Georgia Performance Standards Framework for Earth Science – Grade 6

Unit: Rocks and Minerals

Inquiry Task

How do Fossils Show Evidence of Change in the Surface of the Earth?

Standards (Content and Characteristics):

S6E5. Students will investigate the scientific view of how the earth’s surface is formed.
   g. Describe how fossils show evidence of the changing surface and climate of the Earth.

S6CS2. Students will use standard safety practices for all classroom laboratory and field investigations.
   a. Follow correct procedures for use of scientific apparatus.
   b. Demonstrate appropriate techniques in all laboratory situations.
   c. Follow correct protocol for identifying and reporting safety problems and violations.

S6CS3. Students will use computation and estimation skills necessary for analyzing data and following scientific explanations.
   a. Analyze scientific data by using, interpreting, and comparing numbers in several equivalent forms, such as integers and decimals.
   b. Use metric input units (such as seconds, meters, or grams per milliliter) of scientific calculations to determine the proper unit for expressing the answer.
   d. Draw conclusions based on analyzed data.

S6CS5. Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters.
   a. Observe and explain how parts are related to other parts in systems such as weather systems, solar systems, and ocean systems including how the output from one part of a system (in the form of material, energy, or information) can become the input to other parts. (For example: El Nino’s effect on weather)

S6CS6. Students will communicate scientific ideas and activities clearly.
   c. Organize scientific information using appropriate tables, charts, and graphs, and identify relationships they reveal.

S6CS9. Students will investigate the features of the process of scientific inquiry.
   Students will apply the following to inquiry learning practices:
   a. Scientific investigations are conducted for different reasons. They usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations.
   b. Scientists often collaborate to design research. To prevent bias, scientists conduct independent studies of the same questions.
c. Accurate record keeping, data sharing, and replication of results are essential for maintaining an investigator’s credibility with other scientists and society.
d. Scientists use technology and mathematics to enhance the process of scientific inquiry.
e. The ethics of science require that special care must be taken and used for human subjects and animals in scientific research. Scientists must adhere to the appropriate rules and guidelines when conducting research.

Enduring Understanding:
- Rocks are classified based on how they formed and their mineral composition
- Sedimentary rocks are formed by the ongoing deposition of rocks and other sediments that are cemented together
- Fossils, the remains of organisms preserved in sedimentary rocks, are part of the evidence scientists use to infer changing conditions at the earth’s surface through time
- Rocks at the earth’s surface weather, forming sediments that are buried, then compacted, heated, and often re-crystallized into new rock.

Essential Question(s):
How do fossils help scientists to know the climate of places in the past?

Pre-Assessment:
Define each term or phrase:

- Sedimentary
- Rock cycle
- Lithification
- Sediment
- Fossil

| Outcome/ Performance Expectations | Identify the learning goals for this inquiry-based task. | Students will be able to describe how fossils show evidence of the changing surface and climate of the Earth. |
| Write a concept statement…How would you formulate an expert idea? | List examples of how students may incorporate their ideas into experiments. | Students identify and classify marine fossils. Students then interpret the Earth’s environment where the fossils lived. Students then compare the present-day environment with the environment where the marine organisms lived. Where do we find these organisms today? Are there similar organisms today? |

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<th>Write a concept statement / question...What kind of situation would cause this concept to become apparent in students’ understanding?</th>
<th>Write questions or statements to assist students develop and explain their ideas (i.e. aid in conceptualizing their knowledge-making exploration).</th>
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| 1. Fossils are the preserved remains of past life on Earth.  
2. Fossils are found in rocks deposited in the environment in which they lived.  
3. Fossils are generally most abundant in marine sedimentary rocks.  
4. Fossils generally are not found in igneous and metamorphic rocks. |  |

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<th>Identify necessary data and observations...What data would demonstrate the mastery of the concept by ALL students in the classroom?</th>
<th>Identify relevant observations and data collected by students to aid in conceptualizing their knowledge-making exploration. In addition, lists misconceptions that arise and may prohibit students internalizing their own understandings, and what steps should a teacher take to overcome these misconceptions?</th>
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| Students identify marine versus terrestrial fossils. For example, marine organisms: fish, snails, mollusk shells. Terrestrial organisms: plants and dinosaur tracks. Identification of marine vs. terrestrial fossils is based on observations of the fossil forms. Students will record information of the rock texture and composition associated with the fossil.  
Student Misconceptions: Fossils and present-day bones are the same. Fossils may occur in any rock type. Fossils do not contain any meaning for interpreting Earth’s history. Fossils and artifacts (archeology, anthropological) are the same thing. |  |

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<th>Write procedures that will cause students to organize data...Test a procedure using known concepts.</th>
<th>List sample procedural statements that students may use to organize their data.</th>
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| 1. Identify marine and terrestrial fossils using an identification chart.  
2. Describe texture and composition of the associated rock materials.  
3. Name the rock type based on the answer to #2. (Igneous, sedimentary or metamorphic?)  
4. Students explore igneous and metamorphic rocks to search for fossils and clues to the climate in the past. |  |

| Write questions or activities to use or apply the concept (represent, model, visualize, or design new experiments). | 1. What types of fossils are contained in the sample? Answer: plant or marine.  
2. What is the rock type associated with fossils? What environment did the organisms live? What is the present-day environment where these fossils were found?  
3. Draw a visual representation on the types of rocks that contain fossils. Explain why this is so.  
4. Use the visual representation to predict the climate when the fossil organism was alive. |  |

### Homework/Extension

Students describe the environment in which the organisms that made the fossils live in. Discuss both location and the climate.

### Instructional Tasks

#### Accommodations for ELL Students

- Take time to develop prior knowledge
- Provide seating near a positive role model
- Simplify vocabulary or paraphrase examples
- Relate content to real life experiences
- Reduce key points of information student should be searching for or collecting

#### Accommodations for Students with Disabilities

- Require fewer points and responses from gathered information
- Have students repeat directions verbally to a partner to ensure understanding of expectations
- Extend time to complete the task
- Break work into manageable parts
- Establish and post daily routine of how to progress through the task

#### Accommodations for Gifted Students

- Negotiate independent learning contracts in terms of product
- Offer a multi-faceted alternative to this activity
- Offer greater independence by allowing students to design their own questions, procedures, ideas about the assigned topic of fossils