity create (DOK 1-3)			
c. Evaluate negative and positive consequences of physical and chemical changes on the geosphere (DOK 2-3)			
d. Use remote sensing and geographic information systems (GIS) data to interpret landforms and landform impact on human activity (DOK 1-2)			
Prepared Graduates: <i>(Click on a Prepared Graduate Competency to View Articulated Expectations)</i> Evaluate evidence that Earth's geosphere, atmosphere, hydrosphere, and biosphere interact as a			
Concepts and skills students master: 7. Natural hazards have local, national and global impacts such as volcanoes, earthquakes, tsunamis, hurricanes, and thunderstorms			
Evidence Outcomes			
Students Can: a. Develop, communicate, and justify an evidence-based scientific explanation regarding natural hazards, and explain their potential local and global impacts (DOK 1-3)			
b. Analyze and interpret data about natural hazards using direct and indirect evidence (DOK 1-2)			
c. Make predictions and draw conclusions about the impact of natural hazards on human activity - locally and globally (DOK 2-3)			