

Lesson Plan Beth Kostka

Strategy: __Metaphorical Lesson__

Unit Name

Geology

Lesson Name

Metaphorical Lesson

Time Needed (Hours/Days)

2 days

Grade

6

Subject

Earth Space

Course

6th grade Earth Space Science

Essential Question(s)

What should students know when lesson is completed?

- 1) Looking at this rock in my hand, where did it come from originally?
- 2) Could it have come from somewhere else? (Why? What makes you say that?)
- 3) Will this rock always look like this? Why or Why not?

Standard

GSE S6E5. Obtain, evaluate, and communicate information to show how Earth's surface is formed

c. Construct an explanation of how to classify rocks by their formation and how rocks change through geologic processes in the rock cycle

Learning Targets:

- I can identify the 3 types of rocks and explain how they are formed
- I can explain the rock cycle by connecting it to things I recognize

Teacher Lesson Preparation

Prior Knowledge/Skills: Prior the lesson, students will explore layers of the Earth and the characteristics of each through various stations (text, videos, websites, model creation lab, and candy lab). They will also explore and learn about the rock cycle. This background information will aid students in placing rocks and the rock cycle in context of the Earth. Without the background knowledge of the layers of the Earth, pressures and temperatures each experience, students will struggle to understand the forces acting on rocks that cause the rock cycle and different types of rocks. Without prior knowledge of the rock cycle, understanding of the individual rocks cannot be achieved at a deep level.

Gifted Identification: Students are identified as gifted through CSD testing and qualification. I have 24 students identified as gifted in science plus 16 Gifted in Math and/or Gifted in Reading and 1 twice exceptional (for a total of 41 gifted students in my class).

Pre-assessment: To pre-assess whether students have already met the learning goals prior to this lesson, they were given a google-form pretest at the beginning of the unit. (see attached)

Misconceptions:

Based on assessment from prior years and from the research based website

<https://www.lpi.usra.edu/education/step2012/participant/rockCycle.shtml>.

- One common misconception is that layered rocks are always sedimentary; in fact, many metamorphic rocks are layered, and even a few igneous rocks can have layers.
- Some students mistakenly assume that one type of rock can only change to another type; for example, that igneous can only change to sedimentary or metamorphic rather than melting again and changing to another type of igneous rock.
- Students may think that metamorphic rocks are a “little melted” when, in fact, if there is melting, then the process is igneous.
- Students may think that metamorphic rocks require both heat and pressure, when there are cases of metamorphism that are just heat or predominantly pressure.
- Students may assume that any amount of pressure or heat will cause a rock to metamorphose, when there are specific amounts; some pressure may just make a sedimentary rock, while too much heat will melt a rock, resulting in an igneous process.

“Grouping strategies”: Prior to this lesson, students will take a pre-assessment (see attached google form). The pre-assessment will be graded for understanding. Students will be assigned a lab group of four based on their level of understanding of geology on the pre-assessment such that students with similar levels of understanding will be grouped together. Grouping was done in this manner to facilitate deeper/higher order thinking analogies with high understanding students and simpler connections with students struggling with content, eliminating the problem of some students with hard to grasp connections as compared to their peers.

Special Population Consideration:

Graphic organizers and guidelines (see materials list) will provide structure for twice gifted students who struggle with focus or time management. Creative students have the opportunity to come up with their own self expressive connections with this independent task. Special populations of underachievers will be checked-in on specifically during formative assessment walk-arounds to engage in discussion and higher level idea building. All students will benefit from the choice Ticket out the Door assessment that crosses all learning styles (M, SE, IP, and U). Females and minorities are addressed in the acceleration/extension opportunity (see below)

Activating Strategy (for example: Hook/Mini-Lesson/Warm-Up/Connection to Prior Learning)

Hook:

Warm up will be a series of “Mental Stretchers” questions (see Mental Stretchers Handout) asking students to think to be able to answer (idea source cited in materials section). Students will share their answers with their tablemate. One student per table will anonymously be called on to share their answers to the mental stretchers and be asked to explain why they answered as they did. Next teacher will ask What is a metaphor? 2. Why do human beings use

metaphors? 3. Can metaphors be used in science? If so, give some examples 4. Could a metaphor assist in learning a complex topic in science? End by sharing that today we will be reviewing the three types of rocks and the rock cycle using different types of metaphors to deepen learning.

Instructional Sequence and Activities

Part 1: Set the Scene

Teacher asks and calls on students (with wait time) “Has anyone been to the Mountains? Where? Has anyone gone on a field trip to stone mountain? What were the mountains like? What did they feel like? Did you touch the mountain with your hand? Was it hot or cold? Where did the rock of the mountain come from?”

Teacher will then show a picture of stone mountain and ask the same questions. Then, teacher will show learning targets for the day: *I can identify the 3 types of rocks and explain how they are formed and I can explain the rock cycle by connecting it to things I recognize.*

Part 2

Pose the essential question: Has stone mountain always looked like it does? Will Stone Mountain always look like it does today? Watch a summarizing video about the rock cycle. VIDEO. <https://www.youtube.com/watch?v=SRaInMDNyE8>. Take notes following the Windows Notes format

Facts I learned or Remembered	Feelings
Questions	New Ideas

After the video students and teacher will have a discussion about rocks and the rock cycle (review concepts from prior lesson) and how it got to STONE MOUNTAIN (Connect the concept to our local mountain).

Part 3: Analogies

Direct Analogy: Students will compare and contrast different types of rocks (metamorphic, igneous, sedimentary). A (metamorphic/igneous/sedimentary) rock is like _____. When finished, students will share their direct analogies with their lab group (see above for grouping plan) and then the class will share out.

Examples of the direct analogies that might come out of this.

A metamorphic rock is like a melted piece of candy in the bottom of my Halloween candy bag.

An igneous rock is like the wax drops on the side of a candle

A sedimentary rock is like the layers of crud building up in my backpack

Personal Analogy: Students will compare themselves to a rock. They will individually respond to the following questions: (See Personal Analogy Handout)

Where do you live?
 How do you feel when you get cold?
 How do you feel when you get hot?
 How do you feel when you change?
 Students will then write a paragraph, song or poem in first person about their life as a rock..

Compressed Conflict: Students will discuss antonyms for the rock cycle with their lab group in order to come up with three compressed conflict statements/phrases. (*i.e.* “How can a rock be both hard and soft in its life?” or “*A mountain is hard yet fluid*”) (See *Compressed Conflict Handout*)

Part 4: Synthesis Activity (10 min)

Ticket out the Door: Answer ONE of the following questions on a sticky note.

- Explain the rock cycle in words. Include one analogy to aid the reader in understanding it. (M)
- Why is the rock cycle important? (U)
- How does the rock cycle affect your daily life? (IP)
- Draw a picture or cartoon of how a mountain is formed (SE)

Assessment Strategies

Evidence of Learning

- Students will be able to identify the 3 types of rocks and explain how they are formed
- Students will be able to explain the rock cycle by connecting it things they recognize

Assessment: Students analogies (completed on handout and in discussion) will be formatively assessed for strong personal connection and understanding of the rock cycle. In addition, while students are brainstorming and writing their analogies the teacher will wander around the room reading students notes and helping where needed. Posing questions, saying have you considered, what about, what would it be like if ____? A Final formative assessment will take place with the exit ticket activity. The exit ticket will be assessed as effort using the rubric below.

Exit Slip Rubric for Effort			
1	2	3	4
Exit slip is blank or impossible to understand	Exit slip is difficult to read or understand	Exit slip is mostly organized and easy to understand	Exit slip is very organized and easy to understand
Student makes no effort to answer the question or writes IDK	Exit slip makes very little attempt to answer the question that was asked	Student has made a serious attempt to answer the question asked	Student successfully answers the question asked and includes elaboration

Differentiation

Scaffolds/ Interventions/Extensions/Enrichment/Adaptations for Special Pops students

This lesson differentiates by process (grouping students according to their content understanding as determined by the pretest), types of scaffolding (3 types of Analogies Guideline and Examples Handout), and product (choice for the thing being compared or what is in the analogy).

Graphic organizer is provided to gifted students needing help with organizational skills. Gifted students who are quick to grasp content and motivated to complete assignments have acceleration options of additional/expanded text sources (see materials section). Gifted students who are struggling writers will be provided with sentence starters, checklist and if completely necessary, “flipgrid” to aid them in verbally articulating their understandings. Struggling readers will receive differentiation with tiered lexile text, a video, sentence starters, and checklist. Finally, creatively gifted students are planned for by including points on the assessment rubric for creativity/outside the box thinking (thinking beyond the articles).

Materials/Links/Text References/Resources

Technology:

Video: <https://www.youtube.com/watch?v=SRaInMDNyE8>

Back up video <https://www.youtube.com/watch?v=sN7AficX9e0>

Handouts/Slides:

Handout 1: Mental Stretchers Handout

Slide 1 : Direct Analogy

Handout 2: Personal Analogy

Handout 3: Compressed Conflict

Slide 2 : Synthesis Activity

Acceleration/Extension and Special Population Research

Geology of Stone Mountain:

http://www.aboutnorthgeorgia.com/ang/Stone_Mountain_Natural_History

Female Geologists:

<https://blogs.scientificamerican.com/rosetta-stones/4-fantastic-pioneering-earth-scientists-for-international-womens-day/>

Minority Geologists

<https://blogs.scientificamerican.com/rosetta-stones/black-history-month-making-history-in-the-geosciences/>

Mental Stretchers and personal analogy for this lesson come from the example lesson:

Rachel_Bruckwicki_Metaphorical_Expression_Lesson.docx

Misconceptions : <https://www.lpi.usra.edu/education/step2012/participant/rockCycle.shtml>.

ATTACHED DOCUMENTS

(see below)

ATTACHED DOCUMENTS

Warm up (Hook)

MENTAL STRETCHERS

Directions: Answer the following questions. Be sure to take time to think about each before answering them.

1. If you were any toy what kind of toy would you be and why?

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2. How would you feel if you were a piece of Halloween candy that was never eaten?

--

3. How is a taco like a shark?

--

- 4.

Use 4 words to describe a mountain
(underline the 5 words)

Write 4 opposite words to the words you
underlined

--	--

5. Now use the 5 opposite words you identified above to describe the mountain

--

Direct Analogy

Direct Analogy

A metamorphic rock is like a _____.

An igneous rock is like a _____.

A sedimentary rock is like a _____.

Personal Analogy Rock Cycle Handout

Pretend that you are rock moving through the rock cycle. Answer the following questions as if you were that rock.

Where do you live? (Be specific)	How do you feel when you get very, very, very hot (>150 degrees <u>celcius</u>)?
How do you feel when you get cool? (cooler than 150 degrees <u>celcius</u>)	How do you feel as time passes?

Write a paragraph, poem, or song in first person about your life as a rock. Be sure to include the different stages you go through over your long lifetime.

Compressed Conflict: Rock Cycle Handout

<p style="text-align: center;">List five important words to describe the rock cycle.</p> <p>1.</p> <p>2.</p> <p>3.</p> <p>4.</p> <p>5.</p>	<p style="text-align: center;">List antonyms for each word.</p> <p>1.</p> <p>2.</p> <p>3.</p> <p>4.</p> <p>5.</p>
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Review your original list and its antonyms. Do any of the pairs of words seem to fight each other but still describe the rock cycle? Create three Compressed Conflicts:

1. _____
2. _____
3. _____

Differentiation Handout

Types of Analogies Guideline

Direct analogy	<p>A direct analogy is a comparison of two objects or concepts.</p> <p><u>Example</u>: “Life is like a box of chocolates.”</p>
Personal analogy	<p>A personal analogy connects YOURSELF physically or emotionally to the concept.</p> <p><u>Example</u>: “How would it feel to be a minus sign in a subtraction exam?”</p>
Compressed conflict analogy	<p>The compressed conflict analogy demands you to consider a topic by using two words that contradict each other.</p> <p><u>Example</u>: “Love is joyful and painful”.</p>

To write a DIRECT ANALOGY

Step 1	Brainstorm similarities
Step 2	...is like (fill in one of your similarities)

To write a PERSONAL ANALOGY

Step 1	Brainstorm ways you are like the topic
Step 2	<p>Use questions to help you....</p> <ul style="list-style-type: none"> ● do we look alike ● do we <u>ACT</u> alike ● do we <u>live</u> or go to the same type of place ● do we <u>feel</u> the same way

Part 4: **Synthesis Activity (slide)**

Ticket out the Door:

Answer ONE of the following questions on a sticky note.

Explain the rock cycle in words. Include one analogy to aid the reader in understanding (M)

Why is the rock cycle important? (U)

How does the rock cycle affect your daily life? (IP)

Draw a picture or cartoon of how a mountain is formed (SE)

Acceleration/Extension Activity

Create a Recipe Card that outlines the ingredients, materials and directions to follow for the creation of Stone Mountain

Title of Recipe:	
Ingredients	Directions: Write a recipe to create Stone Mountain (Hint: It is like baking a cake, but instead you are making a mountain. To refresh your memory on the geology of Stone mountain, go to http://www.aboutnorthgeorgia.com/ang/Stone Mountain Natural History).
Amount Material	
	<ol style="list-style-type: none">1. On a note card, write the Title your recipe2. Then, write the ingredients and amount of time needed to create your recipe (What materials and how much time is needed to create each step of the recipe)3. Finally, include a directions section and write the "steps" to make or put together Stone Mountain.4. Write your full name on the corner of the card.5. Decorate your recipe card in a creative way.

EXAMPLE

Recipe for: **German Chocolate Cake**

Ingredients: 1/2 cup water 1 4oz German's Chocolate Bar 1 Cup butter (softened) 2 Cups Sugar 4 eggs (separated) 1 tsp vanilla extract 1 cup buttermilk 2 1/2 cups cake flour 1 tsp baking soda 1/2 tsp salt	Directions: Preheat oven to 350F Line 3 - 9 inch round cake pans with parchment and grease the sides. Sift together the flour, baking soda and salt. Set aside. In a small saucepan add water and chocolate. Heat until melted then let cool. In a large bowl cream butter and sugar until fluffy. Beat in egg yolks 1 at a time. Blend in chocolate and vanilla. Mix in flour mixture, alternating with buttermilk. Do not overmix. In a separate bowl whip egg whites until stiff peaks form. Fold into batter. Combine until there are no streaks of white. Pour into prepared pans and bake for 30 minutes.
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Your email address (bkostka@csdecatur.net) will be recorded when you submit this form. Not **bkostka**?

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* Required

1. How do scientists classify rocks? *

Mark only one oval.

- According to color
- According to where they are found
- According to their age
- According to how they are formed

2. What type of rock am I? I am made from fire. I start out as magma. Then, I cool and harden. I am a _____ rock. *

Mark only one oval.

- Metamorphic
- Sedimentary
- Igneous

3. What type of rock am I? I am called the changeling. I start as one type of rock. Then, heat and pressure change me into a _____ rock. *

Mark only one oval.

6. Molten rock AT or ABOVE Earth's surface is called: *

Mark only one oval.

- Lava
- Magma
- Sedimentary rock
- Igneous rock

7. What kind of rock can form from material that settles to the ocean floor? *

Mark only one oval.

- Igneous
- Metamorphic
- Sedimentary

8. What kind of rock is most likely found near a volcano? *

Mark only one oval.

- Igneous
- Metamorphic
- Sedimentary

9. What process can change a metamorphic rock into molten (liquid) material? *

Mark only one oval.

- Melting
- Heat and pressure
- Erosion
- It cannot become molten material

12/15/2019

Geology Pretest 2018-2019

12. What is the correct order of the layers of the Earth from outside to inside? *

Mark only one oval.

- Inner core, outer core, mantle, crust
- Mantle, inner core, outer core, crust
- Crust, mantle, outer core, inner core
- Outer core, mantle, crust, inner core

13. What is the thinnest layer of Earth? *

Mark only one oval.

- Crust
- Mantle
- Outer core
- Inner core

14. What is the thickest layer of Earth? *

Mark only one oval.

- Crust
- Mantle
- Outer core
- Inner core

15. What is the hottest layer of Earth? *

Mark only one oval.

- Crust
- Mantle
- Outer core
- Inner core

16. Which layer of Earth is solid hot dense rock that flows like asphalt? *

Mark only one oval.

18. Which layer of Earth is made of solid metal? *

Mark only one oval.

- Crust
- Mantle
- Outer core
- Inner core

19. In general, how does density of material in Earth's layers change with depth? *

Mark only one oval.

- Density increases with depth
- Density decreases with depth
- Density does not change with depth
- Density increases, then density decreases with depth

20. A series of processes on Earth's surface and below Earth's surface that slowly changes rocks over time from one kind to another is called *

Mark only one oval.

- the erosion cycle
- the rock cycle
- mountainism
- crystalization
- volcanism

Send me a copy of my responses.