Course: Grade 4 science	Marking Period: 1B	Lesson # 14: Weathering and Erosion Lab (2 Days)

Standard(s): *4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.*

***Objective(s):**

- Students will identify and describe weathering and erosion.
- Students will demonstrate the effects of weathering and erosion on soil.

OR

- Students will identify and describe glaciers.
- Students will demonstrate how glaciers can change a landscape.

*** Target Text/Literacy Component:**

Student lab worksheet - Option #1
Student lab worksheet - Option #2

Planning/Preparation Notes: There are 2 different labs that you can select: (Follow the lesson plan based on the Option lab you select)

Lab #1 - Weathering and Erosion Lab

This lesson is best done in stations: (7) weathering stations and (7) erosion stations. Students will visit one station, make and record their observations and share them with the rest of group.

Not all of the weathering stations or all of the erosion stations are of equal difficulty. They have been identified as such because it may require longer to perform the action, it may require more careful observation to see the effect, or it may involve a more elaborate procedure. The stations can be a way to differentiate your class by ability levels, giving the easier stations to those students who may need more assistance and the harder stations to your challenge students. The stations have been identified as Easy (E); Medium (M); and Hard (H) on the charts.

Lab #2 - Weathering and Erosion Glacier Lab

Before beginning the lesson, prepare the ice trays for the student activity. Make enough ice so that each group has two clear ice cubes and two that have been frozen with sand on the bottom. Then put the other materials in a central place so students are ready to begin immediately following the opening discussion.

Vocabulary:

Canyon A deep, narrow valley that often has steep sides **Context:** Cut by the Colorado River over millions of years, the Grand Canyon is a spectacular example of natural forces carving the Earth.

Erosion The wearing away of the land by flowing water, the movement of glaciers, or by wind **Context:** Flowing water and strong winds are responsible for much erosion of the land.

Glacier A large body of ice slowly moving across the land, pushing sand and rocks as it moves **Context:** The movement of glaciers is

responsible for the formation of Long Island in New York.
Landform A feature of Earth's surface that emerged as a result of natural causes **Context:** Mountains, canyons, and valleys are examples of landforms that occurred as a result of natural forces.
Natural forces Occurrences on Earth attributable to nature, not caused by the actions of people **Context:** Earthquakes and volcanoes are destructive natural forces that can cause extensive damage to buildings and can injure people caught in their path.

Resources/Materials: (Pick 1 of the 2 options as stated in the planning and preparation notes).
Weathering & Erosion Station Lab Google Slides
Youtube video - Erosion of Rocks (2:05)
Youtube video - Physical and Chemical weathering of rocks (2:58)
Student lab worksheet - Option #1
Option #1 - Student Direction Sheet (Explains stations)

Weathering and Erosion Lab
*Not provided

Carbonated water*	Plastic glasses	
Tap water *	Chalk	
8 ounce plastic containers with lids		Pennies
Rock samples		Vinegar
Overhead markers		Antacid tablet
Steel wool		Zip lock bags
Sugar cubes		Shallow pan
Mortar and Pestle	Ice Cubes*	
Sand		Gravel

Weathering & Erosion - Glacier Google Slides
Youtube video - How Glaciers Change the World (5:03)
Youtube video - How do Glaciers change the landscape (2:31)
Student lab worksheet - Option #2
Student Glacier lab Direction sheet - Option #2

Weathering and Erosion Glacier Model Lab

Paper and pencils	Newsprint
Markers	Ice cube tray
Water	Sand
Two plastic cups per group	Teaspoon
Paper towels	

Instructional Sequence of Lesson			
Time	***Activities**	**Instructional Considerations** (*Enrichment/Extension Activities, Accommodations/Modifications, Differentiation Strategies, SDI)*	***Formative Assessment/ Check for Understandings**
Option #1 - Weathering and Erosion Lab Day 1			
10 min	***Getting Started/Drill/Anticipatory Set*** Using the WED Lab Stations Google Slides for reference So we have already learned some basics of WED, but let's actually see it, do it and feel it. This is a 2 day lab experience - day 1 is for weathering and day 2 is for erosion. Let's learn more specifics about weathering - there are 2 types. Check out slide #2 where we can learn more about physical and chemical weathering by watching the video linked to the image. After the video - summarize the difference between the 2 types of weathering using slide 3.		Student responses
20 min	***Instruction: whole, group, individual*** **Day 1 Lab-** Weathering:There are 7 stations - do them all, select 3-4, you choose. A suggestion is to have students experience physical and chemical weathering so they have access to them for future reference. Slide 4 outlines the expectations and resources: ● Lab station direction sheet ● Student the lab student worksheet. Have students help clean up their stations, put lab papers away or collect them based on your classroom policy.		Student engagement and collection of data
5-7 min	***Closing Activity*** Using Slide 5 as a reference - discuss if students completed the final column of their lab sheet, could they identify the type of weathering (physical or chemical)		Lab - Part 1 student worksheet

Option #1 - Weathering and Erosion Lab Day 2			
10 min	***Getting Started/Drill/Anticipatory Set*** Using the WED Lab Stations Google Slides for reference (Begin on slide 6) Today's lab stations are focused on erosion and the 4 FORCES or ways that erosion occurs. On slide 6, there is a video hyperlinked to the image that introduces these 4 forces. Students will need to identify the forces that cause the erosion in the lab stations. Slide 7 has the answers from the video to help list the 4 forces: 1. Water 2. Wind 3. Glaciers 4. Gravity		Student responses
20 min	***Instruction: whole, group, individual*** **Day 2 Lab-** Erosion:There are 7 stations - do them all, select 3-4, you choose. A suggestion is to have students experience the 4 forces, if possible, so they have access to them for future reference. Slide 8 outlines the expectations and resources: ● Lab station direction sheet ● Student the lab student worksheet. Have students help clean up their stations.		Student engagement and collection of data
10 min	***Closing Activity*** Slides 9 & 10 highlight the last column of the student handout - and how weathering and erosion work together to change the land.		Student lab worksheets
Option #2 - Weathering & Erosion (Glacier Lab) Day 1			
5-7 min	***Getting Started/Drill/Anticipatory Set*** Use the Glacier Lab Google Slides as a reference Slide 1 - Begin the lesson by asking students if they know what a glacier is. Answers can be put down as "Jot thoughts" (Kagan strategy) or added to the Google Slides, page 2.		

20-25 min	***Instruction: whole, group, individual*** 1. Slides 3 & 4 pose 3 questions that go along with a video that will help the class form a working definition of a glacier. The image on Slide 3 is hyperlinked to a Youtube video - How Glaciers Change the World (5:03) Answers to the 3 questions are found on slide 4. 2. Slide 5 gives 3 specific actions that glaciers do to the landforms. The image is hyperlinked to the Youtube video - How do glaciers shape the landscapes? (2:31)		
5 min	***Closing Activity*** Have the class take their information from class today and create their own definition of glacier. Slide 6 is a working definition of a glacier if the class wants a reference to their class's definition		
Option #2 - Weathering & Erosion (Glacier Lab) Day 2			
3-5 min	***Getting Started/Drill/Anticipatory Set*** Use the Glacier Lab Google Slides as a reference (Begin at slide 6) Remind the class what they learned last class about glaciers - today's class they will have the opportunity to make some observations about what glaciers physically do as they move through the land.		
25-30 min	***Instruction: whole, group, individual*** Slide 7 outlines the 3 stations the students will rotate through - or you can have 1 set up per group of 4-5 students. ● Student lab worksheet - Option #2 ● Student Glacier lab direction sheet - Option #2 2. Tell students that they will participate in an activity that will demonstrate how glaciers can cause dramatic changes. Divide	**Enrichment -** could have the students complete the Notebook sort (Weathering and Erosion) as they proceed through the stations.	Student lab worksheets

	students into small groups; tell them to select one person in each group who's responsible for collecting materials for the group. **Station #1:** Sandy bottom ice cubes with dixie or plastic cups. You could even use wax paper - rub the sandy bottom on the substances and write or type out your observations on the student worksheet of what the sand does to the surface of the cup/wax paper. *Answer the question:* What did the side of the cup/or wax paper look like before and after you rub it with the sandy ice cubes? **Station #2:** Regular ice cubes with dixie or plastic cups. You could even use wax paper - rub the ice cube on the substances and write or type out your observations on the student worksheet of what the regular ice cube does to the surface of the cup/wax paper. *Answer the question:* What did the side of the cup/wax paper look like before and after you rub it with the plain ice cubes? **Station #3:** Video demo: Glacier Science Experiment (to use as reference for your set up) Using a cafeteria tray, cover the tray with wax paper. Then place soil or dirt, and some pebbles over the wax paper. Tilt the tray and take a "glacier" and push it down the tray and make your observations of what the glacier does to the land. (Glacier is a large ice cube - or frozen water with a sandy bottom removed from a plastic cup). *Answer the question:* Did the dirt stay where we put it or did it move? Explain. 3. Discuss with the class what the results show. Help students understand that the sandy particles in the ice cube are what caused the mark on the cup. This rubbing		

	motion is similar to the way glaciers cut deep depressions in Earth's surface. Collect student observation lab worksheets.		
5 min.	***Closing Activity*** Conclude the lesson by asking students if they can think of other natural forces that cause changes on the Earth's surface. Possible ideas include flowing water, wind, and the movement of tectonic plates or underground water. Slide 7 has an image with a question - how did those lines get into the rock formation (glaciers sliding by)		
***Lesson Evaluation:** **Option 1:Investigating Weathering and Erosion** Day 1- Student lab worksheet (weathering stations) Day 2 - Student lab worksheet (erosion stations) **Option 2: Weathering and Erosion Glacier Lab** **Day 1-** Class's working definition of what a glacier is **Day 2-** Student lab worksheet			

★ *The template includes items listed as minimum requirements listed on Page 11, in Article 6.16.1.2 in the Negotiated Agreement Between The Board of Education of Cecil County and The Cecil County Classroom Teachers Association. This article states: *Plans shall specify the daily outcomes developed from indicators and/or objectives found in the Cecil County Public School approved curriculum, the instructional activities that shall bring these to fruition, and how student achievement of the daily outcomes shall be evaluated.*

★ *Refer to the Text Complexity Grade Bands and Associated Lexile Ranges table in the CCPS Lesson Planning Template Guiding Document for grade specific lexile ranges.*

★ *Every activity does not need an accompanying formative assessment.*