WHERE GRIT MEETS GREATNESS
WEST BONNER COUNTY SCHOOL DISTRICT #83

Secondary Science Essential Standards

7th Grade Science

From Molecules to Organisms: Structures and Processes

MS-LS-1.1 Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.

MS-LS-1.2 Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.

MS-LS-1.3 Make a claim supported by evidence for how a living organism is a system of interacting subsystems composed of groups of cells.

MS-LS-1.4 Construct a scientific argument based on evidence to defend a claim of life for a specific object or organism.

MS-LS-1.5 Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

MS-LS-1.6 Develop a conceptual model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as matter moves through an organism.

Ecosystems: Interactions, Energy, and Dynamics

MS-LS-2.1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS-2.2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-LS-2.3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

MS-LS-2.5 Construct an argument supported by evidence that changes to physical or biological components of an ecosystem affect populations.

MS-LS-2.6 Design and evaluate solutions for maintaining biodiversity and ecosystem services.
Heredity: Inheritance and Variation of Traits

MS-LS-3.1 Develop and use a model to describe why mutations may result in harmful, beneficial, or neutral effects to the structure and function of the organism.
MS-LS-3.2 Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic Variation.

Biological Adaption: Unity and Diversity

MS-LS-4.1 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.

MS-LS-4.2 Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer Relationships.

MS-LS-4.4 Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

MS-LS-4.5 Obtain, evaluate, and communicate information about how technologies allow humans to influence the inheritance of desired traits in organisms.

MS-LS-4.6 Use mathematical models to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

8th Grade Science

Matter and Its Interactions

MS-PS-1.1 Develop models to describe the atomic composition of simple molecules

MS-PS-1.2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

MS-PS-1.4 Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

MS-PS-1.5 Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

Motion and Stability: Forces and Interactions

MS-PS-2.1 Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.

MS-PS-2.2 Plan and conduct an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

MS-PS-2.4 Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and dependent the masses of interacting objects.

MS-PS-2.5 Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

Energy

MS-PS-3.1 Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

MS-PS-3.2 Develop a model to describe the relationship between the relative positions of objects interacting at a distance and the relative potential energy in the system.

MS-PS-3.3 Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

MS-PS-3.5 Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

Waves

MS-PS-4.1 Use diagrams of a simple wave to explain that (1) a wave has a repeating pattern with a specific amplitude, frequency, and wavelength, and (2) the amplitude of a wave is related to the energy in the wave.

MS-PS-4.2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

Earth Science

Earth's Place in the Universe

HS-ESS-1.2 Construct an explanation of the current model of the origin of the universe based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.

HS-ESS-1.4 Use mathematical of computational representations to predict the motion of orbiting objects in the solar system.

HE-ESS-1.5 Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.

HS-ESS-1.6 Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.

Earth's Systems

HS-ESS-2.2 Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth Systems.

HS-ESS-2.3 Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.

HS-ESS-2.4 Use a model to describe how variations in the flow of energy into and out of Earth's systems result in variations in climate.

HS-ESS-2.6 Develop a model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

HS-ESS-2.7 Construct and argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.

Earth and Human Activity

HS-ESS-3.1 Construct an explanation based on evidence for how availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

HS-ESS-3.2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

HS-ESS-3.4 Evaluate or refine a scientific or technological solution that mitigates or enhances human influences on natural systems.

HS-ESS-3.5 Analyze geoscience data and the results from global climate models to make an evidence-based explanation of how climate variability can affect Earth's systems on a global and regional scale.

Life Science – Biology (High School)				
HS-LS-1 – From Molecules to Organisms: Structures and Processes		**Assessment Type**		
HS-LS-1.1	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	Lab		Primary objectives
HS-LS-1.2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	Project		Secondary objectives
HS-LS-1.3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	Project		Low Priority objectives
HS-LS-1.4	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	Lab		
HS-LS-1.5	Communicate scientific and technical information about why the molecular-level structure is important in the Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy	Summative		
HS-LS-1.6	Construct an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.	Lab		
HS-LS-1.7	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.	Lab		
HS-LS-2 – Ecosystems: Interactions, Energy, and Dynamics				
HS-LS-2.1	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	Summative		
HS-LS-2.2	Use mathematical representations to support explanations that biotic and abiotic factors affect biodiversity at different scales within an ecosystem.	Summative		

HS-LS-2.3	Construct an explanation using mathematical representations to support claims for the flow of energy through trophic levels and the cycling of matter in an ecosystem.	Lab		
HS-LS-2.4	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.	Project		
HS-LS-2.5	Evaluate the claims, evidence, and reasoning that changing the conditions of a static ecosystem may result in a new ecosystem.	Summative		
HS-LS-2.6	Design, evaluate, and/or refine practices used to manage a natural resource based on direct and indirect influences of human activities on biodiversity and ecosystem health.	Project		
HS-LS-2.7	Evaluate the evidence for the role of group behavior on individual and species' ability to survive and reproduce.	Lab		
HS-LS-3 – Heredity: Inheritance and Variation of Traits				
HS-LS-3.1	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	Lab		
HS-LS-3.2	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors	Project		
HS-LS-3.3	Apply concepts of probability and statistical analysis to explain the variation and distribution of expressed traits in a population.	Lab		
HS-LS-4 – Biological Adaptation: Unity and Diversity				
HS-LS-4.1	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	Lab		

HS-LS-4.2	Construct an explanation based on evidence that the process of evolution, through the mechanism of natural selection, primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.	Project/ Summative		
HS-LS-4.3	Apply concepts of probability and statistical analysis to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.	Lab		
HS-LS-4.4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.	Lab		
HS-LS-4.5	Evaluate models that demonstrate how changes in an environment may result in the evolution of a population of a given species; the emergence of new species over generations; or the extinction of other species due to the processes of genetic drift, gene flow, mutation, and natural selection.	Lab/Summative		

Advanced Physical Science		Assesment Type
HS-PSC-1 – Structure and Properties of Matter		
HS-PSC-1.1	Develop models to describe the atomic composition of simple molecules and extended structures.	Virtual Lab
HS-PSC-1.2	Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.	Summative assesment
HS-PSC-1.3	Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrostatic forces between particles.	Lab
HS-PSC-1.4	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and the various modes of radioactive decay.	Summative assesment
HS-PSC-1.5 (HS-PSP-1.6)	Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.	Project
HS-PSC-2 – Chemical Reactions		
HS-PSC-2.1	Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.	Lab
HS-PSC-2.2	Develop a model to illustrate that the energy transferred during an exothermic or endothermic chemical reaction is based on the bond energy difference between bonds broken (absorption of energy) and bonds formed (release of energy).	Lab
HS-PSC-2.3	Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.	Lab
HS-PSC-2.4	Use mathematical representations to support the claim that the number and type of atoms, and therefore mass, are conserved during a chemical reaction.	Summative assesment
HS-PSC-3/HS-PSP-2 – Energy		
HS-PSC-3.1	Ask questions to clarify the idea that electromagnetic radiation can be described either by a wave model or a particle model.	
HS-PSC-3.2 (HS-	Create a computational model to calculate the change in the energy of one component in a system when the change in energy	Lab

PSP-2.1)	of the other component(s) and energy flows in and out of the system are known.	
HS-PSC-3.3 (HS-PSP-2.2)	Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects).	Summative assesment
HS-PSC-3.4* (HS-PSP-2.3)	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. ---OPTIONAL	Lab
HS-PSC-3.5 (HS-PSP-2.4)	Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).	Lab
HS-PSP-2.5	Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.	Virtual Lab
HS-PSP-1 – Motion and Stability: Forces and Interactions		
HS-PSP-1.1	Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.	Lab
HS-PSP-1.2	Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.	Summative assesment
HS-PSP-1.3	Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.	Lab
HS-PSP-1.4	Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.	Virtual Lab
HS-PSP-1.5	Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.	Lab
HS-PSP-3 – Waves		
HS-PSP-3.1	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.	Summative assesment
HS-PSP-3.2	Evaluate questions about the advantages of using digital transmission and storage of information.	Project

HS-PSP-3.3	Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.	
HS-PSP-3.4	Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.	Project
HS-PSP-3.5	Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.	Project