Ganado Unified School District
(High School Physical Science)

PACING Guide SY 2021-2022

Timeline & Resources	AZ College and Career Readiness Standard	Essential Question (HESS Matrix)	Learning Goal	Vocabulary (Content/Academic)
In this Course, Students will explore careers in Science, Study Scientists and works in their field, write a Scientific Research Paper, create a Slide Show Presentation using a Computer, Design and Implement a working Scientific Investigation for the GUSD Science Fair, build a model, and create a diagram, to develop Scientific Skills and Knowledge.				
Scientific Inquiry and Methodology **Nine Weeks** **Resources:** **Power Points:** Scientific Inquiry **Scientific Apparatuses:** Thermometers, Metric and Standard rulers, graduated cylinders and balance scales, Computers, and Various Geologic and Meteorological Data Collection Websites. Various Worksheets,	**Strand 1: Inquiry** **Concept 1: Observations, Questions, and Hypotheses** **Concept 2: Scientific Testing (Investigating and Modeling)** **Concept 3: Analysis and Conclusions** **Concept 4: Communication**	How does creating a Hypothesis benefit my experiment? Why is a Hypothesis essential to future exploration of Space, the Oceans, and discovering the depths of the center of our planet? What does the Scientific Method have to do with my everyday life? New Standards: How do I create questions? How do I obtain Information? What are models used for? How do I carry out an investigation?	**Students will first engage in learning the tools and language of Science, the Fields of Science, the People of Science, and the Use of Science. Then, throughout the year the students will utilize the following understandings and skills they develop in this Unit.** **Student will demonstrate an understanding of Scientific reasoning, logic, and the nature of Science by planning and conducting investigations in which:** • chemicals and equipment are used safely; • length, mass, volume, density, temperature, weight, and force are accurately measured; • conversions are made among metric units, applying appropriate prefixes; • triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, probeware, and spring scales are used to gather data; • numbers are expressed in scientific notation where appropriate; • independent and dependent variables, constants, controls, and repeated trials are identified;	Accept, Analyze, Assume, Behavior, Conclusion, Constant, Control, Curiosity, Data, Density, Dependent Variable, Develop, Error, Evidence, Experiment, Formulate, Frequency, Honesty, Hypothesis, Independent Variable, Information, Investigate, Knowledge, Mass, Measurement , Modify, Natural, Observe, Openness, Opinion, Patterns, Phenomena, Predict, Procedure, Qualitative, Quantitative, Range, Requirements, Scientific Law, Scientific Method, Skepticism, Skill, Solution, Systematic, Testing, Theory, Volume, Etc.

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Games, and Films.		What do I need to Analyze Data? How do I construct a Logical Explanation? What does it mean to engage in an argument using Evidence? What are the best ways to communicate information? Who are the People important in Science? Why is Science important to Me? Why do I need to learn Science? What work requires use of Science?	• data tables showing the independent and dependent variables, derived quantities, and the number of trials are constructed and interpreted; • data tables for descriptive statistics showing specific measures of central tendency, the range of the data set, and the number of repeated trials are constructed and interpreted; • frequency distributions, scatterplots, line plots, and histograms are constructed and interpreted; • valid conclusions are made after analyzing data; • research methods are used to investigate practical problems and questions; • experimental results are presented in appropriate written form; • models and simulations are constructed and used to illustrate and explain phenomena; and • current applications of physical science concepts are used.	(Notes: Students will also learn basic concepts, such as map reading, analog clock reading, scale reading, compass use, protractor use, direction, etc.)
States and Properties of Matter **One Week** Prentice Hall Physical Science Textbook Power Points for States and Properties of	**P1:HS.P1U1.1 - Develop and use models** to explain the relationship of the structure of atoms to patterns and properties observed within the Periodic Table and describe how these models are revised with new evidence.	Are all types of Matter able to change properties? What causes the change of the State of Matter?	**The student will investigate and understand the nature of matter.** **Key concepts include:** • the particle theory of matter; • elements, compounds, mixtures, acids, bases, and salts; • solids, liquids, and gases; • physical properties; • chemical properties; and • characteristics of types of matter based on physical and chemical properties.	See Below

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Matter, Lab Equipment Computers, Various Websites, Worksheets, Games, and Films.			**Students will also investigate and understand changes in matter and the relationship of these changes to the Law of Conservation of Matter and Energy.** **Key concepts include:** • physical changes; • chemical changes; and • nuclear reactions.	
History of Atomic Theory **One Week** Prentice Hall Physical Science Textbook Power Points for Atomic Theory, Lab Equipment Computers, Various Websites, Worksheets, Games, and Films.	**P1:HS.P1U1.1 - Develop and use models** to explain the relationship of the structure of atoms to patterns and properties observed within the Periodic Table and describe how these models are revised with new evidence.	How did people understand the structure of an atom before electron microscopes?	**The student will investigate and understand the modern and historical models of atomic structure.** **Key concepts include:** • the historical development of atomic theory. • the contributions of Dalton, Thomson, Rutherford, and Bohr in understanding the atom; • the modern model of atomic structure; and • comparing the Modern Atomic model to past ideas and models.	See Below
The Structure of Atoms **One Week** Prentice Hall Physical Science Textbook	**P1:HS.P1U1.1 - Develop and use models** to explain the relationship of the structure of atoms to patterns and properties observed within the Periodic Table and describe	How can atoms create different elements when they are all made of only energy?	• Students will be able to recreate the structure of an atom; • Students will be able to identify the subatomic particles that make up an atom; and • Students will be able to explain the relative mass of an atom.	See Below

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Power Points for The Structure of Atoms, Lab Equipment Computers, Various Websites, Worksheets, Games, and Films.	how these models are revised with new evidence.			
Properties of Elements and Isotopes **One Week** Prentice Hall Physical Science Textbook Power Points for States and Properties of Matter, Lab Equipment Computers, Various Websites, Worksheets, Games, and Films.	**P1:HS+C.P1U1.1 – Develop and use models** to demonstrate how changes in the number of subatomic particles (protons, neutrons, electrons) affect the identity, stability, and properties of the element.	How does atomic mass change? What determines how an atom becomes an isotope?	• Students will determine whether a substance is an element; • Students will be able to explain the properties of elements; • Students will learn how to calculate how when atoms gain or lose neutrons they become isotopes; and Students will calculate atomic mass.	See Below
The Periodic Table **Two Weeks**	**P1:HS+C.P1U1.2 - Obtain, evaluate, and communicate** the qualitative evidence supporting claims about how atoms absorb and emit	Are there other ways to arrange the Periodic table of Elements? What happens when new elements are discovered?	**The student will investigate and understand the organization and use of the periodic table of elements obtain information.** **Key concepts include:**	See Below

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Prentice Hall Physical Science Textbook Power Points for The Periodic Table of Elements, Lab Equipment Computers, Various Websites, Worksheets, Games, and Films.	energy in the form of electromagnetic radiation.		• symbols, atomic numbers, atomic mass, chemical families (groups), and periods; • classification of elements as metals, metalloids, and nonmetals; and • formation of compounds through ionic and covalent bonding.	
Chemical Bonding **Two Weeks** Prentice Hall Physical Science Textbook Power Points for States and Properties of Matter, Lab Equipment Computers, Various Websites, Worksheets, Games, and Films.	**P1:HS.P1U1.2 - Develop and use models** for the transfer or sharing of electrons to predict the formation of ions, molecules, and compounds in both natural and synthetic processes.	How do chemical bonds break? What happens when you break a bond? How do bonds develop? Why are they weak or strong?	• Students will explore how chemical bonds involve the gain, loss, or sharing of valence electrons; and • Students will observe and compare ionic and covalent bonding.	See Below
Catch up on anything not completed, Review, Finals, Classroom Clean Up. (One Week)				
Semester One Complete				

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Balancing Equations **One Week** Prentice Hall Physical Science Textbook Power Points for Balancing Equations in Chemistry, Lab Equipment Computers, Various Websites, Worksheets, Games, and Films.	**P1:HS.P1U1.2 - Develop and use models** for the transfer or sharing of electrons to predict the formation of ions, molecules, and compounds in both natural and synthetic processes.	Why is there Math in Science? Who figured out how to create the equations for Science? Do I have to do this? ("Yes!") (Science is just Math put to Life!)	• Students will comprehend how chemical equations must be balanced; • Students will practice writing and balancing chemical equations; and • Students will move from simpler to more complex equations.	See Below
Chemical Reactions **One Week** Prentice Hall Physical Science Textbook Power Points for Chemical Reactions, Lab Equipment Computers, Various Websites, Worksheets,	**P1:HS.P1U1.3 - Ask questions, plan, and carry out investigations** to explore the cause and effect relationship between reaction rate factors **P1:HS+C.P1U1.5 - Plan and carry out investigations** to test predictions of the outcomes of various reactions, based on patterns of physical and chemical properties.	How do we measure how much energy is released during a Chemical Reaction? What happens during Chemical Reactions? Are Chemical Reactions dangerous? Do we even know when reactions happen?	• Students will be able to determine the types of chemical reactions and note their differences; • Students will explore reactions that require energy and reactions that release energy; • Students will compare reaction rates; • Students will be able to determine the factors that influence them.	See Below

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Games, and Films.				
Classifying Matter **One Week** Prentice Hall Physical Science Textbook Power Points for States and Properties of Matter, Lab Equipment Computers, Various Websites, Worksheets, Games, and Films.	**P1:8.P1U1.2 - Obtain and evaluate information** regarding how scientists identify substances based on unique physical and chemical properties.	How can we separate something that has been mixed together when they chemically combine? What is the best solvent?	• Students will be able to differentiate between compounds, mixtures, and solutions; • Students will be able to classify different types of matter including compounds, mixtures, and solutions.	See Below
Acids and Bases **One Week** Prentice Hall Physical Science Textbook Power Points for pH – Acids and Bases, Lab Equipment Computers, Various Websites, Worksheets,	**P1:HS+C.P1U1.5 - Plan and carry out investigations** to test predictions of the outcomes of various reactions, based on patterns of physical and chemical properties.	Do all acids burn? How do Acids and Bases react together? Where are acids and bases in our everyday world?	• Students will understand the properties of acids, bases, and neutrals. • Students will test for pH and read the pH scale.	See Below

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Games, and Films.				
Motion and Force **One Week** Prentice Hall Physical Science Textbook Power Points for States and Properties of Matter, Lab Equipment Computers, Various Websites, Worksheets, Games, and Films.	**P3:HS.P3U1.6 - Collect, analyze and interpret data** regarding the change in motion of an object or system in one dimension, to construct an explanation using Newton's Laws.	How are speed, velocity, and acceleration different? Why are they important to know? How do we know what speed we are going when we drive? What propels things forward?	• Students will learn to observe motion; • Students will be able to practice calculating speed, velocity, and acceleration; and • Students will understand inertia, momentum, and net forces	See Below
Gravity **One Week** Prentice Hall Physical Science Textbook Power Points for Gravity, Mass, Weight, Lab Equipment Computers, Various Websites, Worksheets, Games, and Films.	**P3:HS+Phy.P3U1.2 - Develop and use** mathematical **models** of Newton's law of gravitation and Coulomb's law to describe and predict the gravitational and electrostatic forces between objects	How much would I weigh on the Moon? What keeps us stuck on this planet? Why is my mass different than my weight? How can two people who are the same size have two different weights?	• Students will learn the principals of Gravity and how it influences objects. • Students will learn to differentiate between Mass and Weight. • Students will be able to calculate the difference between Mass and Weight.	See Below

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Work **Two Week** Prentice Hall Physical Science Textbook Power Points for Work, Speed, Velocity, Acceleration, Laws of Motion, and Force, Lab Equipment, Computers, Various Websites, Worksheets, Games, and Films.	**P3:HS.P3U2.7 - Use mathematics and computational thinking** to explain how Newton's laws are used in engineering and technologies to create products to serve human ends.	What creates the energy to make the ability to do work? Are all energy's different? So the goal is to create more work output with less energy input?	**Students will investigate and understand the scientific principles of work, force, and motion.** **Key concepts include:** • speed, velocity, and acceleration; • Newton's laws of motion; • work, force, mechanical advantage, efficiency, and power; and • technological applications of work, force, and motion.	See Below
Simple Machines **One Week** Prentice Hall Physical Science Textbook Power Points for States and Properties of Matter, Lab Equipment Computers, Various Websites, Worksheets,	**P3:HS.P3U2.7 - Use mathematics and computational thinking** to explain how Newton's laws are used in engineering and technologies to create products to serve human ends.	How can I build a machine to do a job using less energy? What do I need to make this move?	• Students will understand how the concepts of work, motion and force apply to machines. • Students will create Simple Machines and Demonstrate how Work and Force are applied.	See Below

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Games, and Films.				
Energy **Two Week** Prentice Hall Physical Science Textbook Power Points for States and Properties of Matter, Lab Equipment Computers, Various Websites, Worksheets, Games, and Films.	**P1:HS+C.P1U1.2 - Obtain, evaluate, and communicate** the qualitative evidence supporting claims about how atoms absorb and emit energy in the form of electromagnetic radiation. **P4:HS.P4U1.8 - Engage in argument from evidence** that the net change of energy in a system is always equal to the total energy exchanged between the system and the surroundings.	What are different forms of energy used for? How were each of these forms of energy discovered? What will happen if we do not have one of these types of energy?	**Students will investigate and understand forms of energy and how energy is transferred and transformed.** **Key concepts include:** • Potential; • Kinetic; • Mechanical; • Chemical; • Electrical; • Thermal; • Radiant and, • Nuclear energy.	See Below
Waves **One Week** Prentice Hall Physical Science Textbook Power Points for Waves, Transverse Waves, and Sound Waves, Lab Equipment Computers, Various Websites, Worksheets,	**P4:HS.P4U1.8 - Engage in argument from evidence** that the net change of energy in a system is always equal to the total energy exchanged between the system and the surroundings.	What is measured in "Waves?" What are the different types of waves? What are they used for? How do we measure waves and why?	**Student will investigate and understand the characteristics of sound waves.** **Key concepts include:** • wavelength, frequency, speed, amplitude, rarefaction, and compression; • resonance; • the nature of compression waves; and • technological applications of sound **Student will investigate and understand the characteristics of transverse waves.** **Key concepts include:**	See Below

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Games, and Films.			• wavelength, frequency, speed, amplitude, crest, and trough; • the wave behavior of light; • images formed by lenses and mirrors; • the electromagnetic spectrum; and • technological applications of light	
Electromagnetic Spectrum **One Week** Prentice Hall Physical Science Textbook Power Points for States and Properties of Matter, Lab Equipment Computers, Various Websites, Worksheets, Games, and Films.	**P1:HS+C.P1U1.2 - Obtain, evaluate, and communicate** the qualitative evidence supporting claims about how atoms absorb and emit energy in the form of electromagnetic radiation.	What exactly is happening when someone is shocked? How do you prevent electricity from creating a shock? Who uses Electromagnet Energy? Where does it come from?	**Student will investigate and understand basic principles of electricity and magnetism.** **Key concepts include:** • static electricity, current electricity, and circuits; • relationship between a magnetic field and an electric current; • electromagnets, motors, and generators and their uses; and • conductors, semiconductors, and insulators.	See Below
Electricity **One Week** Prentice Hall Physical Science Textbook	**P4:HS+Phy.P4U2.7 - Design, evaluate**, and refine a device that works within given constraints to transfer energy within a system.	How can we create a machine that uses electricity for energy? How can we get the cheapest electricity to run our circuits?	• Students identify electric forces and electric fields. • Students recognize and understand the functions of different parts within electric circuits. • Students learn to calculate electrical current, power, and energy.	See Below

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Power Points for States and Properties of Matter, Lab Equipment Computers, Various Websites, Worksheets, Games, and Films.				
Magnetism **One Week** Prentice Hall Physical Science Textbook Power Points for States and Properties of Matter, Lab Equipment Computers, Various Websites, Worksheets, Games, and Films.	**P2:HS.P2U1.5 - Construct an explanation** for a field's strength and influence on an object (electric, gravitational, magnetic).	What is the use of magnetism? What would happen if all magnetism stopped? What exactly is an EMP?	**Students understand magnetism including:** • magnets and their poles, • magnetic forces and fields, • and electromagnetism.	See Below
Heat **One Week**	**P1:HS+C.P1U1.2 - Obtain, evaluate, and communicate** the qualitative evidence supporting claims about how atoms absorb and emit	Why is Heat Energy? Where does heat come from? How do we measure	**The student will investigate and understand temperature scales, heat, and thermal energy transfer.** **Key concepts include:**	See Below

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Prentice Hall Physical Science Textbook Power Points for States and Properties of Matter, Lab Equipment Computers, Various Websites, Worksheets, Games, and Films.	energy in the form of electromagnetic radiation.	heat? What is that based on?	• Celsius and Kelvin temperature scales and absolute zero; • phase change, freezing point, melting point, boiling point, vaporization, and condensation; • conduction, convection, and radiation; and • applications of thermal energy transfer.	
Nuclear Energy **One Week** Prentice Hall Physical Science Textbook Power Points for States and Properties of Matter, Lab Equipment Computers, Various Websites, Worksheets, Games, and Films.	**P1:HS+C.P1U1.2 - Obtain, evaluate, and communicate** the qualitative evidence supporting claims about how atoms absorb and emit energy in the form of electromagnetic radiation.	Is nuclear energy dangerous? Where does nuclear energy come from? How can we use nuclear energy?	• Students explore the concept of radioactivity and consider its medical and commercial uses. • Students explain the difference between nuclear fission and fusion.	See Below
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Semester Two Complete				

Aberration of Starlight, Albedo, Absolute Magnitude, Apparent Magnitude, Air Current, Anemometer, Acid Rain, Buoyant Force, Acceleration, Allotropes, Anions, Acid, Activation, Alcohols, Amine, Altitude, Alpha Decay, Alternating Current, Ampere, Atom, Amplitude, Archimedes, Atomic Mass, Atomic Number, Alkali Metals, Alkaline Earth Metals, Barometer, Conversion Factor, Acceleration, Centripetal, Beta Decay, Base, Calorie, Celsius, Conduction, Convection, Concave Lens, Concave Mirror, Convex Lens, Convex Mirror, Charges, Carbohydrates, Carcinogen, Chlorofluorocarbons, Condensation, Coordinated Universal Time, Condensation, Climate, Centrifugal, Conservation of Energy, Chain Reaction, Critical Mass, Chemistry, Compound, Cations, Conservation of Mass, Covalent Bond, Covalent Compounds, Catalyst, Chemical Properties, Chemical Reaction, Combustion, Coalescence, Carbon-14 Dating, Density, Displacement, Distance, Decibel, Doppler Effect, Diffraction, Dispersion, Direct Current, Decomposition, Coulomb, Curie Temperature, Current, Excited States, Element, Electron Configuration, Endothermic Reaction, Equilibrium, Exothermic Reaction, Free Fall, Force, Friction, Fahrenheit Scale, Frequency, Focal Length, Ferromagnetic, Fluorescence, Fission, Fusion, Formula Mass, Experiment, Energy, Electromagnetic Wave, Electric Charge, Electromagnetism, Electrons, Gas, Generator, Ground State, Gamma Decay, Groups, Hypothesis, Horsepower, Heat, Hertz, Half-Life, Inertia, Intensity, Interference, Ion, Ionic Bonds, Ionic Compounds, Kilowatt, Kinetic Energy, Kelvin, Kilocalorie, Law, Linear Momentum, Liquid, Longitudinal Wave, Laser, Limiting Reactant, Light-Year, Long-Shore Current, Magnitude, Mass, Measurement, Metric System, Motion, Magnetic Declination, Magnetic Field, Motor, Mass Number, Metal, Mixture, Molecule, Newton, Neutrons, Nucleus, Noble Gases, Nonmetal, Ohm, Oxidation, Organic Chemistry, Physics, Position, Projectile Motion, Potential Energy, Power, Phases of Matter, Pressure, Period, Polarization, Parallel Circuit, Poles, Protons, Phosphorescence, Photoelectric, Photon, Protons, Period, Periodic Law, Polar Covalent Bond, pH, Precipitate, Products, Photosynthesis, Psychrometer, Pollution, Permeability, Quantum Mechanics, Radiation, Resonance, Ray, Real Image, Reflection, Reflection, Refraction, Resistance, Radioactive Isotope, Radioactivity, Reactants, Reduction, Radar, Rain Gauge, Rayleigh Scattering, Relative Humidity, Radiometric Dating, Renewable Energy Sources, Saturated, Solubility, Solution, Structural, Scalar, Solid, Specific Heat, Steam Point, Sound, Scientific Method, Second, Spectrum, Speed of Light, Speed of Sound, Superposition, Standard Unit, Streak, Theory, Time, Terminal Velocity, Torque, Temperature, Thermodynamics, Transverse Wave, Transformer, Transition Elements, Ultrasound, Unsaturated Solution, Vector, Virtual Image, Viscosity, Weight, Watt, Work, Wave, Wavelength, X-Rays, Volt, Voltage, Valence Electrons, Etc.