Michigan Map (Rocks and Minerals)

Lesson Number: 4

Main Ideas & Objectives:
MI-3: Different minerals and rocks are located in different geographic areas of Michigan. These rocks form a pattern. The explanation of this pattern tells the geologic story of Michigan.
O-4: Use the map index and read a Michigan map to find the localities where specific minerals and rocks occur in Michigan

Lesson Purpose:
This lesson answers the question, "Where do rocks of different types occur in Michigan?" It integrates science and social studies skills. Students also develop pattern-recognition and inference skills.

Grade Levels:
Grades 4-7. Students in lower grades (4,5) may need additional support for activity 4.3. Activities 4.1 and 4.2 could be modified for grade 3.

Activity Description:
4.1 - Placing Minerals on the Map - Students place identified minerals on a map of Michigan in the locations where the minerals occur.
4.2 - Placing Rocks on the Map - Students place identified rocks on a map of Michigan in locations that the rocks occur as bedrock.
4.3 - Looking for Patterns - Students look for patterns of mineral and rock distribution on the map.

Background Information:
Rocks and minerals tell a story about the geologic history of an area. This lesson and lessons 4,5,6 & 7 together will help you and your student understand the geologic history of Michigan. The first step to understanding that story is recognizing that minerals and rocks are not just randomly distributed across the surface of the Earth. Minerals and rocks are clues to what happened in the past. If you find a volcanic rock outcrop on the side of a mountain, you may have a clue that the mountain may have been a volcano, or near a volcano at some time in the past. Similarly, if you find a piece of limestone with fossils of sea shells on a hillside in Michigan, you have a clue that there may have been an ocean in Michigan at one time. There are lots of clues that minerals and rocks can provide; some of these clues will be the topic of future lessons.

In Michigan, as well as many Northern States, glaciers covered large areas of Michigan. The glaciers left behind thick deposits of sediment. This sediment, called glacial till, buried the underlying bedrock. This sediment is mostly sand and gravel, but sometimes included larger rocks and boulders called erratics. These erratics may have traveled long distances from their point of origin. When trying to decipher the geologic history of an area based on the clues in the rocks, it is important look for clues in the bedrock, not in glacial deposits. Bedrock is not exposed in many places in lower Michigan. However, there are places along rivers, lakeshores, and roadcuts where bedrock is visible.

Materials Needed:

For each group:
1 Michigan State Road Map
1 box of minerals
1 box of rocks

Granite*	Gabbro	Rhyolite	Basalt*
Pumice	Scoria	Obsidian	Limestone* (clastic)
Limestone (chemical)	Conglomerate*	Sandstone*	Shale*
Slate*	Mica Schist *	Gneiss*	Marble
Quartzite*			

* indicates minerals used in Lesson 4 on Michigan Geology Map

Optional Resource:

Picture of Final Michigan Map Product

Detailed Procedures:

Activity 4.1 – Placing Minerals on the Michigan Map

1. Write the following list on the board.

Mineral Name	**Location**
Hematite – source of iron ore	Iron Mountain
Halite – source of table salt	Detroit
Magnetite – source of iron ore	Marquette
Gypsum – used for making plaster of paris and wall-board	Grand Rapids

2. Have students find each mineral in their box and place it on the map accordingly. Remind students how to use a map index, if necessary.
3. Explain that in Michigan some minerals, like the ones listed above, are found in specific localities and other minerals, like quartz, are found more broadly.
4. Mention the use of the different minerals placed on the map.

Activity 4.2 – Placing Rocks on the Michigan Map

1. Write the following list on the board.

Rock Name	**Location**
Shale	Gaylord
Basalt	Houghton

Sandstone	Grand Ledge
Gneiss	Marquette
Limestone	Rogers City
Conglomerate	West Branch
Schist	Negaunee

2. Have students find each rock in their box and place it on the map accordingly.
3. Explain that in Michigan some rocks, like the ones listed above, are found in specific localities and other rocks, like sandstone and shale, are found more broadly.

Activity 4.3 – Looking for Patterns

1. Have students work in groups to see if they can find any patterns in the distribution of rocks and minerals. Patterns students may notice include:
    - Only sedimentary rocks and minerals associated with sedimentary processes occur in the Lower Peninsula.
    - Some sedimentary rocks and minerals associated with sedimentary processes also occur in the eastern portion of the Upper Peninsula.
    - Metamorphic rocks and minerals associated with metamorphic processes only occur in the Upper Peninsula (western half).
    - Igneous rocks occur only in the Upper Peninsula (western half).
2. Have students share their findings. You may need to provide guidance to help them focus their pattern-finding. Questions include:
    - Where do you find sedimentary rocks? *Lower Peninsula and eastern half of Upper Peninsula.*
    - Where do you find metamorphic rocks? *Western half of Upper Peninsula.*
    - Where do you find igneous rocks? *Western half of Upper Peninsula.*
    - What does this mean about Michigan?
        - There were once volcanoes in Michigan *Basalt rocks in western Upper Peninsula.*
        - The western Upper Peninsula had large mountains at one time. *Granites, gneiss and schist in western Upper Peninsula.*
        - The Lower Peninsula was covered with seas at various times in geologic history. *Limestone, sandstone, shale in Lower Peninsula and eastern half of Upper Peninsula.*
3. Explain that students will use these patterns in the next three lessons to learn more about Michigan geology.

Management Details:

1. Provide guidance on map reading, if necessary. You may have to model to the students how to use the map index to find the desired locations. Model how to find the location for the first mineral so that all groups understand the process.
2. In order to be sure that one group member does not do all of the placing, suggest that each group member take a turn in placing the minerals and rocks. The turns should move around the group so that everyone participates.

Assessments
Students ability to accurately place commonly found minerals and rocks at the correct Michigan city/location indicates that students are able to:

- identify common MI minerals and rocks
- Use the letter-number index to locate cities on the MI map

Students ability to identify and record patterns of rock types and minerals in Michigan indicates that students are able to:

- Differentiate rocks according to type classification (igneous, sedimentary, metamorphic)
- Understand environments/conditions necessary for the production of halite, gypsum, hematite, copper, gold
- Analyze evidence for patterns

Using This Activity

1. What are the functions of this activity?
2. What are the inquiry elements of this activity?
3. How does this activity fit into your planned sequence?
4. What pre-requisite knowledge do students need to have to complete this activity?
5. How will you modify this activity for younger students?