# STEM Activity- Weathering and Erosion

**Elements:** embedded in lesson
**Daily Learning Targets:** weathering and erosion
**Daily Academic Vocabulary:** weathering, erosion, deposition, physical weathering, chemical weathering, sediment
**Learning Goal:** I will be able to describe the differences between weathering and erosion
**Essential Questions:** How are weathering and erosion interrelated? How can you slow down the coastal erosion of beaches?
**Challenge-** Design a way to slow down the process of erosion, without damaging the coastal ecosystem, after twenty set of wave activity.

**Scale-**
4- I will be able to compare and contrast models of movement of rock by gravity, wind and/or ice.
3- I will be able to describe the basic differences between physical weathering and erosion.
2- I will be able to identify some of the basic differences between physical weathering and erosion.
1- I will be able to define what physical weathering is and what erosion is.

**Materials -** sand, fabric strips, 8" X 1" strips, wire mesh strips, 8" X 1" strips, paper towels, clay, paint mixing sticks/rulers, newspaper, large plastic pans/trays, gauze, cotton balls

Teacher will introduce learning goal.

**We Do:** Review weathering and erosion **(Reviewing Content).** Ask the students what each means. Read a book on each or watch the video (please check videos before showing to your students; things can change or some videos may be deemed appropriate for some classes and not others) – https://www.youtube.com/watch?v=R-Iak3Wvh9c
or https://www.youtube.com/watch?v=exS9gFXgib0

Start with the PowerPoint or Smart Notebook. Students are going to look at the pictures of Jump Off Joe (Slides 2-7).
Ask students (Slides 8-9):
- What has happened in these photographs to Jump-Off Joe? Think-Pair-Share
- How are weathering and erosion interrelated?
- How can you slow down the coastal erosion on beaches?

Slide 10- Have students create three-column notes.
Chunk instruction with PowerPoint- Weathering, Erosion, and Deposition.

**Y'all Do**- In groups have students discuss the similarities and differences of weathering, erosion, and deposition. **(Helping Students Examining Similarities and Differences).**

**We Do-** Pose the scenario to students (Slide 11).
Florida is defined by its beaches. They are arguably our most important natural resource. But our beaches are losing more and more sand each year, as a result of inlets and jetties, erosion causing hurricanes, and slowly rising sea levels. The maintenance of beach nourishment, which means to refill sand where it has been eroded, is very expensive and an engineering solution must be developed to prevent further damage.

Slide 12- Ask students what information they need to complete this challenge. (Some examples are listed on the slide).

**I Do:**
Criteria- Explain to students that they must develop their own working erosion blocking process/ product from everyday items that will prevent erosion after 20 sets of wave activity. (Slide 13)
Remind students:
They can't disrupt the ecosystem.
All groups get 3 inches of "beach" and 1/5 inches of water or "ocean."
All waves will be created by the teacher lifting the pan/bin opposite the beach, 1 inch off the table and down twenty times. (Slide 13)
Slide 14- List of the constraints.
1. Everyone must have exactly three inches of "beach" out of the water and no more to start (teacher should do this so all groups start on a level playing field).
2. 1.5 inches of water will be used as the ocean (teacher should do this so all groups start on a level playing field).
3. All waves will be created by the teacher lifting the pan opposite the beach, 1 inch off the table and putting it back down twenty times.

**We Do**: Slide 15- Introduce students to the Group Jobs. Over the job title and role/responsibility. Have groups assign their group roles. (There is a copy of this in the lesson plan so you can print if you want each group or every student to have a copy).

**Y'all Do:** Slide 16- As a class, think of some ways they could stop erosion. Allow students to share out ideas.

**I Do:** Allow students to see the materials now but don't explain about what they are. Now show students the materials and explain what each one is.

**Y'all Do:** Slide 16 (still). Now, do you have any other ideas? Don't share yet!

**I Do:** Now show students the materials and explain what each one is (Slide 17). These are the materials my class used: sand, fabric strips, 8" X 1" strips, wire mesh strips, 8" X 1" strips, paper towels, clay, paint mixing sticks/rulers, newspaper, large plastic pans/trays, gauze, cotton balls
*You can substitute materials when needed.

**You Do:** Imagine (Slide 18)- You will first come up with your idea on your own. Draw it in your journal. Make sure you label what materials you are using. When everyone is done, you will share your ideas with your group **(Engaging Students in Cognitively Complex Tasks Involving Hypothesis Generation and Testing).**

**Y'all Do/We Do**: (Slide 19)- Now that everyone in your group has share, you are going to pick the best idea to implement. Slide 19 - I will sign off on your idea and then give you your materials to get started! I can't sign off on anything unless everyone has the same drawing and materials labeled.

Slide 20- Remember- You can only shop one time for materials so make you have everything you will need. *At this point, you can add math into your lesson by having students pay for the materials. This is completely optional.
Slide 21- When everyone is finished, we will perform the test. You will record the data in your journal.

Slide 22- Reflect- Now that you have completed the test, how did you do? What could you have done better?

Now you get the chance to redesign, shop, and build again. Your goal is to improve your data **(Revising Knowledge).**
- Students will follow the same process as above. They will create a new design or an addition to their previous design independently. They will then share as a group and pick the best one. All students will draw and label the new design. The teacher will sign off and they will begin building. Remember, students can only shop one time for materials (just like before).

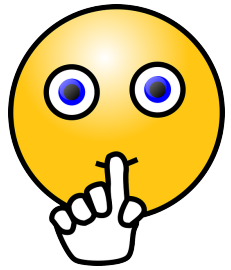
Before allowing them to begin, go over slide 23.
Slide 23- Re-design:
1. You can re-design your product to make it better and that this represented only your first trial. In engineering, a first trial is like a first draft in writing is can be adapted to meet the needs of your client.
2. Think about what you would improve before you start drawing. Why were some designs more successful than others? You will have 10-15 minutes to decide on a re-design.
3. You can get new materials for this re-design and use your previous materials. However, you can only shop one time.

**We Do:** Slide 24- Now that everyone is finished, let's test! Record the findings in your journal.

**You Do:** Slide 25- Final Reflection-

1. After your re-design, did your group improve their data?
2. What would you change about your final design to be more successful? If nothing, why do you think your design was successful?
3. Why did some groups do better than other groups?
4. Are there any materials you wish you had that you didn't?

# Group Jobs

| Project Director | Technical Manager | Materials Manager | Safety Director | Quiet Captain |
|---|---|---|---|---|
| The project director is responsible for the group.<br>  | The technical manager is in charge of recording all data.<br>  | The material manager is responsible for obtaining all necessary materials and/or equipment for the lab.<br>  | The safety director is responsible for enforcing all safety rules and conducting lab.<br>  | The quiet captain keeps the team quiet when the teacher needs your attention.<br>  |
| Roles/responsibilities:<br>• Reads directions to the group<br>• Keeps group on-task<br>• The only group member allowed to talk to the teacher<br>• Shares summary of group work/results with the class | Roles/responsibilities:<br>• Records data in tables and/or graphs<br>• Makes sure all group members are recording on their own papers<br>• Completes conclusions/final summaries<br>• Assists with conducting lab procedures<br>• Assists with clean-up | Roles/responsibilities:<br>• The only person allowed out of seat to pick up needed material<br>• Organizes materials and/or equipment in the work space<br>• Facilitates use of materials during investigation<br>• Assists with conducting Lab procedures<br>• Returns all materials | Roles/responsibilities:<br>• Conducts lab procedures<br>• Reports **any** accident to the teacher<br>• Keeps track of time<br>• Assists materials manager as needed<br>• Assists with clean-up | Roles/responsibilities:<br>• Tells the group to lower their voices when necessary<br>• Ensures all group members are participating quietly<br>• Assists with clean-up |

Here are some pictures of what my class came up with...
You can see more on my blog!
http://anchoringdowninsecondgrade.blogspot.com/2016/01/stem-day-weathering-and-erosion-4th.html