

Environmental Science Institute

The University of Texas - Austin

Geologic Wonders of Central Texas

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This file contains suggestions for how to incorporate the material from this CDROM into curriculum using the Texas Essential Knowledge and Skills for Science.

§112.2. Science, Kindergarten.

(K.7) Science concepts. The student knows that many types of change occur. The student is expected to:

(A) observe, describe, and record changes in size, mass, color, position, quantity, time, temperature, sound, and movement; **[Slides 20,21 - What changes in temperature, movement, or time have made the rock exfoliate? Slides 24-26 - Discuss weathering.]**

(B) observe and record weather changes from day to day and over seasons; **[Slide 23 - What caused this granite look the way it does? Temperature? Time? Movement? Wind? Rain? Discuss the difference between seasonal changes and changes over a long period of time. Slides 2-10 – Discuss how climate can differ from region to region.]**

(K.10) Science concepts. The student knows that the natural world includes rocks, soil, and water. The student is expected to:

(A) observe and describe properties of rocks, soil, and water; and

[Slides 25 - What observations can you make about the properties of this rock? Size? Texture? Slides 25, 46, & 47– Why does this rock look the way it does? Describe how it got this way.]

(B) examples of ways that rocks, soil, and water are useful. **[Slide 18 – Discuss what sort of things granite could be used for? Slides 58 & 59 – Discuss how fossils are formed.]**

§112.3. Science, Grade 1.

(1.5) Science concepts. The student knows that organisms, objects, and events have properties and patterns. The student is expected to:

(B) identify, predict, and create patterns including those seen in charts, graphs, and numbers **[Slides 2-12 – Discuss ways of graphing or charting data about the Earth’s surface]**

(1.7) Science concepts. The student knows that many types of change occur. The student is expected to:

(A) observe, measure, and record changes in size, mass, color, position, quantity, sound, and movement; **[Slides 20, 21 - What changes in temperature, movement or time have made the rock exfoliate? Slides 46, 47- Discuss the effects of weathering.]**

(C) observe and record changes in weather from day to day and over seasons; and **[Slides 22,23, 25 - What caused this granite look the way it does? Temperature? Time? Movement? Wind? Rain? Discuss the difference between seasonal changes and changes over a long period of time. Slide 3 – Discuss how climate exerts a profound influence in shaping the landforms.]**

(1.10) Science concepts. The student knows that the natural world includes rocks, soil, and water. The student is expected to:

(A) identify and describe a variety of natural sources of water including streams, lakes, and oceans; **[Slide 6 - Yellow indicates the floodplains of streams that are carrying sand and mud to the Gulf Coast. Slide 43 - Describe the stream and how the coarse granite grus sediments affect the water flow. Slides 49, 450 & 51 – Example of a natural source of water (McKinney Falls).]**

(B) observe and describe differences in rocks and soil samples; and **[Slides 17, 23, 41 & 42 – Discuss differences in rocks. Slide 69 & 70 – How did these rocks get this way?]**

(C) identify how rocks, soil, and water are used and how they can be recycled **[Slides 17, 19 & 23 – Discuss what sort of things these rocks could be used for? Slide 67 – Could rocks be used as steps?]**

§112.4. Science, Grade 2.

(2.7) Science concepts. The student knows that many types of change occur. The student is expected to:

(A) observe, measure, record, analyze, predict, and illustrate changes in size, mass, temperature, color, position, quantity, sound, and movement; **[Slide 20 - What changes in temperature, movement, or time have made the rock exfoliate? Slides 34, 35, & 71 - Discuss different kinds of weathering.]**

(B) identify, predict, and test uses of heat to cause change such as melting and evaporation; **[Slide 20]**

(D) observe, measure, and record changes in weather, the night sky, and seasons. **[Slide 3 – Discuss how climate exerts a profound influence in shaping the landforms.]**

(2.10) Science concepts. The student knows that the natural world includes rocks, soil, water, and gases of the atmosphere. The student is expected to:

(B) identify uses of natural resources **[Slides 17, 19 & 25 – Discuss what sort of things these rocks could be used for.]**

§112.5. Science, Grade 3.

(3.6) Science concepts. The student knows that forces cause change. The student is expected to:

(B) identify that the surface of the Earth can be changed by forces such as earthquakes and glaciers. **[Slides 51-54 – Discuss changes in the Earth’s surface caused by volcanoes.]**

(3.11) Science concepts. The student knows that the natural world includes earth materials and objects in the sky. The student is expected to:

(A) identify and describe the importance of earth materials including rocks, soil, water, and gases of the atmosphere in the local area and classify them as renewable, nonrenewable, or inexhaustible resources; **[Why are rocks an important element of the Earth’s Surface? Would we be able to survive without any rocks? Slides 58-60 – How would we know about history of the Earth without rocks which have made many fossils?]**

§112.6. Science, Grade 4.

(4.2) Scientific processes. The student uses scientific inquiry methods during field and laboratory investigations. The student is expected to:

(A) plan and implement descriptive investigations including asking well-defined questions, formulating testable hypotheses, and selecting and using equipment and technology; **[Hypothesis how a rock would look like 100 years from now if it was around a tremendous amount of weathering. How would it change?]**

(C) analyze and interpret information to construct reasonable explanations from direct and indirect evidence; **[Slides 24 & 25 - What affects the way rocks are shaped? What weather changes affect the way a rock is formed?]**

(E) construct simple graphs, tables, maps, and charts to organize, examine, and evaluate information **[Slides 2-12 – Discuss ways of graphing or charting data about the Earth’s surface]**

(4.3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

(A) analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information; **[How a rock would look like 100 years from now if it experienced a tremendous amount of weathering. How would it change? Do you disagree with the scientist or have any other explanations of how rocks change?]**

(4.10) Science concepts. The student knows that certain past events affect present and future events. The student is expected to:

(A) identify and observe effects of events that require time for changes to be noticeable including growth, erosion, dissolving, weathering, and flow; and **[Slides 20-26 - What affects the way rocks are shaped? What weather changes affect the way a rock is formed? Observe the effects of weathering.]**

§112.7. Science, Grade 5.

(5.3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

(C) represent the natural world using models and identify their limitations; **[Slide 2 - This map shows the average rainfall in Texas. How do you take into account the extreme events like droughts and floods?]**

(D) evaluate the impact of research on scientific thought, society, and the environment; and **[Slides 2-10 – Relate weather patterns to geological patterns in Texas]**

(5.5) Science concepts. The student knows that a system is a collection of cycles, structures, and processes that interact. The student is expected to:

(B) describe some interactions that occur in a simple system. **[Discuss the formation of rocks through heat and pressure]**

(5.7) Science concepts. The student knows that matter has physical properties. The student is expected to:

(C) identify changes that can occur in the physical properties of the ingredients of solutions such as dissolving sugar in water; and **[Ask how weather phenomena like acid rain effects and erodes rocks.]**

(D) observe and measure characteristic properties of substances that remain constant such as boiling points and melting points. **[Tie in the various properties of different rocks, and ask why certain rocks behave a certain way under a certain temperature, whereas another rock, of different**

chemical properties, acts in a different manner under that same temperature]

§112.22. Science, Grade 6.

(6.14) Science concepts. The student knows the structures and functions of Earth systems. The student is expected to:

(A) summarize the rock cycle; **[Slide 18 – This is an example of an igneous intrusive rock, which forms the visible crystals in granite. How does heat and pressure affect the size of mineral crystals in the different types of rock? What is the difference between an igneous rock and a metamorphic rock?]**

§112.23. Science, Grade 7.

(7.7) Science concepts. The student knows that substances have physical and chemical properties. The student is expected to:

(A) identify and demonstrate everyday examples of chemical phenomena such as rusting and tarnishing of metals and burning of wood; **[Slide 17 - Acid rain can erode away the potassium feldspar much faster than it can erode away the quartz, which is due to the varying chemical compositions, as well as the strengths in chemical bonds, etc.]**

(B) describe physical properties of elements and identify how they are used to position an element on the periodic table; and **[Slide 17 - The chemical composition of the quartz (in granite for example) mostly consists of carbon, the 12th element in the periodic table]**

(7.12) Science concepts. The student knows that there is a relationship between organisms and the environment. The student is expected to:

(C) describe how different environments support different varieties of organisms; and **[Slide 2 – Use the map to hypothesize what kinds of animals prefer wet environments, dry environments, etc., and explain why]**

(7.14) Science concepts. The student knows that natural events and human activity can alter Earth systems. The student is expected to:

(B) analyze effects of regional erosional deposition and weathering; and **[Slides 2, 29 – 31: Slide 2 shows how rain amounts in different areas can influence the land formations (through different depositions and weathering), and slides 29-31 illustrate how various types of weathering and erosion can change the topography of the land]**

§112.24. Science, Grade 8.

(8.14) Science concepts. The student knows that natural events and human activities can alter Earth systems. The student is expected to:

(A) predict land features resulting from gradual changes such as mountain building, beach erosion, land subsidence, and continental drift; **[Slides 23, 39 – Predict what such erosion to this granite stone can produce in millions of years from now; Slide 48 -The channel of Sandy Creek is clogged with abundant, coarse granite grus sediment. Predict what types of natural or man-made events could move this heavy stream load along; Slides 64-74 – Predict future land movement considering the present land formations and fault movements.]**

(B) analyze how natural or human events may have contributed to the extinction of some species; and **[Slides 58-60 – What are some possible explanations that would explain how this ammonite could have possibly wound up in central Texas (McKinney Falls)? Hypothesize how large ammonites could have become extinct?]**

§112.49. Geology, Meteorology, and Oceanography. (Grades 11 – 12)

(5) Science concepts. The student knows about the formation and history of the Earth. The student is expected to:

(A) research and describe the historical development of scientific theories of the Earth's formation; and **[Slides 13–14, 27 - Use these illustrations and fit this central Texas geological history to the rest of the formations and deformations of earth; Slides 36-38, 70-73 – Use these images to relate the faulting on in Central Texas to the Plate Tectonic Theory.]**

(B) use current theories to design and construct a geologic time scale **[Slide 33 – Use these illustrations and fit this central Texas geological history to the rest of the formations and deformations of earth.]**

(7) Science concepts. The student knows the origin and composition of minerals and rocks and the significance of the rock cycle. The student is expected to:

(A) demonstrate the density, hardness, streak, and cleavage of particular minerals; **[Slide 17 – identify the density, hardness, streak, and cleavage of this granite; Slide 47 – describe density, hardness, streak, and cleavage of this limestone. How does it differ from granite?]**

(B) identify common minerals and describe their economic significance; **[Slide 17 – What is the economic significance of granite, and the various mineral components of granite; Slide 56 – This slide shows limestone, which is the rock formations of McKinney Falls how porous is limestone in comparison to granite, in the previous slide.]**

(C) classify rocks according to how they are formed during a rock cycle; and **[Slide 29 - Between what points in the rock cycle do these sedimentary rocks form? Relate to how these sedimentary rocks in the Riley Mountains**

were possibly formed; Slides 30-31 – Identify when the rocks shown were probably formed, and integrate this to the various parts of the rock cycle.]

(D) examine and describe conditions such as depth of formation, rate of cooling, and mineral composition that are factors in the formation of rock types. **[Slide 27 – How do these conditions correspond to the time frame illustrated on this slide.]**

(8) Science concepts. The student knows the processes and end products of weathering. The student is expected to:

(A) distinguish chemical from mechanical weathering and identify the role of weathering agents such as wind, water, and gravity; **[Slide 56 – What kind of weathering does the water over limestone create, as shown here in McKinney Falls?]**

(B) identify geologic formations that result from differing weathering processes; and **[Slide 48 – Be able to understand why Sandy Creek does not run through the granite formations, and how this relates to weathering on sedimentary rocks and igneous rocks; Slides 46,47 – Hypothesize how such erosion can effect large geological landforms, just as the erosion effects this granite rock to grus.]**

(C) illustrate the role of weathering in soil formation. **[Slides 46,47 – Hypothesize what kind of weathering has occurred in these slides, and what types of minerals the grus can add to the soil.]**

(10) Science concepts. The student knows the interactions that occur in a watershed. The student is expected to:

(A) identify the characteristics of a local watershed such as average annual rainfall, run-off patterns, aquifers, locations of river basins, and surface water reservoirs; **[Slide 48 – Be able to understand why Sandy Creek does not run through the granite formations, whereas it runs through the surrounding sedimentary land forms.]**

Source: The provisions of this §112.2 – §112.49 adopted to be effective September 1, 1998, 22 TexReg 7647.