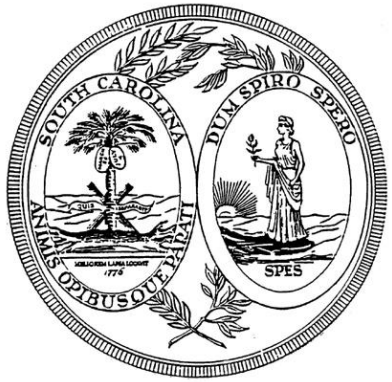
South Carolina Academic Standards and Performance Indicators for Science 2014



Instructional Unit Resource

Earth Science

South Carolina Academic Standards and Performance Indicators for Science 2014
Earth Science Instructional Unit Resource

As support for implementing the *South Carolina Academic Standards and Performance Indicators for Science 2014*, the standards for Earth Science have been grouped into possible units. In the Overview of Units below, the titles for those possible units are listed in columns. Refer to the Overview document to note these unit titles and how Standards, Conceptual Understandings, Performance Indicators, Science and Engineering Practices, and Crosscutting Concepts align. Following the Overview of Units, an Instructional Unit document is provided that delivers guidance and possible resources in teaching our new *South Carolina Academic Standards and Performance Indicators for Science 2014*. The purpose of this document is to provide guidance as to how all the standards in this grade may be grouped into units and how those units might look. Since this document is merely guidance, districts should implement the standards in a manner that addresses the district curriculum and the needs of students. This document is a living document and instructional leaders from around the state will continuously update and expand these resource documents. These documents will be released throughout the 2016-2017 school year with the intentionality of staying ahead of instruction. Teachers should also note that links to the Standards document, A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas, the SEP Support Document, and the Support Document 2.0 are embedded throughout the Instructional Unit format for reference.

Acknowledgments

Jean Baptiste Massieu, famous deaf educator, made a statement that is now considered a French proverb. “Gratitude is the memory of the heart. Indeed, appreciation comes when you feel grateful from the depths of your heart. The head keeps an account of all the benefits you received and gave. But the heart records the feelings of appreciation, humility, and generosity that one feels when someone showers you with kindness.” It is with sincere appreciation that we humbly acknowledge the dedication, hard work and generosity of time provided by teachers and instructional leaders across the state that have made and are continuing to make the Instructional Unit Resources possible.

Earth Science Overview of Units

Unit 1		Unit 2		Unit 3	Unit 4	UNIT 5
EARTH SCIENCE: Astronomy		EARTH SCIENCE: Earth's Geosphere		EARTH SCIENCE: Paleobiosphere	EARTH SCIENCE: Atmosphere-Weather and Climate	EARTH SCIENCE: Hydrosphere
Standard		**Standard**		**Standard**	**Standard**	**Standard**
H.E.2		H.E.3		H.E.4	H.E.5	H.E.6
Conceptual Understanding		**Conceptual Understanding**		**Conceptual Understanding**	**Conceptual Understanding**	**Conceptual Understanding**
H.E.2.A	H.E.2.B	H.E.3A	H.E.3B	H.E.4A	H.E.5A	H.E.6A
Performance Indicators		**Performance Indicators**		**Performance Indicators**	**Performance Indicators**	
H.E.2A.1 H.E.2A.2 H.E.2A.3 H.E.2A.4 H.E.2A.5	H.E.2B.1 H.E.2B.2 H.E.2B.3 H.E.2B.4	H.E.3A.1 H.E.3A.2 H.E.3A.3 H.E.3A.4 H.E.3A.5 H.E.3A.6 H.E.3A.7 H.E.3A.8	H.E.3B.1 H.E.3B.2 H.E.3B.3 H.E.3B.4 H.E.3B.5	H.E4.A.1 H.E.4A.2 H.E.4A.3 H.E.4A.4 H.E.4A.5 H.E.4A.6 H.E.4A.7	H.E.5A.1 H.E.5A.2 H.E.5A.3 H.E.5A.4 H.E.5A.5 H.E.5A.6 H.E.5A.7 H.E.5A.8	H.E.6A.1 H.E.6A.2 H.E.6A.3 H.E.6A.4 H.E.6A.5 H.E.6A.6 H.E.6A.7 H.E.6A.8
***Science and Engineering Practices**		***Science and Engineering Practices**		***Science and Engineering Practices**	***Science and Engineering Practices**	***Science and Engineering Practices**
S.1A.2 S.1A.7 S.1A.4 S.1A.8 S.1A.5 S.1A.6		S.1A.2 S.1A.6 S.1A.3 S.1A.7 S.1A.4 S.1A.8 S.1A.5 S.1B.1		S.1A.2 S.1A.8 S.1A.5 S.1A.6 S.1A.7	S.1A.2 S.1A.4 S.1A.6 S.1A.7	S.1A.1 S.1A.8 S.1A.2 S.1A.3 S.1A.4
***Crosscutting Concepts**		***Crosscutting Concepts**		***Crosscutting Concepts**	***Crosscutting Concepts**	***Crosscutting Concepts**
1,2,3,4,5,7		1,2,4,6,7		1,2,3,4,5	1,2,5,6	2,3,4,5

**Teachers have the discretion to enhance the selected SEP's and CCC's.*

Unit Title
Earth's Geosphere
Standard http://ed.sc.gov/scdoe/assets/file/agency/ccr/Standards-Learning/documents/South_Carolina_Academic_Standards_and_Performance_Indicators_for_Science_2014.pdf
Standard H.E.3 The student will demonstrate an understanding of the internal and external dynamics of Earth's geosphere.

Conceptual Understanding
H.E.3A**.** Evidence indicates Earth's interior is divided into a solid inner core, a liquid outer core, a solid (but flowing) mantle and solid crust. Although the crust is solid, it is in constant motion and is recycled through time. Plate tectonics is the unifying theory that explains the past and current movements of the rocks at Earth's surface and provides a coherent account of its geological history. Weathering (physical and chemical) and soil formation are a result of the interactions of Earth's geosphere, hydrosphere, and atmosphere. All forms of resource extraction and land use have associated economic, social, environmental, and geopolitical costs, risks, and benefits. Natural hazards and other geological events have shaped the course of human history.
New Academic Vocabulary **Some students may need extra support with the following academic vocabulary in order to understand what they are being asked to understand and do. Teaching these terms in an instructional context is recommended rather than teaching the words in isolation. A great time to deliver explicit instruction for the terms would be during the modeling process. Ultimately, the student should be able to use the academic vocabulary in conversation with peers and teachers. These terms are pulled from the essential knowledge portion of the Support Doc 2.0 (http://ed.sc.gov/instruction/standards-learning/science/support-documents-and-resources/) and further inquiry into the terms can be found there.**

Core inner/outer	Subduction	Seafloor spreading	Epicenter	Luster	Weathering	Convection currents
Mantle	Divergent boundary	Magnetic striping	Igneous	Streak	Erosion	Continental Drift
Crust	Convergent boundary	Seismogram	Sedimentary	Cleavage	Deposition	Mineral
Plate Tectonics	Transform boundary	S wave	Metamorphic	Fracture	Glaciation	P wave

Soil	Silt	Sand	Humus			

Performance Indicators

Text highlighted below in *orange* and *italicized/underlined* shows connections to SEP's

H.E.3A.1 *Analyze and interpret data* to explain the differentiation of Earth's internal structure using (1) the production of internal heat from the radioactive decay of unstable isotopes, (2) gravitational energy, (3) data from seismic waves, and (4) Earth's magnetic field.

H.E.3A.2 *Analyze and interpret data* from ocean topography, correlation of rock assemblages, the fossil record, the role of convection current, and the action at plate boundaries to explain the theory of plate tectonics.

H.E.3A.3 *Construct explanations* of how forces cause crustal changes as evidenced in sea floor spreading, earthquake activity, volcanic eruptions, and mountain building using evidence of tectonic environments (such as mid-ocean ridges and subduction zones).

H.E.3A.4 *Use mathematical and computational thinking* to analyze seismic graphs to (1) triangulate the location of an earthquake's epicenter and magnitude, and (2) describe the correlation between frequency and magnitude of an earthquake.

H.E.3A.5 *Analyze and interpret data* to describe the physical and chemical properties of minerals and rocks and classify each based on the properties and environment in which they were formed.

H.E.3A.6 *Develop and use models* to explain how various rock formations on the surface of Earth result from geologic processes (including weathering, erosion, deposition, and glaciation).

H.E.3A.7 *Plan and conduct controlled scientific investigations* to determine the factors that affect the rate of weathering.

H.E.3A.8 *Analyze and interpret data* of soil from different location to compare the major physical components of soil (such as the amounts of sand, silt, clay, and humus) as evidence of Earth processes in that region producing each type of soil.

***Science and Engineering Practices**

Support for the guidance, overviews of learning progressions, and explicit details of each SEP can found in the Science and Engineering Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf). It is important that teachers realize that the nine science and engineering practices are not intended to be used in isolation. Even if a performance indicator for a given standard only lists one of the practices as a performance expectation, scientists and engineers do not use these practices in isolation, but rather as part of an overall sequence of practice. When educators design the learning for their students, it is important that they see how a given performance expectation fits into the broader context of the other science and engineering practices. This will allow teachers to provide comprehensive, authentic learning experiences through which students will develop and demonstrate a deep understanding of scientific concepts.

H.E.1A.2 Develop and Use Models - Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.

H.E.1A.3 Plan and Carry out Investigations - Plan and conduct controlled scientific investigations to answer questions, test hypotheses, and develop explanations: (1) formulate scientific questions and testable hypotheses, (2) identify materials, procedures, and variables, (3) select and use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Use

appropriate safety procedures.
H.E.1A.4 Analyze and Interpret Data - Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation, graphing, or statistical analysis) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs.
H.E.1A.5 Use Mathematics and Computational Thinking - Use mathematical and computational thinking to (1) use and manipulate appropriate metric units, (2) collect and analyze data, (3) express relationships between variables for models and investigations, or (4) use grade-level appropriate statistics to analyze data.
H.E.1A.6 Construct Explanations - Construct explanations of phenomena using (1) primary or secondary scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.

***Cross Cutting Concepts**(http://www.nap.edu/read/13165/chapter/8)
The link above provides support from the Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2012) The text in blue and *italicized/underlined* below provides a brief explanation of how the specific content ties to the CCC's.

1. Patterns: The National Research Council (2012) states that "observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them" (p. 84). *The classification of rocks and minerals requires knowledge of their physical and chemical properties and the environment in which they were formed. It is important to be able to recognize patterns in data in order to be able to determine if relationships relationships demonstrated by the data are correlative or casual regarding ocean topography, correlation of rock assemblages, the fossil record, the role of convection current, and the action at plate boundaries.*

2. Cause and effect: Mechanism and explanation: The National Research Council (2012) states that "events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts" (p. 84). *The theory of plate tectonics can be explained using data from ocean topography, correlation of rock assemblages, the fossil record, the role of convection current and the action at plate boundaries.*

4. Systems and systems models: The National Research Council (2012) states that "Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering" (p. 84). *Weathering, erosion, deposition, and glaciation can be explained by modeling (developing and using diagrams, constructs, mathematical formula, and simulation of actions) to represent how these geologic processes results in various rock formations.*

6. Structure and function: The National Research Council (2012) states that "the way in which an object or living thing is shaped and its substructure determine many of its properties and functions" (p. 84). *The Earth is made of layers. The composition of those layers determine the properties of the layers with respect to radioactive decay, gravitational energy, seismic wave data and Earth's magnetic field.*

7. Stability and change: The National Research Council (2012) states that "For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study" (p. 84). *The rate at which rocks weather is determined by climate, rock composition, and surface area.*

**Teachers have the discretion to enhance the selected SEP's and CCC's.*

Prior Knowledge
● 3.E.4 Rocks and Minerals ● 6.P.3A.4 Magnetic fields ● 6.P.3A.5 Convection ● 7.P.2B.1 Physical and Chemical Properties ● 8.P.2A.1 Forces ● 8.E.5 Weathering, erosion, deposition, rock cycle, plate tectonics, fossils, rock layers, and volcanoes ● 8.P.3A.1 Seismic waves
Subsequent Knowledge
● H.C.2 Radioactive decay ● H.P.2D Radioactive decay ● H.P.2D Magnetic Fields

Possible Instructional Strategies/Lessons **Strategies and lessons that will enable students to master the standard and/or indicator.**
● The Magma Factory: This NOAA lesson plan allows students to analyze and interpret data to construct explanations for processes that form volcanoes at convergent tectonic plate boundaries and demonstrate how forces cause crustal changes as evidenced in sea floor spreading, earthquake activity, volcanic eruptions, and mountain building using evidence of tectonic environments (such as mid-ocean ridges and subduction zones). This activity also includes the Earth's layers. This resource can be found at: http://oceanexplorer.noaa.gov/explorations/12fire/background/edu/media/magma_912.pdf

- Determining and Measuring Earth's Layered Interior: This lesson allows students to examine evidence from a seismic record section and to use that evidence to explain the Earth's internal structure. This resource can be found at http://www.iris.edu/hq/inclass/lesson/determining_and_measuring_earths_layered_interior

- Learning About Earthquakes: The students will analyze and investigate seismic data from earthquakes. They will investigate elastic rebound, seismograph basics and locating earthquake epicenter location. This lesson also includes magnitude and frequency activities. The resource can be found at: https://earthref.org/SCC/lessons/2009/earthquakes/

- Breaking it Down: Weathering and Erosion: The student models the processes of weathering and erosion and how they work together to shape the earth's landscape. An online game introduces students to the basic modes of erosion. The processes of chemical and physical weathering that enable erosion are then explored in detail using online media and hands-on laboratory experiments. This resource can be found at: http://www.pbslearningmedia.org/resource/nat08.earth.geol.eros.lpbreakit/breaking-it-down-weathering-and-erosion/

- Curricular Unit: The Rock Cycle: A series of lessons incorporate an introduction to the types of rocks and minerals, as well as material stresses and weathering which occur during natural processes and erosion. This also includes pressure and heat that are part of the rock cycle. Geologic time and fossil formation activities help to round out the lessons, which then leads to soil lessons that help demonstrate soil formation, composition and soil profiles. This resource can be found at: https://www.teachengineering.org/curricularunits/view/cub_rock_curricularunit

- Radioactive Dating Game: Students will plan and carry out an investigation to identify isotopes that are commonly used to determine how old matter might be to help them understand how radiometric dating works and why different elements are used for dating different objects. Using mathematics and computation thinking, students will determine the percent of an isotope measured in an object to estimate its age and identify types of nuclear reaction used for dating. This resource can be found at https://phet.colorado.edu/en/simulation/radioactive-dating-game.

- Experiments with Weathering, Erosion and Deposition for the Earth Science Regents Course: These lessons allow the students to model how streams form, where erosion and deposition occur in a watershed due to streams ("big picture"), and where erosion and deposition occur within a stream itself (micro-setting). The last activity of the series will help students explore and understand how surface area relates to the rate of weathering of minerals and rocks. This resource can be found at: http://csip.cornell.edu/Curriculum_Resources/CEIRP/StreamTable_Teacher.doc

- Soil Triangle Texture Activity: Students use data to analyze and evaluate the value of different types of soil using the soil triangle. The resource can be found at http://www.nbcsd.org/cms/lib/PA01001217/Centricity/Domain/116/Soil Texture Soil Activity.pdf

- Soil Texture: This is an interactive activity where students use given data and the soil triangle to determine the type of soil being described. In completing the activity the data they are given is analyzed and interpreted. The resource can be found at http://www.isa-arbor.com/education/onlineresources/CDDemos/triangle.swf

Resources

- Geologic Timescale from http://community.geosociety.org/tap/resources/timescale

- Rock cycle interactive from https://www.learner.org/interactives/rockcycle/types.html

- Radiometric dating practice with interactive from http://www.pbs.org/wgbh/nova/tech/radiocarbon-dating.html

- Fun weathering interactive for review from http://sciencenetlinks.com/interactives/shapeitup_final.swf

Sample Formative Assessment Tasks/Questions

Additional sample formative assessment tasks/questions for grade bands are located at the end of each of the SEP Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf)

- The teacher creates a spinner marked into 4 quadrants and labeled "Predict, Explain, Summarize, Evaluate." After new material is presented, the teacher spins the spinner and asks predict, explain, evaluate.

- Inside and outside circles of students face each other. Within each pair of facing students, students quiz each other with questions they have written. Outside circle moves to create new pair and repeat.

- From an assigned text have students act it out.

- Students write a summary sentence answering who, what, when, why, and where.

- Select or invent one word that best summarizes the information presented.
- Using a topographical map, have students, working in groups, circle and label areas where they thinking weathering, erosion, deposition, and glaciation might occur. Student groups will be expected to defend their choices based on their evidence and their understanding of the processes involved.
- Using teacher provided materials, have students make a physical model of a surface feature formed by weathering, erosion, deposition, and/or glaciation.

Unit Title
Earth's Geosphere
Standard http://ed.sc.gov/scdoe/assets/file/agency/ccr/Standards-Learning/documents/South_Carolina_Academic_Standards_and_Performance_Indicators_for_Science_2014.pdf
H.E.3 The student will demonstrate an understanding of the internal and external dynamics of Earth's geosphere.

Conceptual Understanding
H.E.3B. The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. Human transformation of the natural environment can contribute to the frequency and intensity of some natural hazards.
New Academic Vocabulary **Some students may need extra support with the following academic vocabulary in order to understand what they are being asked to understand and do. Teaching these terms in an instructional context is recommended rather than teaching the words in isolation. A great time to deliver explicit instruction for the terms would be during the modeling process. Ultimately, the student should be able to use the academic vocabulary in conversation with peers and teachers. These terms are pulled from the essential knowledge portion of the Support Doc 2.0 (http://ed.sc.gov/instruction/standards-learning/science/support-documents-and-resources/) and further inquiry into the terms can be found there.**

Ores	Fossil fuels	Biodiversity	Sustainability	Biosphere	Hydrosphere
Geosphere	Atmosphere	Point source pollution	Greenhouse effect	Eutrophication	Thermal pollution
Nonpoint source pollution	Global warming	Nutrient pollution			

Performance Indicators

Text highlighted below in *orange* and *italicized/underlined* shows connections to SEP's

H.E.3B.1 *Obtain and communicate information* to explain how the formation, availability, and use of ores and fossil fuels impact the environment.
H.E.3B.2 *Construct scientific arguments* to support claims that responsible management of natural resources is necessary for the sustainability of human societies and the biodiversity that supports them.
H.E.3B.3 *Analyze and interpret data* to explain how natural hazards and other geologic events have shaped the course of human history.
H.E.3B.4 *Obtain and evaluate available data* on a current controversy regarding human activities which may affect the frequency, intensity, or consequences of natural hazards.
H.E.3B.5 *Define problems* caused by the impacts of locally significant natural hazards and *design possible devices or solutions* to reduce the impacts of such natural hazards on human activities.

*Science and Engineering Practices

Support for the guidance, overviews of learning progressions, and explicit details of each SEP can found in the Science and Engineering Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf). It is important that teachers realize that the nine science and engineering practices are not intended to be used in isolation. Even if a performance indicator for a given standard only lists one of the practices as a performance expectation, scientists and engineers do not use these practices in isolation, but rather as part of an overall sequence of practice. When educators design the learning for their students, it is important that they see how a given performance expectation fits into the broader context of the other science and engineering practices. This will allow teachers to provide comprehensive, authentic learning experiences through which students will develop and demonstrate a deep understanding of scientific concepts.

H.S.1A.4 Analyze and Interpret Data - Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation, graphing, or statistical analysis) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs.
H.S.1A.7 Engage in Scientific Argument from Evidence - Construct and analyze scientific arguments to support claims, explanations, or designs using evidence from observations, data, or informational texts.
H.S.1A.8 Obtain, Evaluate, and Communicate Information - Obtain and evaluate scientific information to (1) answer questions, (2) explain or describe phenomena, (3) develop models, (4) evaluate hypotheses, explanations, claims, or designs or (5) identify and/or fill gaps in knowledge. Communicate using the conventions and expectations of scientific writing or oral presentations by (1) evaluating grade-appropriate primary or secondary scientific literature, or (2) reporting the results of student experimental investigations.
H.S.1B.1 Construct Devices or Design Solutions - Construct devices or design solutions using scientific knowledge to solve specific problems or needs: (1) ask questions to identify problems or needs, (2) ask questions about the criteria and constraints of the device or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem and refine the design if needed, and (6) communicate the results.

***Cross Cutting Concepts** (http://www.nap.edu/read/13165/chapter/8)

The link above provides support from the Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2012) The text in blue and *italicized/underlined* below provides a brief explanation of how the specific content ties to the CCC's.

1. Patterns: The National Research Council (2012) states that "observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them" (p. 84). *The sustainability and biodiversity of an area depends upon the responsible management of natural resources.*

2. Cause and effect: Mechanism and explanation: The National Research Council (2012) states that "events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts" (p. 84). *Natural hazards and other geologic events have shaped the course of human history.*

4. Systems and systems models: The National Research Council (2012) states that "Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering" (p. 84). *Human activities in agriculture, industry and everyday life can affect the frequency, intensity, or consequences of some natural hazards (for example flooding, erosion, forest fires, air and water pollution, and species endangerment/extinction).*

6. Structure and function: The National Research Council (2012) states that "the way in which an object or living thing is shaped and its substructure determine many of its properties and functions" (p. 84). *The way fossil fuels are formed determines their physical and chemical properties which in turn, determines their functions.*

7. Stability and change: The National Research Council (2012) states that "For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study" (p. 84). *If human activities are carefully managed the stability of an area is less impacted by change as a result of natural disasters.*

**Teachers have the discretion to enhance the selected SEP's and CCC's.*

Prior Knowledge

- 6.E.2 Atmospheric layers.
- 8.E.4 Earth's solar system
- 8.E.5 Rock layers and fossils

- 8.E.6 Biological adaptation and genetic variation
- 8.E.6A Earth's history

Subsequent Knowledge

- H.B.6B Photosynthesis, Cellular Respiration, Carbon Cycle, Global Climate

Possible Instructional Strategies/Lessons

Strategies and lessons that will enable students to master the standard and/or indicator.

- Mining in Texas: This cookie mining activity is a great way to obtain and communicate information about how mining occurs and the economic and environmental costs to the Earth. This resource is found at http://science-class.net/archive/science-class/Lessons/Geology/Rocks_Minerals/mining_in_texas.pdf

- The Challenge: Green Design: Students construct devices from their trash The resource can be found at http://pbskids.org/designsquad/parentseducators/lesson-plans/green_design.html

- Natural Disasters: Nature's Fury Activity. In this lesson, explore the ways natural disasters have affected American lives. Through analyzing and interpreting data from natural disasters, students will obtain, evaluate, and communicate the experiences of the people who lived through each event. This resource can be found at http://www.loc.gov/teachers/classroommaterials/lessons/nature/procedure.html

- Flood Lesson Plans: Why does York flood?: Students obtain and evaluate data to construct scientific arguments about the human effect of natural disasters. This particular lesson should use a current flooding situation with this Geographical Association Lesson plan. The lesson should be modified to analyze a flood most relevant to the local location example: Louisiana 2016 or South Carolina 2015. This resource can be found at http://www.geography.org.uk/resources/nationalcurriculumgeography-extendingknowledgeabouthydrologyandcoasts/floodslessonplanwhydoesyorkflood/

- Engineer a Dam: Lesson focuses on the different uses of dams and how they are engineered. Students work in teams to analyze and interpret data to develop a system of damming water in a trough. The system must completely hold back the water and also have a way of executing a controlled release. The students create a design that will have the least effect on the environment if implemented on a local river. This lesson can be found at http://tryengineering.org/lessons/engineeradam.pdf

- To Dam or not to dam: A resource concerning Dams and the many benefits, such as energy, drinking water supply and water for irrigation – but these benefits can come at great social and environmental cost. Students will be able to define problems caused by locally significant hazards and explore possible solutions. This lesson can be found at http://assets.panda.org/downloads/2045.pdf

Resources

- Data.gov: Data source, citizen involvement United States. GSA. (2016). Retrieved Sept. 4th, 2016 from https://www.data.gov/disasters/

Sample Formative Assessment Tasks/Questions

Additional sample formative assessment tasks/questions for grade bands are located at the end of each of the SEP Support Doc (http://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf)

- Periodically, distribute index cards and ask students to write on both sides, with these instructions: (Side 1) Based on our study of (unit topic), list a big idea that you understand and word it as a summary statement. (Side 2) Identify something about (unit topic) that you do not yet fully understand and word it as a statement or question.

- Ask students to display a designated hand signal to indicate their understanding of a specific concept, principle, or process: - I understand_____ and can explain it (e.g., thumbs up). - I do not yet understand _____ (e.g., thumbs down). - I'm not completely sure about _____ (e.g., wave hand).

- A one-minute essay question (or one-minute question) is a focused question with a specific goal that can, in fact, be answered within a minute or two.

- Present students with an analogy prompt: (A designated concept, principle, or process) is like _____ because _____.

- The Three-Minute Pause provides a chance for students to stop, reflect on the concepts and ideas that have just been introduced, make connections to prior knowledge or experience
  I changed my attitude about….
  I became more aware of….
  I was surprised about……
  I related to……..

References

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