

Ganado Unified School District

(Geology/9th - 12th)

GEOLOGY SEMESTER 1 PACING Guide SY 2014-2015

Timeline & Resources	AZ College and Career Readiness Standard	Essential Question (HESS Matrix)	Learning Goal	Vocabulary (Content/Academic)
1	STRAND 6 EARTH SCIENCE Concept 1 Geochemical Cycles PO1 Identify the ways that rocks and water are cycled within the Earth System	What is a mineral? What the physical properties used to identify minerals? What are physical properties in general?	Systematically identify minerals	Mineral, hardness luster, streak, crystal form, cleavage
2	STRAND 6 EARTH SCIENCE Concept 1 Geochemical Cycles PO1 Identify the ways that rocks and water are cycled within the Earth System	What defines an igneous rock? What defines a sedimentary rock? A metamorphic rock	Igneous, sedimentary and metamorphic rock types, Rock cycle, and identification of basic rock types.	Texture, (aphanitic, porphyritic, phaneritic) composition, (mafic, intermediate, felsic) Crystals, matrix, clasts, foliated, non-foliated, glassy, frothy.
3	S6 Concept 1 PO2 Demonstrate how processes such as weathering, erosion, sedimentation, metamorphism, and orogenesis redistribute materials within Earth System	What defines an igneous rock? What defines a sedimentary rock? A metamorphic rock	Igneous, sedimentary and metamorphic rock types, Rock cycle, and identification of basic rock types.	Weathering, erosion, heat, pressure, melting, cooling
4	S6 Concept 1 PO3 Rock Cycle and Plate Tectonics	How do rocks cycle from one type to another? What is the source of heat which drives the rock cycle	Students will render a diagram of the Rock Cycle and an earth structure diagram which illustrates most of the plate boundaries and the processes happening there.	Weathering, erosion, heat, pressure, melting, cooling,
5	S6 Concept 1 PO5 Describe factors that affect current and future water quantity	How old is the water on this Earth? Where does	Water Cycle Diagram , prepare for surface hydrologic fieldwork at	Evaporation, transpiration

	and quality of surface, ground and local water supplies.	Arizona get most of its water? Where do we in Ganado get our water? Where does the water to grow our food come from?	Hubbell's Trading Post NHS	transportation, precipitation, percolation, recharge, discharge, spring, water table, saturated zone. Meander, meander ratio, floodplain, fill terrace, cut terrace.
6	S6 Concept 1 PO5 Describe factors that affect current and future water quantity and quality of surface, ground and local water supplies.	How old is the water on this Earth? Where does Arizona get most of its water? Where do we in Ganado get our water? Where does the water to grow our food come from?	Groundwater Quantity Lab, Local Groundwater diagram. Conduct fieldwork at Hubbell's	Evaporation, transpiration transportation, precipitation, percolation, recharge, discharge, spring, water table, saturated zone
7	STRAND 6 EARTH SCIENCE Concept 2 energy in the Earth System PO2 Explain the mechanisms of heat transfer.	How do we know the continents move? How fast are they moving? What drive the motion of the plates? What typed of volcanoes do we have here in Northern Arizona?	Evidence for plate tectonics. Volcano types.	Radiation, convection conduction. Shield, composite cone, cinder cone.
8	PO4 Demonstrate the relationship between Earth's internal convection and plate tectonics.	How can you distinguish between a normal and a reverse fault? A right-lateral or left lateral	Folds and Faults, the different mountain types through the world	Normal fault, reverse fault, strike-slip fault, hanging wall, footwall
9	PO5 Demonstrate the relationships among earthquakes, volcanoes, mountain ranges, mid-ocean ridges, deep sea trenches and tectonic plates	What would the earth look like if it was sliced in half? How do all of the structures and functions we've learned about relate to each	Earth Structure Diagrams	subduction zone, convection, rift valley, collision zone, solid inner core, liquid outer core

		other?		
10	PO6 Distinguish between S, P and surface waves	What are the different types of motion associated with earthquakes? How can we calculate the distance to an epicenter by analyzing the difference in their arrival times?	Earthquake Distance Calculations	S-waves, P-waves, difference, velocity.
11	PO6 Distinguish between S, P and surface waves	What are the different types of motion associated with earthquakes? How can we calculate the distance to an epicenter by analyzing the difference in their arrival times? How do we determine where an earthquake has taken place?	Earthquake Triangulation Lab	S-waves, P-waves, difference, velocity.
12	PO 8 describe how radioactive decay maintains the Earth's internal heat	How do heavier elements change into lighter elements?	Uranium decay series activity	Alpha decay, beta decay, gamma radiation, daughter, isotope, half-life
13	No standard for this activity	How are different sedimentary environments characterized by the size distribution of their sediments?	Saive Ananalysis Lab	Phi sizes, poorly sorted, well-sorted, coarse and fine sediments.
14				
15	STRAND 1 INQUIRY PROCESS Concept 1 Observations, Questions and Hypotheses. PO2 develop questions		Science Fair Project	Scientific method, hypothesis, observation,

	from observations that transition into testable hypotheses. PO2 Formulate a testable hypothesis.			conclusion, chart, table, graphs, positive correlation, neagative correlation, no correlation
16	S1 Concept 2 Scientific Testing PO2 identify resources needed to conduct an investigation	THINKING	Science Fair Project	Scientific method, hypothesis, observation, conclusion, chart, table, graphs, positive correlation, neagative correlation, no correlation
17	S1 Concept 2 PO3 Design an appropriate protocol for testing a hypothesis	COMMUNICATION RESPECT & REVERENCE	Science Fair Project	Scientific method, hypothesis, observation, conclusion, chart, table, graphs, positive correlation, neagative correlation, no correlation
18	Final Exam Testing	SELF & SOCIAL AWARENESS		

Ganado Unified School District

(Insert Subject/Grade Level)

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	S1 Concept 2 PO1 Interpret data that show a variety of possible relationships including positive, negative and no relationship. PO 2 Evaluate whether investigational data support or do not support proposed hypotheses. Concept 4 PO1 For a specific investigation, choose an appropriate method for communicating the results S6 Concept 3 Origin and Evolution of the Earth System PO4 Interpret a geologic time scale. PO 8 analyze patterns in the fossil record related to the theory of organic evolution.	What is Evolution? How does evolution happen? What are the lines of evidence in support of evolution, How do we scale geologic time so we can think about it?	Science Fair Project, Evolution by natural selection and the fossil record. Geologic time scale project.	Evolution, natural selection mutation, era period, Precambrian, Cambrian, Ordovician, Silurian, Devonian, Mississippian, Pennsylvanian, Silurian, Devonian, Permian, Triassic, Jurassic Cretaceous, Tertiary, Quaternary.
2	S1 Concept 2 PO1 Interpret data that show a variety of possible relationships including positive, negative and no relationship. PO 2 Evaluate whether investigational data support or do not support proposed hypotheses. Concept 4 PO1 For a specific investigation, choose an appropriate method for communicating the results. S6 Concept 3 Origin and Evolution of the Earth System PO4 Interpret a geologic time	Where does the extinction of the dinosaurs (the KT extinction) fit into the stack of rocks we live in here on the Navajo Rez?	Science Fair Project, Rez Rocks Cross section.	Scale, slope-former, cliff former, Geologic cross-section Unconformity

	scale. PO 8 analyze patterns in the fossil record related to the theory of organic evolution. PO8 Sequence major events in Earth's evolution using relative and absolute dating data.			
3	S1 Concept 2 PO1 Interpret data that show a variety of possible relationships including positive, negative and no relationship. PO 2 Evaluate whether investigational data support or do not support proposed hypotheses. Concept 4 PO1 For a specific investigation, choose an appropriate method for communicating the results	Where do the Devonian and Permian Extinctions fit into the stack of rock in the Grand Canyon?	Science Fair Project, Grand Canyon Cross section.	Scale, slope-former, cliff former, Geologic cross-section Unconformity
4	S1 Concept 2 PO1 Interpret data that show a variety of possible relationships including positive, negative and no relationship. PO 2 Evaluate whether investigational data support or do not support proposed hypotheses. Concept 4 PO1 For a specific investigation, choose an appropriate method for communicating the results		Science Fair Project	
5	S1 Concept 2 PO1 Interpret data that show a variety of possible relationships including positive, negative and no relationship. PO 2 Evaluate whether investigational data support or do not support proposed hypotheses. Concept 4 PO1 For a specific investigation, choose an appropriate method for communicating the results		Science Fair Project	
6	S6 Concept 2: Energy in the Earth System PO1 Describe the flow of	What is the difference between weather and	Weather & Climate	Radiation, conduction, convection, specific

	energy to and from the Earth. PO2 Explain the mechanisms of heat transfer among the atmosphere, land masses and oceans. PO3 Distinguish between weather and climate.	climate? What are some examples of radiation, conduction, and convection? Why does the wind blow?		heat, heat, temperature, weather, climate.
7	S6 Concept 2: Energy in the Earth System PO1 Describe the flow of energy to and from the Earth. PO2 Explain the mechanisms of heat transfer among the atmosphere, land masses and oceans. PO3 Distinguish between weather and climate. PO9 Explain the effect of heat transfer on climate and weather. PO10 Demonstrate the effect of the Earth's rotation (Coriolis effect on the movement of water and air.	How can I read a weather map? How can I use a weather map to predict future winds and temperatures?	Weather and Climate.	Isotherms, isobars, high atmospheric pressure, low atmospheric pressure, cold front, warm front.
8	PO11 Describe the origin, life cycle and behavior of weather systems	What is the typical winter storm cycle here in Ganado? Can I draw a 3-panel diagram showing the path of a Pacific storm passing Ganado.	Weather & Climate.	Isotherms, isobars, high atmospheric pressure, low atmospheric pressure, cold front, warm front.
9	PO16: Explain the causes and/or effects of climate changes over long periods of time.	How much carbon dioxide does Ganado Unified School District exhaust into the atmosphere to teach one student for one year?	GUSD Carbon Footprint lab	Kilowatt hour,
10	S6 Concept 3 Origin and Evolution of the Earth System. PO1 Describe the scientific theory of the origin of the Solar System. PO3 Explain the phases of the moon eclipses, and tides.	Why does the moon appear different shape at different times of the month? How can you safely view a solar	Astronomy. Moon phase diagrams and questions, eclipse diagrams, tidal diagrams.	Full, waning gibbous, 3 rd quarter, waning crescent, new, waxing crescent, 1 st quarter, waxing gibbous, lines

		eclipse.		of sight, umbra penumbra, spring tide, neap tide.
11	S6 Concept 3 Origin and Evolution of the Earth System. PO1 Describe the scientific theory of the origin of the Solar System. PO3 Explain the phases of the moon eclipses, and tides.	Why does the moon appear different shape at different times of the month? How can you safely view a solar eclipse.	Astronomy. Moon phase diagrams and questions, eclipse diagrams, tidal diagrams.	Full, waning gibbous, 3 rd quarter, waning crescent, new, waxing crescent, 1 st quarter, waxing gibbous, lines of sight, umbra penumbra, spring tide, neap tide.
12	S6 Concept 3 Origin and Evolution of the Earth System. PO1 Describe the scientific theory of the origin of the Solar System. PO2 Describe the characteristic, location and motions of the various kinds of objects in our solar system.	How old is the Solar System? How far apart are the planets if we have scaled them down to human size?	Astronomy	Doppler shift, red shift, expanding Universe. Open Universe, Closed Universe
13	Concept 4: Origin and Evolution of the Universe PO1 Describe the Big Bang theory as the best explanation for the origin of the Universe.	How old is the Universe? How did it form? What is the evidence for the Big Bang? What might happen to our Universe in the future?	Astronomy	Doppler shift, red shift, expanding Universe. Open Universe, Closed Universe, singularity
14	PO 3 Analyze the evolution of various types of stars using the Hertzsprung-Russell diagram. PO4 Compare the evolution of stars of different masses.	Where do the chemical elements come from? How are heavier elements made from lighter ones? How will our Sun die? How would a star twice as massive as our Sun die? How will a star three	Astronomy. H-R Diagram	Main sequence stars, white dwarves, pulsars, neutron stars, black holes, supernova.

		times as massive as our sun die?		
15	PO5 Explain the formation of the light elements in stars and the heavy elements in supernova explosions.	Where does all the gold in our banks come from? How about the carbon in your body? How might cosmic rays affect the evolution of life on Earth	Astronomy	Main sequence stars, white dwarves, pulsars, neutron stars, black holes, supernova.
16	PO5 Explain the formation of the light elements in stars and the heavy elements in supernova explosions.	Where does all the gold in our banks come from? How about the carbon in your body? How might cosmic rays affect the evolution of life on Earth	Astronomy.	Main sequence stars, white dwarves, pulsars, neutron stars, black holes, supernova.
17				
18	All of the above		Finals	