Earth Science DW MASTER*(Master)*

Teacher: FUSD Curriculum & Instruction

Month	Content	Skills with Relevance/Rigor	Assessments with Relevance/Rigor	Suggested Activities & Resources
August 2013	**A. Science as a process** • Ideas developed through reasoning • Claims based on testing (scientific method) • Claims subject to review and replication • Standardized measurement systems and tools • Language of science **B. Earth science** (5 days) • Different sciences involved (geology, astronomy, meteorology, oceanography) • Investigations • Laboratory work • Inquiry process SCHS-S1C1, SCHS-S1C2 **Essential questions** 1. Why is the inquiry method used when conducting scientific investigations? 2. How are scientific measurements distinguishable	A1. Define science SCHS-S1C1-01, SCHS-S2C1-04, SCHS-S2C2-01, SCHS-S2C2-02, SCHS-S2C2-03, SCHS-S2C2-04 A2. Describe observable phenomena SCHS-S1C2-05 A3. Ask questions based on observations SCHS-S1C1-02 A4. Distinguish between scientific and non-scientific statements SCHS-S1C1-01 A5. Make inferences from available data SCHS-S1C1-04 A6. Write a lab report according to a provided format/template SCHS-S1C4-01 A7. Record data in table or organized notebook SCHS-S1C2-05 A8. Give examples of qualitative and quantitative data from diagrams/specimens SCHS-S1C3-01 A9. Select and assemble prefixes and roots to create meaningful scientific terms and definitions SCHS-S1C2-05 A10. Estimate and measure objects using correct metric units and values,	A1. SCHS-S1C1-01, SCHS-S2C1-04, SCHS-S2C2-01, SCHS-S2C2-02, SCHS-S2C2-03, SCHS-S2C2-04 A2. SCHS-S1C2-05 A3. SCHS-S1C1-02 A4. SCHS-S1C1-01 A5. SCHS-S1C1-04 A6. SCHS-S1C4-01 A7. SCHS-S1C2-05 A8. SCHS-S1C3-01 A9. SCHS-S1C2-05 A10. SCHS-S1C2-03 A11. SCHS-S1C2-03 A12. SCHS-S1C1-02, SCHS-S1C1-03 A13. SCHS-S1C2-04 A14. SCHS-S1C2-03 A15. SCHS-S1C2-03 A16. SCHS-S1C2-03 A17. SCHS-S1C2-01, SCHS-S1C2-03 A18. SCHS-S1C3-02, SCHS-S2C2-01 A19. SCHS-S1C2-01 A20. SCHS-S1C2-05, SCHS-S1C3-01 A21. SCHS-S1C2-05, SCHS-S1C3-01 A22. SCHS-S1C4-04 A23. SCHS-S1C4-03 A24. SCHS-S1C3-03 A25. SCHS-S1C3-07	**Resources** **B Activites** • Illustrate mastery of a laboratory balance and graduated cylinders • Define testable questions specific to the earth sciences **Instructional Questions** 1. What methods are used for scientific investigation and observation, understanding that learning involves gathering data and forming inferences based on the data? 2. How are basic arithmetic and functions used in calculating quantitative date collecting? 3. What are some of the basic laboratory techniques and equipment used in the science classroom? 4. How is lab equipment used correctly and safely? 1. [To understand the metric system as an accurate international system of

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	from other measurements?	converting measurements appropriately SCHS-S1C2-03  A11. List and justify in writing reasons for using the metric system SCHS-S1C2-03  A12. Write a testable hypothesis as an *if-then* statement SCHS-S1C1-02, SCHS-S1C1-03  A13. Design and conduct an experimental investigation SCHS-S1C2-04  A14. Classify experimental variables as independent or dependent SCHS-S1C2-03  A15. Use a control or comparison when appropriate SCHS-S1C2-03  A16. List examples of constants in experimental design SCHS-S1C2-03  A17. Practice the appropriate use of scientific equipment/tools SCHS-S1C2-01, SCHS-S1C2-03  A18. Sequence the steps of the scientific method SCHS-S1C3-02, SCHS-S2C2-01  A19. Follow predetermined safety protocols in all science settings SCHS-S1C2-01  A20. Convert raw data into organized data (e.g., graphs, tables, models, diagrams)		measure that is based upon multiples of ten] 2. What are scientific measurements? 3. What units are used to make measurement during experiments? 4. Why doesn't the United States use the metric system regularly? 5. How difficult is it to use/learn the metric system? **Labs** • Practicing the use a triple beam balance, recording the mass of several objects. Students will find the volume of irregular objects by using the displacement method. • Practicing metric skills • Determining the density and specific gravity of various objects • Let's Brown Bag It! Using a laboratory balance and determining volume **Homework** 1. Metric conversion problems 2. Homework - practicing metric skills 3. 45 problems where students demonstrate an understanding of metric conversion between

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		SCHS-S1C2-05, SCHS-S1C3-01  A21. Conduct analysis (e.g., explain, correlate, identify trends, compare) data SCHS-S1C2-05, SCHS-S1C3-01  A22. Support conclusions with investigative evidence, comparing to hypothesis SCHS-S1C4-04  A23. Communicate effectively results and conclusions, citing potential sources of experimental error SCHS-S1C4-03  A24. Critique reports of scientific studies by logical inference and analogy SCHS-S1C3-03  A25. Propose further questions and investigations based on findings SCHS-S1C3-07  B1. Provide examples of interrelationships of multiple disciplines of science which are essential to understand Earth systems SCHS-S1C1-01  B2. Calculate specific density and make estimates of gravity SCHS-S1C2-05  Integrated Scientific Processes: A10, A12, A13, A14, A15, A16, A17 SCHS-S1C1-02, SCHS-S1C1-03, SCHS-S1C2-01, SCHS-S1C2-03, SCHS-S1C2-04 		English Standard and the metric System **Classroom** • Scientific method problem solving • Classroom experiment: using a battery, copper wire and flashlight bulb students designed a method to light the bulb utilizing as many methods as possible. The process demonstrates the need to use the steps of the scientific method when approaching a problem.

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September 2013	**C. Meteorology** (20 days) • Layers of atmosphere • Water cycle • Clouds • Storms • Fronts • Weather instruments • Global warming research project SCHS-S1C1, SCHS-S1C2, SCHS-S1C3, SCHS-S1C4, SCHS-S6C1, SCHS-S6C2 **Essential questions** 1. How is weather distinguishable from climate? 2. How are weather patterns and climate related? 3. What causes climate change? 4. How does location (both globally and locally) affect temperature? 5. **How do the elements of weather (temperature, air pressure, wind, and moisture) interact with each other?** 6. How does weather in different places affect people, places, animals, and the environment? 7. How are measuring weather and forecasting weather related? 8. How does global warming affect you?	C1. Distinguish each layer of the atmosphere based on temperature and density SCHS-S6C2-15 C2. Explain scientific reasons for Earth's changing seasons SCHS-S6C2-01, SCHS-S6C2-09, SCHS-S6C2-10 C3. Model the characteristics of the water cycle SCHS-S6C1-01 C4. Gather and interpret weather data (air pressure, wind, rain, moisture, and temperature) C5. Use weather instruments to gather data SCHS-S6C2-09, SCHS-S6C2-14, SCHS-S6C2-15 C6. Explain how predominant air masses influence weather (e.g., United States, ocean, global) SCHS-S6C2-11, SCHS-S6C2-15 C7. Predict weather based on cloud patterns SCHS-S6C2-11 C8. Outline the factors that influence storm formation in various geographical locations SCHS-S6C2-12 C9. Summarize the causes and effects of global warming SCHS-S6C2-14, SCHS-S6C2-16 Integrated Scientific Processes: A2, A3, A5, A7, A9, A10, A20, A21, A23, A25 SCHS-S1C1-02, SCHS-S1C1-04, SCHS-S1C2-03, SCHS-S1C2-05, SCHS-S1C3-01, SCHS-S1C3-07,		**Instructional Questions** 1. What is weather? 2. What kinds of patterns do we see in weather? 3. How can we measure and forecast weather? 4. How do humans contribute to global warming? **Weather Map Activity** • Using data, constructing a weather map with isobars, weather fronts, and rainfall patterns **Worksheets** 1. Atmosphere and elevation (average skills - interpreting diagrams) may also be used in conjunction with web based activity. 2. Oxygen calculation (average skills -making calculations) 3. Land and sea breezes (remedial - applying skills) 4. Heating the land and sea (making inferences) • All worksheets taken from Prentice Hall *"Earth Science"*: Teachers Resource Guide. **Map Activity**

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		SCHS-S1C4-03 		1. Reading a highway map (using an atlas map, following a series of directions, plotting a journey around the state of Arizona) 2. Practicing map skills (using a two dimensional map to locate various points about the globe) 3. Interpreting topographic maps (using Flagstaff east and west topographic maps to find various locations about the city of Flagstaff). 4. Map legends and symbols (average - interpreting diagrams) **Labs:** 1. Mapping a mountain 2. Developing a topographic cross section
October 2013	**D. Maps and map making** (15 days) • Topography • Longitude and latitude • Map scale • Landforms SCHS-S1C1, SCHS-S1C2, SCHS-S1C3, SCHS-S1C4  SSHS-S4C1, SSHS-S4C6 	D1. Compare and read a variety of maps (e.g., topographical, road, world map, globe) SSHS-S4C1-02  D2. Make and interpret maps, including essential components SSHS-S4C1-02  D3. Select the appropriate map for the intended use (e.g., map projections, distortions)		**Instructional Questions** 1. What is matter? 2. How do we describe matter? 3. How can matter be changed? 4. How does the gain and loss of energy affect matter? 5. What makes up an atom? 6. How do atoms combine to form molecules and compounds?

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	E. Minerals (15 days) • Characteristics of matter • Atomic structure • Periodic table • Bonding • Five characteristics of minerals • Eight identifying properties SCHS-S1C1, SCHS-S1C2, SCHS-S1C3, SCHS-S1C4, SCHS-S5C1, SCHS-S5C4, SCHS-S6C1  **Essential questions** 1. How are maps used to interpret the earth? 2. How do we know where we are in relation to other objects on the earth? 3. How can a map be used to make a picture of the world? 4. How do the properties and structures of matter determine their uses? 5. How does matter change due to different conditions? 6. How does matter and energy flow through Earth's systems and how do people interact with them? 7. How do the atomic matter of structure and its interactions at the atomic level influence the behavior of matter at the everyday level? 8. How does the structure of	SSHS-S4C1-02  D4. Locate positions using latitude and longitude SSHS-S4C1-01  D5. Cipher topographic maps (e.g., elevation, direction, landforms) SSHS-S4C1-03  D6. Demonstrate how to make a map cross section, using a topographic map SSHS-S4C6-01  D7. Interpret landforms and features, using a topographic map and seven rules of contours SSHS-S4C1-02, SSHS-S4C1-03  Integrated Scientific Processes: A2, A5, A8, A10, A17, A20, A21, A23 SCHS-S1C1-04, SCHS-S1C2-01, SCHS-S1C2-03, SCHS-S1C2-05, SCHS-S1C3-01, SCHS-S1C4-03  E1. List the particles that make up atoms SCHS-S5C1-01  E2. Compare the particles that make up atoms and elements (e.g., charge, size, mass, function, location) SCHS-S5C1-06  E3. Describe the three types of chemical bonds SCHS-S5C1-07, SCHS-S5C4-04  E4. Differentiate among the properties of solids, liquids, and gases and how matter changes states		7. What is the purpose of the periodic table of elements? 8. What is the difference between a rock and a mineral? 9. How can I tell the difference between a rock and a mineral? 10. How are minerals formed? 11. What is the difference between a mineral and a gem? 12. How are minerals used in industry? **Unit 1 Reading** • A: Minerals; using a graphic organizer during chapter reading **C1 Worksheet** • Atomic structure using diagrams to model atoms: the Bohr model and the Lewis Dot Diagram. • Composition and matter review vocabulary sheet: making calculations as it relates to atomic structure (counting atoms in molecules, using chemical equations and formulas) **C2 Lab** 1. Building models of paper that represent the six systems of crystalline structures

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	matter affect its properties and interactions? 9. How can physical properties be used to identify matter?	SCHS-S5C1-02, SCHS-S5C1-07  E5. Describe how elements, ions, and isotopes are related to minerals SCHS-S5C1-01, SCHS-S5C1-02, SCHS-S5C1-08  E6. Compare chemical and physical changes SCHS-S5C1-04, SCHS-S5C1-05  E7. Relate the structure of the the periodic table to behaviors and trends of elements SCHS-S5C1-03, SCHS-S5C4-04  E8. Model chemical bonding and crystalline structures SCHS-S5C1-01  E9. Key minerals based on physical and chemical characteristics SCHS-S5C1-01, SCHS-S5C1-02, SCHS-S5C1-03  E10. List the physical characteristics of minerals that are influenced by their crystalline structure SCHS-S5C1-01  E11. Distinguish between minerals and non-minerals using the five characteristics that define a mineral SCHS-S5C1-03  E12. Discuss the use of renewable and non-renewable materials within our modern world SCHS-S6C1-07  Integrated Scientific Processes: A2, A3, A5, A6, A17, A19, A20, A21 SCHS-S1C1-02, SCHS-S1C1-04, SCHS-S1C2-01, SCHS-S1C2-03, SCHS-S1C2-05, SCHS-		2. Construct simple toothpick-marshmallow models of the silica tetrahedron 3. Forming crystals from melt and from solution **C3 Reading** • Chapter 2 Minerals from text book *Earth Science* Prentice Hall **Minerals lab** • Comparing physical properties of several minerals (using a Mohs Mineral Hardness Scale and mineral identification key) • Building models out of paper that represent the six systems of crystalline structures • Constructing simple toothpick-marshmallow models of the silca tetrahedron • Forming crystals from melt and from solution **Reading** • Chapter 5 from text book Earth Science McDougal-

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		S1C3-01, SCHS-S1C4-01		Littell
November 2013	**F. Rocks** (20 days) • Three rock types (igneous, metamorphic, sedimentary) • Rock cycle • Forces within rock cycle • Natural resource presentation SCHS-S1C1, SCHS-S1C2, SCHS-S1C3, SCHS-S1C4, SCHS-S6C1, SCHS-S6C2 **Essential questions** 1. What unique properties do rocks, minerals, and gems exhibit? 2. In what ways can rocks differ from one another? 3. Why are some rocks and minerals more valuable than others? 4. What are minerals and why are they important to humans and industry? 5. To what extent must a metal be concentrated above its average crustal content to make it economically viable? 6. How do various types of rocks fit into the rock cycle? 7. Why are rocks different? 8. How do rocks change over time?	F1. Differentiate among the three major types of rocks SCHS-S6C1-01 F2. List similarities and differences among various stages of the rock cycle and the processes involved in each SCHS-S6C2-01, SCHS-S6C2-04 F3. Make a rock cycle diagram SCHS-S6C2-01 F4. Distinguish between intrusive and extrusive igneous rocks and their formations, comparing crystalline structures SCHS-S6C1-01 F5. Classify the three types of sedimentary rocks and their formations SCHS-S6C1-01 F6. Discuss the different typical features of sedimentary rocks SCHS-S6C1-01 F7. Outline processes involved in the formation of metamorphic rocks SCHS-S6C2-04 F8. Distinguish the different kinds of metamorphic rocks (foliated, non-foliated textures) SCHS-S6C1-01 Integrated Scientific Processes: A2, A3, A5, A7, A8, A9, A17, A19, A20, A21, A22, A23, A25		**E Activities** • water bending demonstration **Instructional Questions** 1. What is matter? 2. How do we describe matter? 3. How can matter be changed? 4. How does the gain and loss of energy affect matter? 5. What makes up an atom? 6. How do atoms combine to form molecules and compounds? 7. What is the purpose of the periodic table of elements? 8. What is the difference between a rock and a mineral? 9. How can I tell the difference between a rock and a mineral? 10. How are minerals formed? 11. What is the difference between a mineral and a gem? 12. How are minerals used in industry? **Rocks lab** • Rock around the rock cycle using Starburst candy to model the rock cycle • Laboratory component emphasizes hand specimen

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		SCHS-S1C1-02, SCHS-S1C1-04, SCHS-S1C2-01, SCHS-S1C2-03, SCHS-S1C2-05, SCHS-S1C3-01, SCHS-S1C3-07, SCHS-S1C4-03, SCHS-S1C4-04 		identification using rock identification key and testing for physical and chemical properties **Reading** • Chapter 6 pages 116-140 Earth Science text, McDougal-Littell, using graphic organizer during chapter reading
December 2013	**G. Mass wasting and weathering** (10 days) • Mass wasting • Weathering process • Erosion • Soils SCHS-S6 	G1. List controlling factors or causes of mass wasting and describe how each affects slope instability SCHS-S6C1-01  G2. Discuss the various types of mass wasting in terms of type and rate of movement SCHS-S6C1-02  G3. Point out features of the landscape that indicate slope instability or previous episodes of mass wasting SCHS-S6C1-02  G4. Compare the various techniques for controlling mass wasting especially in populated areas and explain why some work and others fail SCHS-S6C1-01  G5. Explain how humans can act to		

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		reduce or accelerate mass wasting SCHS-S3C1-02, SCHS-S3C1-03  G6. State three agents of weathering SCHS-S6C1-02  G7. Compare mechanical weathering to chemical weathering SCHS-S6C1-04  G8. Describe four chemical reactions that decompose rock SCHS-S6C1-02  G9. Define the terms and concepts associated with weathering and erosion SCHS-S6C1-01, SCHS-S6C1-02, SCHS-S6C1-04  G10. Explain how rock composition effects the rate of weathering SCHS-S6C1-01, SCHS-S6C1-02  G11. Discuss how surface area affects the rate of weathering SCHS-S6C1-02  G12. Describe the effects of climate and topography on the rate of weathering SCHS-S6C2-14  G13. Compose a clear definition of erosion and list the agents of erosion SCHS-S6C1-01  G14. Defend the four farming methods used for the conservation of soils G15. Discuss two ways gravity contributes to erosion SCHS-S3C1-03, SCHS-S3C1-05 		

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		G16. Describe three major landforms shaped by weathering and erosion SCHS-S6C1-01, SCHS-S6C1-02, SCHS-S6C1-03  G17. Summarize the major variables that influence landscape development SCHS-S6C1-02  G18. Diagram or list the process of deposition G19. Summarize how soil forms SCHS-S6C1-01  G20. Explain how the composition of parent rock affects soil composion SCHS-S6C1-01, SCHS-S6C1-02  G21. Describe the charactistic layers of mature residual soils G22. Differentiate between residual and transported soils G23. Predict the type of soil that form in Arizona SCHS-S6C1-07  G24. Practice laboratory techniques for determining soil texture and the sediment size distribution of fine (2mm) sediment SCHS-S1C1-01  Integrated Scientific Processes: A2, A3, A5, A7, A10, A12, A17, A18, A19, A20, A21, A22, A23, A25		
January 2014	**H. Land masses** (15 days) • Plate tectonics • Layers of the Earth • Continental drift • Plate boundaries	H1. Discuss evidence for the theory of continental drift, and show support for Alfred Wegener's ideas SCHS-S6C2-04  H2. Explain the theory of plate tectonics, showing support through		**E Activities** • water bending demonstration

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	• Sea floor spreading SCHS-S1C1, SCHS-S1C2, SCHS-S1C3, SCHS-S1C4, SCHS-S6C2 **I. Hydrologic Cycle** (10 days) • Surface water (stream dynamics, stream erosion) • Ground Water (porosity, permeability, recharge rate, aquifers) SCHS-S6 **Essential questions** 1. How does the rock cycle relate to plate tectonics? 2. What are the connections between plate tectonics and rock formation? 3. What is special about the Earth that allows plate tectonics to occur? 4. Why do layers of the Earth move and how does it affect the surface? 5. What evidence supports the theory of plate tectonics? 6. How have plate movements caused changes in the positions and shapes of Earth's landmasses? 7. How do tectonic plates interact at the different types of boundaries?	occurrences of earthquakes and volcanoes SCHS-S6C2-05 H3. List and describe physical characteristics of plate boundaries SCHS-S6C2-04 H4. Diagram and label the three types of plate boundaries, providing examples of each SCHS-S6C2-04 H5. Summarize the concept of mantle convection in relation to heat transfer SCHS-S6C2-02, SCHS-S6C2-04, SCHS-S6C2-08 H6. Illustrate and explain the internal structure of the earth SCHS-S6C2-02, SCHS-S6C2-04, SCHS-S6C2-08 H7. Give examples of the possible causes of plate movements (e.g., convection cell, ridge push, slab pull, cold plume) SCHS-S6C2-04, SCHS-S6C2-07 H8. Summarize how Earth's landmasses have changed over the last 200 million years SCHS-S6C2-05, SCHS-S6C2-08 H9. Articulate the relationship between plate tectonics and igneous activity, deposition and the formation of continental landmasses SCHS-S6C2-05, SCHS-S6C2-08 Integrated Scientific Processes: A2, A3, A4, A5, A9, A10, A21, A22, A23, A24, A25 SCHS-S1C1-01, SCHS-S1C1-02, SCHS-S1C1-04, SCHS-S1C2-03, SCHS-S1C2-05, SCHS-		**Instructional Questions** 1. How did the theory of plate tectonics evolve? 2. What is the mechanism that drives the movement of the continents? What is its fuel? 3. What allows the continents to move? 4. Why did competent scientists reject the idea of continental drift? 5. Why is this theory a revolution? **Unit 1 Reading** • A: Minerals; using a graphic organizer during chapter reading **C1 Worksheet** • Atomic structure using diagrams to model atoms: the Bohr model and the Lewis Dot Diagram. • Composition and matter review vocabulary sheet: making calculations as it relates to atomic structure (counting atoms in molecules, using chemical equations and formulas) **C2 Lab**

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	8. How are surface features changed by constructive and destructive processes? 9. What ongoing processes have shaped and continue to shape the geology of the Earth?	S1C3-01, SCHS-S1C3-03, SCHS-S1C3-07, SCHS-S1C4-03, SCHS-S1C4-04  I1. Reproduce by diagram or illustration the hydrologic cycle and discuss both its parts and its driving force SCHS-S6C1-01, SCHS-S6C1-04  I2. Indicate how velocity and discharge are determined and discuss what factors influence their values SCHS-S6C1-05  I3. Describe and differentiate between water flow in a channel and sheet flow SCHS-S6C1-04  I4. Give examples of the techniques farmers use to slow sheet erosion in their fields SCHS-S6C1-04  I5. Indicate the factors that influence the velocity of a stream SCHS-S3C1-05  I6. State the relationship between stream velocity and the erosion, transportation, and deposition of sediment SCHS-S5C2-01  I7. Compare three mechanisms (i.e., hydraulic action, solution, abrasion) by which a stream erodes the rock and sediment SCHS-S5C2-01  I8. Describe how sediment is		1. Building models of paper that represent the six systems of crystalline structures 2. Construct simple toothpick-marshmallow models of the silica tetrahedron 3. Forming crystals from melt and from solution **Plate tectonics lab** 1. Patterns of magnetic polarity reversals measuring the rate of sea-floor spreading, using patterns of magnetic reversals 2. Fossils as clues to ancient continents determining how rocks indicate the environment in which they were formed 3. Determining how fast some crustal plates move, examining the rate of plate movement, in support of continental drift 4. Observing convection currents using a model to examine convection currents to illustrate sea-floor spreading **Worksheets** 1. Evidence for continental drift,

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		transported as bed load, suspended load, and dissolved load SCHS-S6C1-02  I9. Describe the various features created through repeated cycles of river erosion and deposition (e.g., potholes, bars, braided streams, meandering streams, flood plains, deltas, alluvial fans) SCHS-S6C1-01, SCHS-S6C1-04  I10. Describe the role human activity can play in intensifying or reducing the potential danger of natural flooding SCHS-S3C1-02  I11. Explain how the tectonic and hydrologic cycles work together to shape the land SCHS-S6C1-01, SCHS-S6C1-02, SCHS-S6C1-04  I12. Compare a drainage basin to a drainage divide and explain how drainage divides change with time SCHS-S6C1-01  I14. Discuss how stream shape indicate their age (downcutting, lateral erosion, headward erosion, and sediment deposition) SCHS-S6C1-02  I15. Relate the concepts of base level and graded stream to the process of valley development I16. List the factors that affect slope erosion SCHS-S5C2-01  I17. Describe the relationship between		using map models to reconstruct ancient continental formations 2. Theory of plate tectonics 3. Continental drift: crustal boundaries 4. Earth's moving plates, identifying present continental masses by name and geographic location **Reading** • Chapter 9: Plate Tectonics *Earth Science*, Prentice Hall, using graphic organizer during chapter reading

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		the drainage pattern and the underlying rocks I18. Explain the processes affecting the formation of stream terraces and incised meanders SCHS-S5C2-01  I19. Explain why ground water is a critical natural resource SCHS-S6C1-05, SCHS-S6C1-06  I20. Distinguish between porosity and permeability and indicate how these factors influence ground water I21. Describe how ground water forms and its rate of migration SCHS-S5C2-01  I22. Sketch the relative positions of the saturated and unsaturated zones, the water table, and perched water tables I23. Model how permeability and the slope of the water table control the velocity of ground-water flow SCHS-S5C2-01  I24. Connect the relationships among springs, streams (gaining and losing), and ground water I25. Explain why certain rock types make good aquifers SCHS-S6C1-05  I26. Describe the relationship between wells and the water table and how a pumped well and the heavy use of ground water affect the water table SCHS-S6C1-06  I27. Discuss several ways in which ground water can become		

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		contaminated SCHS-S6C1-06  I28. Compare the effects of groundwater action to the formation of caverns and depositional cave features and karst topography SCHS-S6C1-01, SCHS-S6C1-02  I29. Explain how hot springs and geysers are formed SCHS-S6C1-01  I30. Debate the potential uses of geothermal energy SCHS-S6C1-07  I31. Specify the origin of pressure in an artesian well Integrated Scientific Processes: A2, A3, A5, A7, A13, A17, A19, A20, A21, A22, A23, A25		
February 2014	**J. Earthquakes** (12 days) • Faults • Seismic waves • Mercalli and Richter scales • Earthquake damage • Tsunami SCHS-S1C1, SCHS-S1C2, SCHS-S1C3, SCHS-S6C2  **Essential questions** 1. How predictable are earthquakes and volcanic eruptions? 2. What do earthquakes and	J1. Model and explain how most earthquakes are the result of stress and strain built up in faults and plate boundaries SCHS-S6C2-05  J2. Describe how energy released during an earthquake results in seismic waves SCHS-S6C2-06  J3. Compare P, S, and surface (L waves) seismic waves SCHS-S6C2-06, SCHS-S6C2-07  J4. Explain how seismographs are used to find the epicenter of an earthquake (i.e., triangulation method) SCHS-S6C2-07		**Earthquakes Labs** 1. Locating an epicenter, using the difference in arrival time between P and S waves to locate the epicenter of an earthquake 2. Determining the intensity of an earthquake change with distance, using the Rossi-Forel earthquake intensity scale to assess damage done by an earthquake **Relative and absolute time labs**

Month	Content	Skills with Relevance/Rigor	Assessments with Relevance/Rigor	Suggested Activities & Resources
	volcanoes reveal about the Earth, both on and below the its surface? 3. What determines when and where earthquakes and volcanic eruptions occur? 4. How do the constructive and destructive forces of earthquakes and volcanoes shape and reshape the Earth's surface?	J5. Interpret structural geology folds, faults, and plate boundaries, using diagrams SCHS-S6C2-05, SCHS-S6C2-07 J6. Summarize earthquake hazards and damage associated with them SCHS-S6C2-13 J7. Describe how earthquake data collected from seismographs can be used to infer and draw conclusions about the Earth's internal structure SCHS-S6C2-05, SCHS-S6C2-07 J8. Describe the characteristics of a tsunami and how a tsunami wave travels SCHS-S6C2-05 Integrated Scientific Processes: A2, A3, A5, A7, A17, A20, A21 SCHS-S1C1-02, SCHS-S1C1-04, SCHS-S1C2-01, SCHS-S1C2-03, SCHS-S1C2-05, SCHS-S1C3-01		1. Rock correlation - using cross section to identify types of sedimentary rock and their depositional order, constructing a stratigraphic column 2. Making a geologic timeline compare and contrast the relative lengths of the geologic eras and periods 3. Deciphering tree rings, graphing tree ring growth data and analyzing the effect of environmental factors on the tree ring growth 4. Using fossils, comparing the age of fossils, and identifying the geologic age of rocks containing fossils **Worksheets** • Absolute dating - calculating half-lives • Relative dating - cross-cutting relationships **Reading** • *Earth Science* Prentice Hall
March 2014	**K. Volcanoes** (12 days) • Volcanic eruptions	K1. List the qualities between three types of volcanoes K2. Describe what causes volcanic		**Instructional Questions**

Month	Content	Skills with Relevance/Rigor	Assessments with Relevance/Rigor	Suggested Activities & Resources
	• Three types of volcanoes • Igneous features related to volcanoes • Plate tectonics and volcanoes • Magmatic composition SCHS-S6C2  **Essential questions** 1. How predictable are earthquakes and volcanic eruptions? 2. What do earthquakes and volcanoes reveal about the Earth, both on and below the its surface? 3. What determines when and where earthquakes and volcanic eruptions occur? 4. How do the constructive and destructive forces of earthquakes and volcanoes shape and reshape the Earth's surface?	eruptions B1-B2 SCHS-S6C2-04, SCHS-S6C2-05  K3. Model, label, and define terms of intrusive igneous landforms K4. Compare the origin of magma based on chemical composition K5. Explain the relationship between plate tectonics and volcanoes B4-B5 SCHS-S6C2-04, SCHS-S6C2-05  Integrated Scientific Processes: A2, A3, A5, A8, A17, A19, A20, A21, A25		1. From where do magma and lava come? 2. How do volcanoes form? 3. What effects does lava composition have on volcano topography and gradient? 4. How are volcanoes identified by their topography? 5. What is the difference between a hot spot and a plate boundary? 6. What is time and how is it measured? 7. What is geologic time how is it measured? 8. How did the discovery of radioactivity enable the direct measurement of the Earth's age? 9. How can fossils by used to construct a timeline of the Earth's history?
April 2014	**L. Relative and absolute time** (15 days) • Uniformitarianism • Evidence of Earth's history from rocks • Unconformities • Relative and absolute dating • Fossil and fossil succession • Radioactive dating	L1. Summarize the principles that scientist use to determine the relative ages of Earth rocks SCHS-S6C3-02, SCHS-S6C3-05, SCHS-S6C3-06, SCHS-S6C3-08, SCHS-S6C3-09  L2. Practice principles used for absolute dating and processes used for different types of dating methods SCHS-S6C3-08		**Relative and absolute time labs** 1. Rock correlation - using cross section to identify types of sedimentary rock and their depositional order, constructing a stratigraphic column

Month	Content	Skills with Relevance/Rigor	Assessments with Relevance/Rigor	Suggested Activities & Resources
	• Carbon-14 • Geologic time scale • National Parks research paper SCHS-S6C3  **Essential questions** 1. How are the assessment and measurement of time integral to interpret and summarize Earth's geological history?	 L3. Describe the three types of unconformities SCHS-S6C3-02  L4. Construct an example of a rock correlation SCHS-S6C3-02  L5. Model the process of radioactive decay SCHS-S6C3-05  L6. Graph half-life examples to show relationship to isotope decay SCHS-S6C3-05  L7. Describe how radiometric dating is used to measure absolute time SCHS-S6C3-05  L8. Memorize geologic time scale SCHS-S6C3-04  Integrated Scientific Processes: A2, A3, A4, A5, A7, A8, A13, A17, A19, A20, A21, A23, A24, A25		2. Making a geologic timeline compare and contrast the relative lengths of the geologic eras and periods 3. Deciphering tree rings, graphing tree ring growth data and analyzing the effect of environmental factors on the tree ring growth 4. Using fossils, comparing the age of fossils, and identifying the geologic age of rocks containing fossils **Worksheets** • Absolute dating - calculating half-lives • Relative dating - cross-cutting relationships **Reading** • *Earth Science* Prentice Hall
May 2014	**M. Astronomy** (20 days) • Origin of the Universe • Origin of the Solar System • Origin of the Earth and Moon SCHS-S2C1, SCHS-S6C4  **Essential questions** 1. What can be learned from	M1. Describe the characteristics of electromagnetic radiation SCHS-S6C4-02  M2. Explain techniques for analyzing light to obtain information about the stars SCHS-S6C4-03, SCHS-S6C4-04  M3. Explain the Doppler effect and how it gives information about the		**Instructional Questions** 1. What makes up our solar system? 2. How do planets differ from each other? 3. Can other planets support life? 4. What causes day and night? Years? 5. What are the planets?

Month	Content	Skills with Relevance/Rigor	Assessments with Relevance/Rigor	Suggested Activities & Resources
	observing the night sky? 2. How can the position and motion of celestial bodies be used to understand what is seen in the night sky? 3. How does the position of the Earth in the Solar System affect the conditions of life on our planet? 4. How do interactions in the universe create predictable and observable patterns of change? 5. How is the universe structured? 6. What role did density play in the formation of the solar system? 7. What distinguishes the spectral class of stars? 8. What determines the timeline for a star's life? 9. Why do astronomers believe the universe is expanding? 10. How does the rest of the solar system impact Earth? 11. How does astronomy advance our understanding of our place in the universe? 12. How have astronomers worked to define and shape the science of astronomy? 13. What are the major astronomical laws that govern the motions of celestial objects? 14. How are the motions of celestial objects governed by major astronomical laws? 15. How is light used to benefit human beings? 16. How are human lives affected	stars SCHS-S6C4-04  M4. Summarize essential ideas about the composition and structure of the universe and the Earth's place in it SCHS-S6C4-01  M5. List three units astronomers use to measure distance to stars and galaxies SCHS-S6C4-03  M6. Describe the characteristics of stars (i.e., mass, size, temperature, color, luminosity) SCHS-S6C4-04, SCHS-S6C4-05  M7. Describe how telescopes work and how they can contribute to our knowledge of the universe SCHS-S2C1-01, SCHS-S2C1-02, SCHS-S2C1-03, SCHS-S2C1-04  M8. Compare the relationship between science and technology SCHS-S2C1-01, SCHS-S2C1-03  M9. Describe the birth and death of a star SCHS-S6C4-05  M10. Compare and contrast the life cycle of a star like the sun and of other types of stars SCHS-S6C4-05, SCHS-S6C4-06  M11. Define galaxy and describe the various types of galaxies SCHS-S6C4-06  M12. Explain the origin of the universe according to the big bang		6. What is a constellation? 7. What are the relationships of Earth, Moon, and sun? 8. What are meteors, stars, asteroids? 9. How do we study space? **Astronomy Lab** 1. Expansion of the universe, calculating the expansion rate of a hypothetical universe and modeling expansion by using balloon model 2. Hertzprung-Russell diagram, plotting star luminosity relative to star temperature and life cycle 3. Observing circumpolar constellations, using a constellation map to position stars and constellations in the night sky during the seasons

Month	Content	Skills with Relevance/Rigor	Assessments with Relevance/Rigor	Suggested Activities & Resources
	by astronomy, the study of space and everything in it?	model SCHS-S6C4-01  Integrated Scientific Processes: A1, A2, A3, A4, A5, A8, A10, A12, A13, A17, A19, A20, A21, A22, A23, A24, A25		