Adair County Middle School

2019-2020

8th Grade Middle Science STANDARDS / PACING GUIDE

5 Key Skills

Clarification Statement for each standard, Science and Engineering Practices, Disciplinary Core Ideas, Crosscutting Concepts and KAS Connections can be viewed by clicking on the link of the title in each section.

Standard	Learning Target We are learning to……	Window of Instruction (weeks)	Essential Vocabulary (# in parentheses indicates week Vocabulary word was studied)
Structure and Properties of Matter **Students who demonstrate understanding can:**			
MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures. **MS-PS1-3** Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. **MS-PS1-4** 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.	• The purpose of the periodic table arrangement • Use the periodic table to determine atomic particles for an element • To identify the atomic particles and their locations • Make a model of an atom based on information obtained from the periodic table • Model different of isotopes of an element • Make a model of atomic composition of simple molecules. • Describe how a synthetic material is formed. • Analyze how synthetic materials such as new medicines, foods, and alternative fuels, impact society.	**Weeks 2-4**	Matter (2) Atom (2) Electron (2) Nucleus Proton (2) Neutron Atomic number (2) Isotopes (3) Molecule (3) Mass number Atomic mass (3) Periodic table (2) Chemical Symbol (3) Period (3) Group Compound Pure Substance Valence electron (3) Reactivity Ion (5) Thermal Energy Kinetic Energy Transfer (5) Covalent (5) Ionic Octet (5) Oxidation Number (5) Transition Metal (5)
Chemical Reactions **Students who demonstrate understanding can:**			
MS-PS1-2 Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. **MS-PS1-5** 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. **MS-PS1-6** Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.	• Illustrate ionic and covalent bonding. • Based on the interactions of substances, determine whether a chemical reaction has occurred. • explain the conservation of mass in a chemical reaction. • model the conservation of mass in a chemical reaction • Make a CER statement about the conservation of mass	**Weeks 5-8**	Mixture Colloid (8) Suspension (8) Solution (8) Solvent Solute Solubility Physical Change (7) Chemical Change (7) Chemical Equation (6) Balanced Equation (7) Reactant (6) Product (6) Yield (6) Exothermic Reaction (6) Endothermic Reaction

	• describe a device designed to release or absorb thermal energy through chemical processes.		(7) Law of Conservation of Mass (6) Open System (7) Closed System (7) Malleable (8) Ductile (8) Precipitate (8)
Forces and Interactions **Students who demonstrate understanding can:**			
MS-PS2-1 Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. **MS-PS2-2** Plan 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-PS2-3** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. **MS-PS2-4** Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. **MS-PS2-5** Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects forces on each other even though the objects are not in contact. **MS-PS3-2** Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.		**Weeks 9-11**	Newton's Third Law of Motion Action/Reaction Motion Energy Potential Energy Kinetic Energy Thermal Energy Law of Conservation of Energy Joule Work Reference point Momentum Mass Force (9) Newton (9) Friction (9) Gravity Net force Speed Relative speed Instantaneous speed Slope Velocity (9) Acceleration (9) Average Variable Inertia (9) Direct current(10) Alternating current (10) Series circuit (10) Parallel circuit (10) Conductor (10) Insulator (10) Static electricity (11) Volt (11) Amp (11) Electric Field (11) Potential energy (11) Kinetic energy (11)
Energy **Students who demonstrate understanding can:**			
08-PS3-1 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. **07-PS3-2** Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. **07-PS3-5** Construct, use and present arguments to support the claim that when		**Weeks 12-14**	

the kinetic energy of an object changes, energy is transferred to or from the object.			
Structure, Function and Information Processing **Students who demonstrate understanding can:**			
07-LS1-3 Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. **08-LS1-8** Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.		**Weeks 15-17**	Plant cells Animal cells Cell parts (structures) - Nucleus - Chloroplast - Mitochondria - Cell membrane - Cell wall Cell function
Matter and Energy in Organisms and Ecosystems **Students who demonstrate understanding can:**			
08-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.		**Week 18**	Matter Energy Construct Evidence Empirical evidence Argumentative Evidence Law of Conservation of Energy Ecosystem Equilibrium
Interdependent Relationships in Ecosystems **Students who demonstrate understanding can:**			
08-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.		**Week 19**	Biodiversity Species Diversity Ecosystem Diversity Keystone Species Model Conservation Stewardship Evidence/Claim/ Reasoning Scientific Reasoning/ Principles Quantitative Data Qualitative Data Hypothesis Control Variable Independent Variable Dependent Variable Engineering Engineering Design/Process Technology Ecotourism
Growth, Development, and Reproduction of Organisms **Students who demonstrate understanding can:**			
08-LS3-1 Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial or neutral effects to the structure and function of the organism. 08-LS3-2 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. 08-LS4-5 Gather and synthesize information about the technologies that have changed		**Week 20-23**	Heredity Genes Sex-linked genes Dominant allele Recessive Allele Probability Punnett Square Genotype Phenotype Chromosome Mutation Pedigree

the way humans influence the inheritance of desired traits in organisms.			Meiosis Chromatids Mitosis DNA Protein Synthesis Artificial selection Genetic engineering Gene therapy Clone Genome
Natural Selection and Adaptations **Students who demonstrate understanding can:**			
08-LS4-1 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. 08-LS4-2 Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. 08-LS4-3 Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evidence in the fully formed anatomy. 08-LS4-4 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. 08-LS4-6 Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.		**Weeks 24-28**	Species Evolution Fossil Adaptation Scientific theory Natural selection Competition Sexual selection Coevolution Fossil record Homologous Extinct
History of Earth **Students who demonstrate understanding can:**			
08-ESS1-4. Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.		Weeks 29-30	Relative age Absolute age Law of superposition Fossil Unconformity Radioactive decay Radioactive dating Infer/inference Geologic Time Scale Era Period Mass extinction
Earth's Systems **Students who demonstrate understanding can:**			
08-ESS3-1 Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.		Weeks 31-32	Water Cycle Nitrogen Cycle Nitrification Denitrification Carbon Cycle Nitrogen Cycle Evidence/Claim/Reaso

			ning Biosphere Lithosphere Atmosphere Hydrosphere
Weather and Climate **Students who demonstrate understanding can:**			
06-ESS2-6 Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. **08-ESS3-5** Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.		**Weeks 33-34**	Climate Weather Fronts Air Masses Greenhouse gases Greenhouse effect Climate change Global warming Fossil Fuel Alternative Energy Thermal energy Convection Conduction Radiation Wind Sea breeze Land breeze Coriolis effect Jet stream El Nino La Nina Evidence/Claim/Reasoning Model Interpretation Patterns Cause/Effect
Human Impacts **Students who demonstrate understanding can:**			
08-ESS3-2 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. **08-ESS3-3** Apply scientific principles to design a method form monitoring and minimizing a human impact on the environment. **08-ESS3-4** Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.		**Embedded**	FEMA Evidence/Claim/Reasoning Analyze Interpret Catastrophic Mitigate Cause/Effect Quantitative Data Qualitative Data Scientific Reasoning/Principles Poluntant Water pollution Point-source pollution Non-point pollution Thermal pollution Eutrophication Potable Parts per million (ppm) Parts per billion (ppb) reservoir Watershed Renewable resource Non-renewable resource Deforestation

			Land degradation Urbanization Acid rain/precipitation Fossil fuels Greenhouse effect Climate change Air pollution smog Particulates Conservation stewardship Flooding Landslides Volcano eruption Tornadoes Hurricane Tsunami EPA
Engineering Design **Students who demonstrate understanding can:**			
MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. **MS-ETS1-2** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. **MS-ETS1-3** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. **MS-ETS1-4** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.		**Embedded**	Evidence/Claim/ Reasoning Scientific Reasoning/ Principles Quantitative Data Qualitative Data Hypothesis Control Variable Independent Variable Dependent Variable Engineering Engineering Design/Process Technology Innovation Need/Want Cause/Effect Brainstorming Criteria Constraints Prototype Mock-Up Testing Experimentation Model Market Research Trademark Copyright Patent Sampling Documentation Ergonomics Sustainability OSHA