

# Ganado Unified School District

## Geology

### *GEOLOGY PACING Guide SY 2017-2018*

Timeline & Resources	AZ College and Career Readiness Standard	Essential Question (HESS Matrix)	Learning Goal	Vocabulary (Content/Academic)
1	2:2:3. Distinguish between pure and applied science.	What is Science?	Understanding Science	Earth Science, Geology, Oceanography, Meteorology, Astronomy, Resources, Literacy, Applied, Pure, Compare, Contrast, Visible, Tangible
2	1:2:1. Demonstrate safe and ethical procedures (e.g., use and care of technology, materials, organisms) and behavior in all science inquiry.; 1:1:2. Develop questions from observations that transition into testable hypotheses.; 1:1:3. Formulate a testable hypothesis.; 1:1:4. Predict the outcome of an investigation based on prior evidence, probability, and/or modeling (not guessing or inferring).	What is Scientific Investigation and how can I apply it?	Creating a Testable Hypothesis	Hypothesis, Theory, Scientific Investigation, Concept, Analyse, Design, Infer, Conclude
3	1:2:2. Identify the resources needed to conduct an investigation.; 1:2:3. Design an appropriate protocol (written plan of action) for testing a hypothesis;	How do I formulate a Scientific Investigation?	How to test a Hypothesis	Formulate, Conduct, Protocol

4	1:3:3. Critique reports of scientific studies (e.g., published papers, student reports); 1:3:4. Evaluate the design of an investigation to identify possible sources of procedural error, including; 1:3:7. Propose further investigations based on the findings of a conducted investigation; 1:2:4. Conduct a scientific investigation that is based on a research design;	How can I interpret and understand a Scientific Investigation? How Can I demonstrate an Investigation?	How to investigate and understand prior investigations...interpreting data	Scientific method, hypothesis, observation, conclusion, chart, table, graphs, positive correlation, neagative correlation, no correlation
5	1:4:1. For a specific investigation, choose an appropriate method for communicating the results; 1:4:2. Produce graphs that communicate data;	What do I need to analyze, organize, and communicate the results of my own Scientific Investigation?	How to Communicate Results through charts, graphs, diagrams, speeches, and writings.	Communication, Speech, Debate, Results
6	1:4:3. Communicate results clearly and logically; 1:4:4. Support conclusions with logical scientific arguments; Review of Inquiry Process Standards	Who is my audience and how is my Scientific Investigation relevant to them and how can I convey this logically to them through my Communication?	Creating an Analysis and Conclusion	Support, Logic, Argue
7	2:1:1. Describe how human curiosity and needs have influenced science, impacting the quality of life worldwide; 2:1:2. Describe how diverse people and/or cultures, past and present, have made important contributions to scientific innovations; 2:1:3. Analyze how specific changes in science have affected society; 2:1:4. Analyze how specific cultural and/or societal issues promote or hinder scientific advancements.	Why is Science Important? Who has influenced Science? How has Science been impacted by Culture?	Understanding the need for curiosity and how Science has impacted Humans and Life on Earth	Curiosity, Diversity, Contribution, Impact, Human, Society, Culture

8	6:4:1. Describe the Big Bang Theory as an explanation for the origin of the universe. 6:3:1. Describe the scientific theory of the origin of the solar system (solar nebular hypothesis).	How did Earth Get here?	Origin of the Universe	Origin, Matter, Energy, Mass, Atom
9	6:3:2. Describe the characteristics, location, and motions of the various kinds of objects in our solar system, including the Sun, planets, satellites, comets, meteors, and asteroids. 6:3:3. Explain the phases of the Moon, eclipses (lunar and solar), and the interaction of the Sun, Moon, and Earth (tidal effect).	Where are we in the entire Scope of the Universe and what does the Universe comprise of?	Celestial Bodies and Moon Phases	Satellite, Comet, Meteor, Asteroid, Moon, Lunar, Eclipses, Celestial, Universe
10	6:4:2. Describe the fusion process that takes place in stars. 6:4:3. Analyze the evolution of various types of stars using the Hertzsprung-Russell (HR) diagram.	What is the Hertzsprung-Russell diagram? How does it relate? What energy transfers occur in space and the celestial bodies?	How stars form	Star, Fusion, Fission, Space, Telescope, Refraction, Reflection
11	6:4:4. Compare the evolution (life cycles) of stars of different masses (low and high mass). 6:4:5. Explain the formation of the light elements in stars and the heavier elements (what astronomers call "metals") in supernova explosions.	How do energy and star life cycles relate to light and mass?	Life cycle of stars and light in space	Life Cycle, Light, Elements
12	6:4:6. Explain the evolution and life cycles of galaxies.	How does a galaxy begin and end? Where does it go?	How galaxies form and why they end	Planets, Satellites, Evolution, Galaxy, Solar System, Rings, Gas
13	6:2:5. Demonstrate the relationships among earthquakes, volcanoes, mountain ranges, mid-oceanic ridges, deep sea trenches, and tectonic plates.	How does Earth fit into the Universe and how did our land masses form?	Plate Tectonics and Earth movement	Plate Tectonics, Wagner, Land Mass, Continent, Shield, Subduction, Conduction

14	6:2:6. Distinguish among seismic S, P, and surface waves. 6:2:7. Analyze the seismic evidence (S and P waves) used to determine the structure of the Earth.	How can we discover the unseen? How can prior knowledge and logic show us the interior of the Earth?	The interior of the Earth	Seismic, Wave, Lithosphere, Magma, Lava, Asthenosphere, MOHO, Plates,
15	6:2:4. Demonstrate the relationship between the Earth's internal convective heat flow and plate tectonics. 6:2:8. Describe how radioactive decay maintains the Earth's internal temperature.	Hot must go up and cold must go down, but how does that keep us moving?	Earth's energy and how it affects us	Convection, Conduction, Heat, Energy, Radioactive, Daughter, Half-Life
16	3:2:2. Recognize the importance of basing arguments on a thorough understanding of the core concepts and principles of science and technology;	Why is Arguing called Debate and why is it necessary to the development of the Scientific World? How do we connect?	Debate in Science and why we need it.	Argument, Debate, Understanding, Comprehension, Cohesion, Principles
17	3:2:3. Support a position on a science or technology issue.	Let's review creating a Hypothesis! If this happens, then this will happen, because why?	Finding a side to argue and a valid/logical argument.	Support, Deny, Valid, Logic
18	Final Exam Testing			

Ganado Unified School District

**GEOLOGY SEMESTER2 PACING Guide SY 2014-2015**

Timeline & Resources	AZ College and Career Readiness Standard	Essential Question (HESS Matrix)	Learning Goal	Vocabulary (Content/Academic)
1	2:2:1. Specify the requirements of a valid, scientific explanation (theory)	What creates a Theory?	Creating a testable Hypothesis for the Science Fair Experiments	Requirements, Information, Data

2	<p>1:1:1. Evaluate scientific information for relevance to a given problem;          1:1:2. Develop questions from observations that transition into testable hypotheses; 1:1:3. Formulate a testable hypothesis;          1:1:4. Predict the outcome of an investigation based on prior evidence, probability, and/or modeling (not guessing or inferring);</p>	<p>How do I use Prior Evidence and why is it important?</p>	<p>Research and Formulating a Scientific Investigation</p>	<p>Develop, Testable, Predict, Formulate, Evidence,</p>
3	<p>1:2:1. Demonstrate safe and ethical procedures (e.g., use and care of technology, materials, organisms) and behavior in all science inquiry; 1:2:2. Identify the resources needed to conduct an investigation; 1:2:3. Design an appropriate protocol (written plan of action) for testing a hypothesis:</p> <ul style="list-style-type: none"> <li>· Identify dependent and independent variables in a controlled investigation,</li> <li>· Determine an appropriate method for data collection (e.g., using balances, thermometers, microscopes, spectrophotometer, using qualitative changes),</li> <li>· Determine an appropriate method for recording data (e.g., notes, sketches, photographs, videos, journals (logs), charts, computers/calculators)</li> </ul>	<p>What procedures do I need to take to prove my Hypothesis?</p>	<p>Lab Safety and running your own experiments. What do you need and how do you use it productively?</p>	<p>Demonstrate, Safety,</p>

4	<p>1:2:5. Record observations, notes, sketches, questions, and ideas using tools such as journals, charts, graphs, and computers; 1:3:1. Interpret data that show a variety of possible relationships between variables, including: positive relationship, negative relationship, no relationship; 1:3:2. Evaluate whether investigational data support or do not support the proposed hypothesis; 1:3:3. Critique reports of scientific studies (e.g., published papers, student reports); 1:3:4. Evaluate the design of an investigation to identify possible sources of procedural error, including: sample size, trials, controls, analyses.</p>	<p>How do I question? Why is it necessary?</p>	<p>Research and Data Collection</p>	
5	<p>1:4:1. For a specific investigation, choose an appropriate method for communicating the results; 1:4:2. Produce graphs that communicate data; 1:4:3. Communicate results clearly and logically; 1:4:4. Support conclusions with logical scientific arguments; Review of Inquiry Process Standards</p>	<p>How do I communicate my results and who do I communicate them to?</p>	<p>Organizing Data</p>	<p>Organization, Method, Produce, Support, Inquiry, Standards, Evidence, Growth</p>
6	<p>6:3:4. Interpret a geologic time scale. 6:3:5. Distinguish between relative and absolute geologic dating techniques.</p>	<p>What is time and how does it influence me?</p>	<p>Understanding Time</p>	<p>Time, Space, Dimension, Concept, Virtual, Dating, Supposition</p>

7	<p>6:3:6. Investigate scientific theories of how life originated on Earth (high temperature, low oxygen, clay catalyst model). 6:3:7. Describe how life on Earth has influenced the evolution of the Earth's systems. 6:3:8. Sequence major events in the Earth's evolution (e.g., mass extinctions, glacial episodes) using relative and absolute dating data. 6:3:9. Analyze patterns in the fossil record related to the theory of organic evolution.</p>	<p>Where did life start on Earth and how has it changed?</p>	<p>Life and where it came from and where it might go</p>	<p>Origination, Catalyst, Absolute, Definitive, Prior, Justification</p>
8	<p>6:1:2. Demonstrate how dynamic processes such as weathering, erosion, sedimentation, metamorphism, and orogenesis relate to redistribution of materials within the Earth system. 6:1:3. Explain how the rock cycle is related to plate tectonics.</p>	<p>Where do all our rocks come from? How do we know?</p>	<p>Difference between Weathering and Erosion and how each work to create and ever changing Earth. The Rock Cycle</p>	<p>Weathering, erosion, sedimentation, metamorphism, orogenesis, deposition</p>
9	<p>6:1:1. Identify ways materials are cycled within the Earth system (i.e., carbon cycle, water cycle, rock cycle). 6:1:7. Explain how the geochemical processes are responsible for the concentration of economically valuable minerals and ores in Arizona and worldwide.</p>	<p>Why are minerals important?</p>	<p>How Earth is important to our every day life and our very lives.</p>	<p>Cycle, Crystal, Element, Face, Cleavage, Streak, Mohs</p>
10	<p>6:2:1. Describe the flow of energy to and from the Earth. 6:2:2. Explain the mechanisms of heat transfer (convection, conduction, radiation) among the atmosphere, land masses, and oceans.</p>	<p>Hot, Hot, Hot! The different types of Energy and how it moves and what it does? How is it important to Earth and Me?</p>	<p>How heat is essential to our life and planet</p>	<p>Convection, Conduction Radiation, Energy</p>

11	6:2:3. Distinguish between weather and climate. 6:1:4. Demonstrate how the hydrosphere links the biosphere, lithosphere, cryosphere, and atmosphere.	There will be Weather, whether or not! What is the difference between weather and climate?	Difference between Weather and Climate. (Reiterate that Weather is not Weathering!)	Hydrosphere, Biosphere, Lithosphere, Cryosphere, Atmosphere
12	6:1:5. Describe factors that impact current and future water quantity and quality including surface, ground, and local water issues. 6:1:6. Analyze methods of reclamation and conservation of water.	How am I responsible for the weather, climate, and water resources on my planet?	Water Cycle and Conservation. How can we help?	Quality, Quantity, Pure, Resource, Reclamation, Conservation, Waste
13	6:2:9. Explain the effect of heat transfer on climate and weather. 6:2:10. Demonstrate the effect of the Earth's rotation (i.e., Coriolis effect) on the movement of water and air. 6:2:11. Describe the origin, life cycle, and behavior of weather systems (i.e., air mass, front, high and low systems, pressure gradients).	There goes that Hot stuff again! How does heat affect the weather and what other factors move the atmospheric conditions?	How is weather and Climate affected by heat from Space and Earth's interior. What is Heat Transfer? What are the different types?	Climate, Weather, Heat, Condition, Behavior, Rotation, Current
14	6:2:12. Describe the conditions that cause severe weather (e.g., hurricanes, tornadoes, thunderstorms). 6:2:13. Propose appropriate safety measures that can be taken in preparation for severe weather. 6:2:14. Analyze how weather is influenced by both natural and artificial Earth features (e.g., mountain ranges, bodies of water, cities, air pollution). 6:2:15. List the factors that determine climate (e.g., altitude, latitude, water bodies, precipitation, prevailing winds, topography).	How do I keep safe in a storm? Why should I be concerned?	This storm's a doozie! What to do and why? How do we impact our own weather and do humans create storms?	Hurricane, Tornado, Sharknado (just joking), Tsunami, Earthquake, Volcanic, Wind, Twister, Cyclone

15	6:2:16. Explain the causes and/or effects of climate changes over long periods of time (e.g., glaciation, desertification, solar activity, greenhouse effect). 6:2:17. Investigate the effects of acid rain, smoke, volcanic dust, urban development, and greenhouse gases, on climate change over various periods of time.	How climate change affects me and why I care?	What is Climate Change? Global Warming? Acid Rain? How do these phenomenon affect Glaciation and Desertification? What is the Greenhouse effect? Should we be concerned and what can we do? Why Recycle?	Climate, Cause, Effect, Glaciation, Desertification, Greenhouse, Smog, Carbon Dioxide
16	3:1:1. Evaluate how the processes of natural ecosystems affect, and are affected by, humans; 3:2:1. Analyze the costs, benefits, and risks of various ways of dealing with the following needs or problems: -various forms of alternative energy, storage of nuclear waste, abandoned mines, greenhouse gases, hazardous wastes; 2:2:2. Explain the process by which accepted ideas are challenged or extended by scientific innovation.	What do I do as a human to affect the planet I live on?	Human Energy Use and Resources? What are alternatives? Who cares and why? What can I do, if anything, to change the habits of humans on my planet? (Recycle and Litter control? Water conservation, etc.)	Human, Energy, Nuclear, Solar, Wind, Hydro
17	2:2:4. Describe how scientists continue to investigate and critically analyze aspects of theories.	What impact can I have on the world of Science? What should we, as humans, continue to investigate in the future?	If I were a Scientist when I grow up, what would I focus on?	Critical, Investigate, Future, Concern, Prior, Knowledge
18	All of the above		Finals	