

Geology Rocks! – The Rock Cycle

Lesson: Engage Scaffolding Lesson: Intro to Geology and the Rock Cycle

Subject/Grade: Earth Science 30, Science/7, and Science/4

Stage 1: Identify Desired Results

Outcome(s)/Indicator(s)

Earth Science 30

ES30-LS1 Examine the processes that lead to the formation of sedimentary, igneous and metamorphic rocks and minerals. [SI]

Indicators

- e) Differentiate among the three main rock groups (igneous, sedimentary and metamorphic) by their processes of formation, including the roles of time, heat and pressure.
- f) Outline the basic transitions inherent in the rock cycle and the forces that disrupt equilibrium to cause these transitions.

Grade 7 Science

EC7.3 Investigate the characteristics and formation of the surface geology of Saskatchewan, including soil, and identify correlations between surface geology and past, present, and possible future land uses. [DM, SI]

Indicators

- a) Model the processes of formation of the three major types of rocks: sedimentary, igneous, and metamorphic.

Grade 4 Science

RM4.1 Investigate physical properties of rocks and minerals, including those found in their local environment. [CP, SI]

Key Understandings: ('I Can' statements)

- I can ... explain what 'geology' means.
- I can ... describe what a geologist does and why they are important.
- I can ... differentiate among the three main rock types – Igneous, Sedimentary and Metamorphic.
- I can ... explain the basic transitions within the rock cycle.

Essential Questions:

- How would you define geology?
- How would you define a geologist?
- What does a geologist do?
- Explain the rock cycle?

Teacher Background

What is geology and what does a geologist do? What is the rock cycle? In this lesson students will develop a deeper understanding of the field of geology and the rock cycle through an interactive lesson and activities.

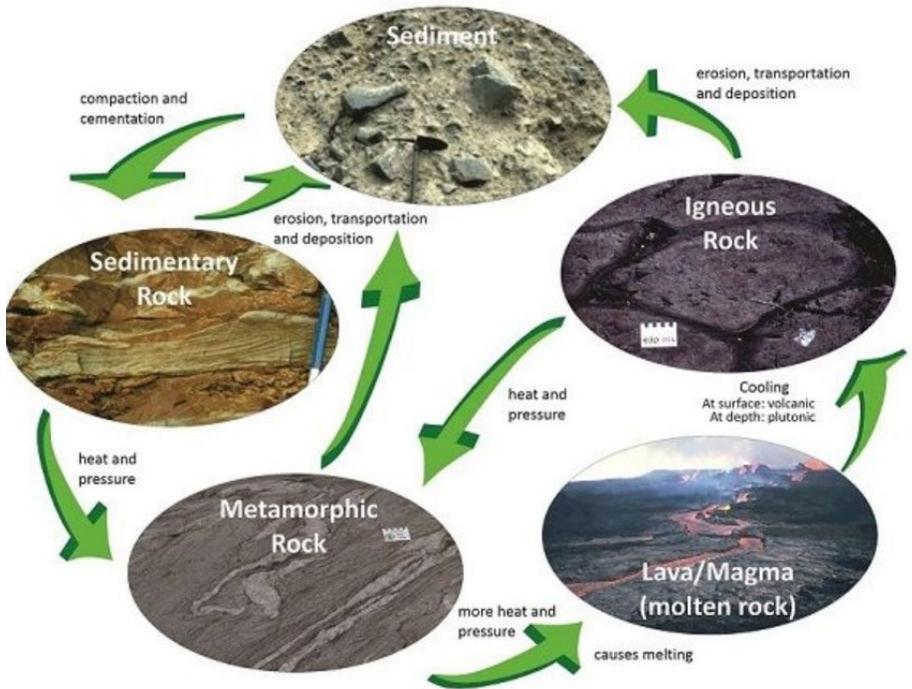
Vocabulary

Geology: from the Latin geo (Earth) and logia (discourse/study of). So geology means the study of the Earth.

Geologist: a person who studies the Earth.

Rock Types: rocks are classified into three main types based on how they formed, which can be represented by a diagram called the rock cycle.

- Igneous - derived from the Latin word *ignis* meaning fire. These are rocks formed from the solidification of molten (melted) material (magma = underneath surface or lava = above surface).
- Metamorphic - change form or shape. Rocks change into a different rock because of heat and pressure when they get buried deep in the earth.
- Sedimentary - rocks that form by the compaction (squeezing) and cementing (gluing) together of small particles (sediments).



Rock Cycle Lab Explanation

Each group receives three different colours of unwrapped Starburst candy and scissors.

- **Sediments** - take the three Starbursts and use scissors to cut them into pieces. Draw a picture of your sediments. Words used to describe this = weathering, erosion, breakdown, pieces...
- **Sedimentary Rock** - take all of the pieces and squeeze them together into a solid form. Draw a picture. Words used to describe this = compaction, cementation, squeezing, gluing....
- **Metamorphic Rock** - Students will take their solid form and add heat from the hands and pressure from their hands to squish it into a pancake. Students can use books to help. Draw a picture. Words used to describe this = heat, pressure, squish, flatten, bend, fold, align....
- **Lava/Magma** - students will put their solid form on wax paper and put it in the microwave for 10 second increments or use a hot plate and make a foil bowl. Put up a sign on safety and instructions or guide students, depending on age. Draw a picture. Words used to describe this = heat, pressure, melt, molten, liquid, flow...

- **Igneous Rock** - set the 'magma' on a table and observe it as it cools. Draw a picture. Words to describe this = cool, solid, solidification, crystalize...

Note students may do this in a different order or figure out how to include the other arrows in the rock cycle (for example melting a sedimentary rock to form an igneous rock or using scissors to cut an igneous rock into sediments). For best results, specific to the metamorphic rock and sedimentary, you don't want all the colours muddled together by melting it first. Then, students can draw and colour in their observations.

Stage 3: Build Learning Plan

Set (Warm-up, Focusing the Learning): Time:

- Start PowerPoint Slides – Geology Rocks!
- Go over the outline
- Engage by having students discuss their prior knowledge through think -pair- shares based on the discussion questions in the PPT.
- Play the Bill Nye Video (did he get it all correct?)

Development:

Time:

- Explain to students that they will create their own rock cycle by completing an inquiry lab activity. Students will fill in their own rock cycle by drawing observations in the circles and by using arrows and words to describe how to get from one circle to another.
- Discuss lab safety
- Each group will receive three different colours of Starburst candy. Tell students to start with sediments.
- Provide guidance
- Have students do the igneous rock last because all of the colours will mix together or have lots of extra Starbursts.

Learning Closure:

Time:

- Have students clean up
- Discuss the rock cycle by having groups come up to the board to help fill in the rock cycle diagram on the PPT. Ask questions to check for understanding.
- If students are missing arrows help them fill in the arrows by demonstrating with the Starbursts or by asking questions.
- Show students the picture of the rock cycle.
- If there is time, you can do the extension activity

Materials/Equipment:

- Geology Rocks! PPT
- Rock Cycle Worksheet
- Different coloured Starburst Candies (3 per group)
- Scissors
- Microwave and wax paper
Or Hotplates and tin foil

Safety Considerations:

Microwave

- Use wax paper and be careful not to spill hot starburst liquid on yourself or others
- Use the microwave in 10 sec increments
- Do not overheat

Hotplate

- Be careful not to burn yourself
- Use tin foil and create a bowl or plate with raised edges
- Do not spill hot starburst liquid on yourself or others
- Do not overheat

Stage 4: Determine Evidence for Assessing Learning

- Cannot be taken in for grades since the class went over it at the end
- Can be taken in for a completion grade or to check for understanding/lab skills
- For the higher grades you could use the assessment sheet provided, which focuses on laboratory skills (good drawing skills, good observation skills and clean-up) and understanding. At the bottom you can assign a grade. There is also a space for teacher feedback.

Extensions

Activity -

Each group will get three rocks - a rock representing each rock type. Have students place the rocks where they think they belong on the rock cycle by classifying them into the appropriate rock types. Have groups discuss how they classified the rocks. Check in with groups as they are working and challenge them to try to place them all correctly. Ask them questions. Once the groups are ready, do a final check where you tell them which belong where. Note - this can become very competitive.

Use rock samples that are very distinguishable for that rock type.

- Sedimentary - conglomerate, sandstone, samples with fossils
- Metamorphic - samples with foliation (gneiss and schist)
- Igneous - vesicular (filled with holes) samples (e.g., vesicular basalt) or amygdaloidal (holes have been filled with minerals)

Resource -

Look at the GeoExplore Saskatchewan website. This is a digital version of the paper Geological Highway Map of Saskatchewan, plus lots of exciting new content) for further information and a deeper understanding of the local context:

Main Website

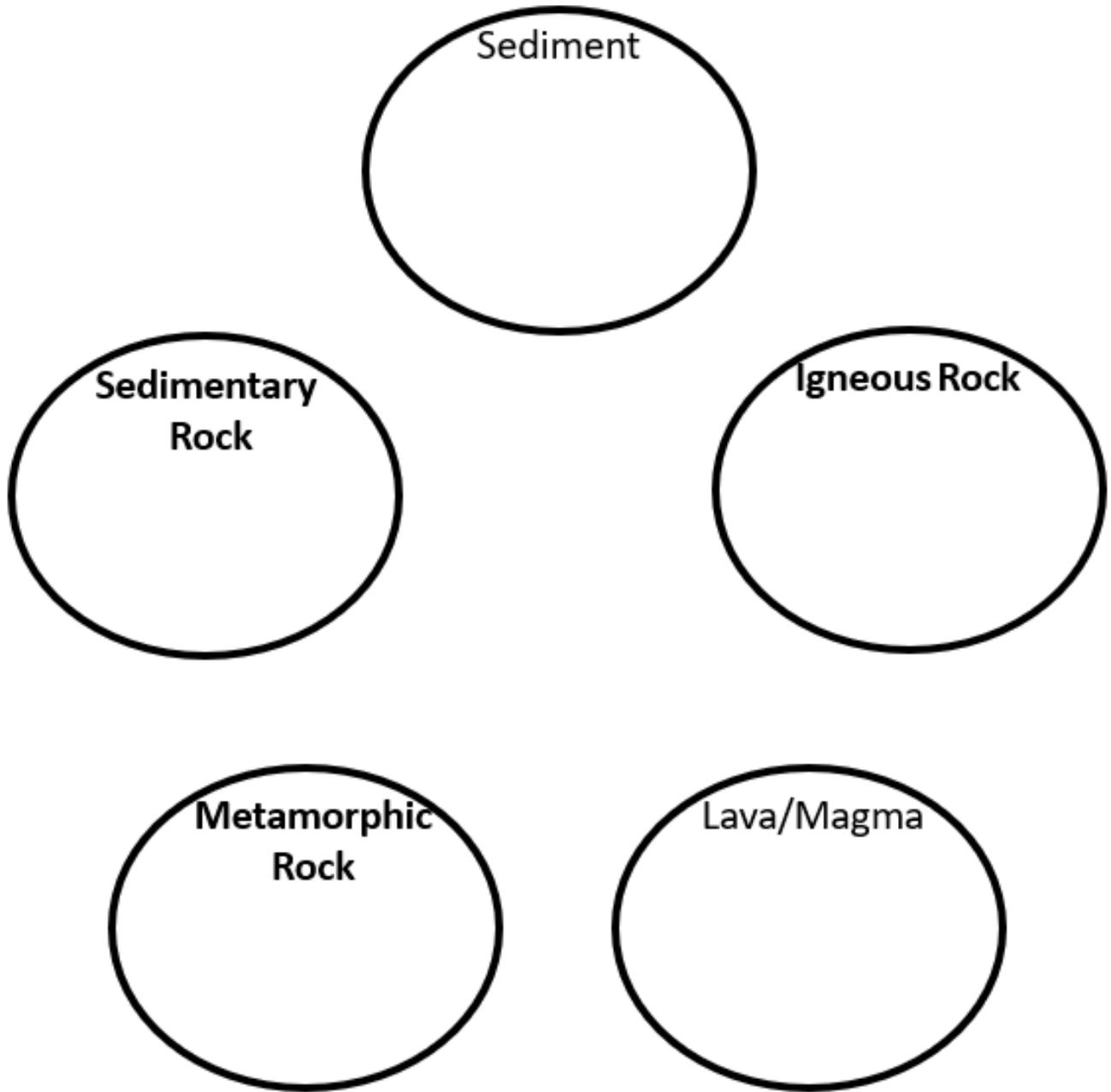
<https://skgeolhighwaymap.maps.arcgis.com/apps/MapSeries/index.html?appid=a845cbb370f7401597806887318e2676>

For more background information related to this lesson check out

- Main tab "Geo 101"

Created by: _____

The Rock Cycle



Name: _____

Observations Criteria and Feedback

Criteria for a Good Drawing	Met	Not Yet
Large enough to show the details		
Illustrates all the parts as realistically as possible		
Illustrates details such as texture, colour, and shape		
Properly labeled (measurements, minerals, and important features.)		
Criteria for a Good Observation		
Specifics measurements (length, width, mass), number of characteristics (e.g. 10 jointed legs), etc.		
Descriptive Words (e.g. Iridescent, spherical, scaly, powdery, etc.) and details (location, colour, texture, quantity, sounds, smells, etc.)		

Observations Include:	Feedback:	Current Score
Specifics		
Descriptive details		

Clean-up?	Met	Not Yet
Did you clean up your lab station and put materials away properly?		

Grade _____ /