Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Science	Course:	Science 8 (Earth Science)	Unit 3 Title:	Geology	Grade Level(s):	8
Assessed Trimester:	Trimester 2	Pacing:	1 Trimester	Date Created:	6/19/2013	Last Revision Date:	6/23/2014

Course Understandings: *Students will understand that:*

- Scientific inquiry is a way of processing information about their world through the interactions among technology, engineering, and mathematics.
- Scientific investigations involve asking testable questions. Different kinds of questions suggest different scientific investigations and findings of current investigations will guide future investigations.
- Many cultures and groups have been and continue to be involved in advancements in engineering, exploration, and inquiry.
- Earth systems are distinct but interrelated and affect human lives.
- In order to maintain and improve their existence, humans interact with and influence Earth systems.
- Materials within the Earth's systems have physical/chemical properties that make them useful in different ways.

DESIRED RESULTS (Stage 1) - WHAT WE WANT STUDENT TO KNOW AND BE ABLE TO DO?

Established Goals

Benchmark:

8.3.1.1.1: Recognize that the Earth is composed of layers, and describe the properties of the layers, including the lithosphere, mantle, and core.
8.3.1.1.3: Recognize that major geological events, such as earthquakes, volcanic eruptions and mountain building, result from the slow movement of tectonic plates.
8.3.1.3.1: Interpret successive layers of sedimentary rocks and their fossils to infer relative ages of rock sequences, past geologic events, changes in environmental conditions, and the appearance and extinction of life forms.
8.3.1.3.2: Classify and identify rocks and minerals using characteristics including, but not limited to, density, hardness and streak for minerals; and texture and composition for rocks.
8.3.1.3.3: Relate rock composition and texture to physical conditions at the time of formation of igneous, sedimentary and metamorphic rock.
8.2.3.1.1: Explain how seismic waves transfer energy through the layers of the Earth and across its surface.
8.3.1.1.2: Correlate the distribution of ocean trenches, mid-ocean ridges, and mountain ranges to volcanic and seismic activity.
8.3.1.2.1: Explain how landforms result from the processes of crustal deformation, volcanic eruptions, weathering, erosion, and deposition of sediment.
8.3.1.2.2: Explain the role of weathering, erosion, and glacial activity in shaping Minnesota's current landscape.
8.3.4.1.1: Describe how mineral and fossil fuel resources have formed over millions of years, and explain why these resources are finite and non-renewable over human time frames.
8.1.3.3.1: Explain how constraints like scientific laws and engineering principles, as well as economic, political, social, and ethical expectations, must be taken into account in designing engineering solutions or conducting scientific investigations. (Trimester 2 and Trimester 3)

Transfer

Students will be able to independently use their learning to: (product, high order reasoning)

- Model complex ideas and systems.
- Create a visual representation of Earth systems (Layers of Earth, Plate Boundaries, etc.)
- Analyze how weathering and erosion shape the surface of Earth.
- Use their knowledge of the scientific process to answer testable questions.
- Collect and analyze data to draw scientific conclusions.
- Understand that science is a dynamic field and that with new technology comes new information, with new information comes change in understanding.

Meaning

Unit Understanding(s):

Students will understand that:

- Earth is a geologically active planet.
- Huge quantities of energy are always acting on the surface of the Earth and its interior.
- Observable evidence in the present gives information about processes and events that occurred in the past.

Essential Question(s):

Students will keep considering:

- Why is Earth is a geologically active planet?
- How do Earth's different systems/processes interact?
- Why rock and mineral formation create unique characteristics?
- How are properties used in the identification of rocks and minerals?
- How do rocks tell the geological history of an area?

Acquisition

Knowledge - Students will:

- Students will identify the layers of the Earth (lithosphere, mantle and core). (8.3.1.1.1)
- Students will understand how waves transfer energy. (8.2.3.1.1)
- Students will list the layers of the Earth (including the crust, lithosphere, asthenosphere, mantle, and core). (8.3.1.1.1)
- Students will define the properties of the layers. (8.3.1.1.1)
- Students will understand there are different types of plate boundaries. (8.3.1.1.3)
- Students will explain tectonic plates and their slow movement. (8.3.1.1.3)
- Students will describe how the movement of tectonic plates causes geological events. (8.3.1.1.3)
- Students will explain different examples of physical and chemical weathering and erosion forces. (8.3.1.2.1)
- Students will explain how the landscape of Minnesota has been shaped by glaciers and other weathering processes. (8.3.1.2.2)
- For example: Students can use the maps/emerging technologies to analyze how Minnesota's landscape has been affected by glaciers and other weathering processes.
- Students will interpret cross-sections of sedimentary rocks, using index fossils to infer relative ages and recognizing extinct life forms. (8.3.1.3.1)
- Students will infer changes in environmental conditions (ex. marine to land fossils). (8.3.1.3.1)
- Students will describe how coal and oil are formed. (8.3.4.1.1)
- Students will be able to explain how constraints like scientific laws and engineering principles, as well as economic, political, social, and ethical expectations, must be taken into account in designing engineering solutions or conducting scientific investigations. (8.1.3.3.1)
- Students will be able to identify geological features in map or satellite images. (8.1.3.4.1)

Reasoning - Students will:

- Students will compare/contrast seismic waves as they go through different layers (ex. the way different Earth materials affect the propagation of seismic waves). (8.2.3.1.1)
- Students will analyze and interpret how the movements of plates form ocean trenches, mid-ocean ridges and mountain ranges and lead to volcanic and seismic activity. (8.3.1.1.2)
- Compare plate movement at different plate boundaries, including subduction zones and divergent boundaries. (8.3.1.1.3)
- Students will distinguish between chemical and physical weathering. (8.3.1.2.2)
- Students will analyze different landforms, emphasizing Minnesota geology, and interpret how they formed according to geologic processes. (8.3.1.2.2)
- Students will distinguish between weathering and erosion. (8.3.1.2.1)
- Students will distinguish between rocks and minerals. (8.3.1.3.2)
- Students will classify rocks and minerals based on their properties. (8.3.1.3.2)
- Students will compare/contrast intrusive and extrusive igneous rocks. (8.3.1.3.3)
- Students will compare/contrast chemical, organic, and clastic sedimentary rocks. (8.3.1.3.3)
- Students will compare/contrast foliated and non-foliated metamorphic rocks. (8.3.1.3.3)
- Students will compare/contrast a parent rock to a metamorphic rock or sedimentary rock. (8.3.1.3.3)
- Students will predict/infer how one type of rock can change into any other type (ex. rock cycle). (8.3.1.3.3)
- Students will compare/contrast the human time frame with the mineral/fossil fuel formation time frame. (8.3.4.1.1)
- Students will predict the effect of overuse of mineral and fossil fuel resources. (8.3.4.1.1)
- Students may use computers to examine different types of technology (ideas - Google Earth, probes, computer simulations, Riverside Scientific, etc). (8.1.3.4.1)
- Students may use computers to access or view satellite images and data sets. (8.1.3.4.1)

Skills - Students will:

- Students will use the tools necessary to determine the specific properties of examples of rocks and minerals. (8.3.1.3.2)
- Students will use specific characteristics and properties to classify minerals common to Minnesota. (8.3.1.3.2)
- Students will use a specific characteristics and properties to classify rocks common to Minnesota. (8.3.1.3.2)
- Students will model the rock cycle. (8.3.1.3.3)

Common Misunderstandings

- Ice takes up less space than liquid water
- Rocks must be heavy
- Earth is all molten rock except for the crust
- Tectonic plates stopped moving a long time ago
- Mountains form very quickly in an extreme event
- We have been to the center of the Earth
- Rocks and minerals are the same
- Volcanoes are the only things that create mountains
- The tallest mountains are on land
- Earthquakes cannot happen in Minnesota
- Earth is younger than 10, 000 years old
- There are no limitations on resources

Essential new vocabulary

- Mineral
- Streak
- Hardness
- Luster
- Cleavage
- Fracture
- Igneous
- Sedimentary
- Metamorphic
- Intrusive
- Extrusive
- Crystallization
- Lava
- Magma
- Renewable
- Non-renewable
- Fossil fuel
- Fault
- Tectonic plate
- Subduction
- Organic
- Clastic
- Erosion
- Deposition
- Weathering (physical and chemical)
- Compaction
- Cementation
- Sediment
- Foliated
- Re-crystallization
- Superposition
- Original horizontality
- Relative age
- Absolute age
- Intrusion
- Cross-cutting
- Index fossil
- Constraints
- Ethics
- Constructive
- Destructive
- Uplift
- Crustal deformation
- River Valley
- Cliff
- Moraines
- Floodplain
- Oceanic trench
- Mid-ocean ridge
- Mountain range
- Inner core
- Outer core
- Mantle
- Asthenosphere
- Lithosphere
- Crust
- Earthquakes
- P-waves
- S-waves
- Surface waves