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Governors State UNIVERSITY

Unit Title:
Weathering and Erosion
Grade Span: 4th grade
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Manteno, Illinois

Aligned Standards:

NGSS

- 4-ESS1-1 - Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.
  [Clarification Statement: Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells,
  indicating a change from land to water over time; and, a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut
  through the rock.] [Assessment Boundary: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.]
- 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.
  [Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative
  rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [Assessment Boundary: Assessment is limited to a single form of weathering or erosion.]
- 4-ESS2-2 - Analyze and interpret data from maps to describe patterns of Earth's features.
- 3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- 3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

CCSS ELA

- RI.4.1 - Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
  RI.4.4 - Determine the meaning of general academic and domain- specific words or phrases in a text relevant to a grade 4 topic or subject area.
  RI.4.10 - By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4-5 text complexity band proficiently, with scaffolding as needed at the high end of the range.
  W.4.2 (a-e) - Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
  W.4.4-Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.
  L.4.1d.-Order adjectives within sentences according to conventional patterns
- SL.4.1 - Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.
  SL.4.3- Identify the reasons and evidence a speaker provides to support particular points.
- SL.4.6- Differentiate between contexts that call for formal English (e.g., presenting ideas) and situations where informal discourse is appropriate (e.g., small-group discussion); use formal English when appropriate to task and situation

CCSS MA

- MP.2- Reason abstractly and quantitatively.
- MP.4- Model with Mathematics
- 4.MD.A.1- Know relative sizes of measurement units within one system of units.
- 4.MD.A.2- Use the four operations to solve word problems.

IL-SS

- SS.IS.2.3-5: Create supporting questions to help answer essential questions in an inquiry.
- SS.G.1.4: Construct and interpret maps of Illinois and the United States using various media.
- SS.H.2.4: Using artifacts and primary sources, investigate how individuals contributed to and the founding and development of Illinois.

Enduring Understandings	**Essential Questions**
• Earth's fossil layers can be used to order events that have occurred throughout Earth's history.(4-ESS1-1) • Earth's physical features occur in patterns, as do earthquakes and volcanoes. Maps can be used to locate features and determine patterns in those events. (4-ESS2-2) • Erosion affects the physical characteristics of the Earth.(4-ESS2-1) • A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions).(4-ESS3-2)	How does weathering affect the earth over time?(4-ESS1-1) How can we use the information in rocks formations to understand the past and predict the future of the earth?(4-ESS2-2) How are Earth's landforms broken down? What is the impact of weathering? How long does it take to change the shape of the lands on Earth? How can we design an object to solve a problem? How can we protect our Earth? How can we slow down the effects of weathering?

Transfer Goals

(Will be some or all of the skills listed below, plus any additional ones the groups feels important.)

Asking questions (for science) and defining problems (for engineering)
Developing and using models
Planning and carrying out investigations
Analyzing and interpreting data
Using mathematics and computational thinking
Constructing explanations (for science) and designing solutions (for engineering)
Engaging in argument from evidence
Obtaining, evaluating, and communicating information

Common Misconceptions Within Unit

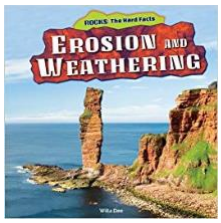
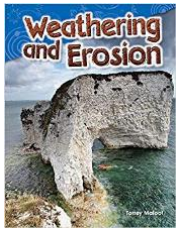
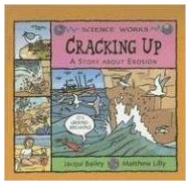
- Students will need to understand that erosion can happen very slowly or quickly when completing experiments and slideshows
  - Time might be an issue for the outside slideshow activity
- Students need to stay within groups when doing experiments and must follow them closely without messing around
- When working within peer to peer try the Borrowing Table method. Students get a partner and share then need to take information from the partner and go to another student and add onto their explanation. This will help build and build onto the explanations and students will understand at a student level.
  - Outside disturbances
  - Sentence starters will help
- Put up a cross cutting poster in room and ask students to point out which standard the lesson talks about.
  - Need devices to record and type on
  - Videos will not play if internet is unavailable
  - Rubrics might need to be more NGSS for your district
  - Will need a membership to BrainPop
- Weathering and Erosion are often used interchangeably.
- Weathering BREAKS rock; Erosion TAKES rock away;
- Only catastrophic events, such as volcanoes, earthquakes, and tsunamis change Earth.

Learning Objectives

*Students will be able to… OR I can…

- I can understand that weather and erosion impact the land.
- I can make observations and measurements to prove the effects of weathering or the rate of evolution by erosion, weathering, glacier, sediment, and acid rain.
- I can analyze and interpret data from maps and graphs to describe patterns of Earth's features.
- I can model to demonstrate landform changes.
- I can model to design a solution to a problem.
- I can find evidence in text and videos to support a claim.
- I can write my thinking about science investigations and concepts in as a 4th grader.
- Students can plan and conduct investigations.

Evidence of Learning

Example Performance Tasks	**Example Evidence**
• Students will complete exit slips, Google slide show presentations, posters, and models throughout the unit that continue to monitor students' building knowledge of essential understandings. • Students will record growing understanding of the unit's concepts in their science journals and on a class KWL chart. These recordings will include both visual and written work on observations and thoughts.	Students will be learning through analysis of photos, videos, diagrams, graphic organizers, hands on experiments, and maps. Students will be able to research questions about weathering, erosion, deposition and conclude with cause and effects. Students will be able to model structures of erosion and weathering and how they can withstand further breakdowns. Students can complete research using a Google Doc, Google Slide presentation, writing a creative story, poster, flipbook, writing a poem, and hands on demonstrations. etc. (4-ESS2-1, 4-ESS2-2)
Library of Congress: Primary Sources	**Materials/Supplies/Resources**
 • Puck's Political Weather Forecast • A Winter Day in Apsaroke  • A Stretch of the Colorado River	***All books are linked***   

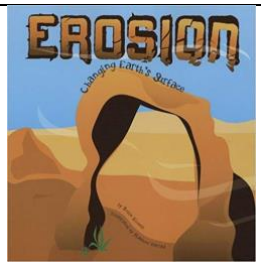
- **Weathered Structure**

Erosion On Land

- San Simon Wash

- Erosion on Farmland

- Eroded Land

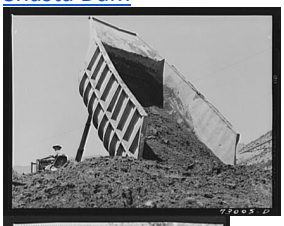


- 4 cut water bottles, plastic tray, rocks, gravel, soil, plants
- **Weathering Video**
- **Quizlet on Weathering and Erosion Vocabulary**
- Brain Pop video on Weathering

- A Guide to WebRangers Activities for Educators
- National Park Teachers Ning Site
- National Park Service @Education Twitter Feed
- LearnNPS
- National Park Photos and Multimedia
- Views of the National Parks
- Bill Nye- Erosion Video
- Weathering, Erosion, Deposition Slideshow notes
- Book Creator
- Newsela article- (can adapt for student's lexile level) What Causes Landslides and Mudslides?
- How Does Erosion Happen?
- BrainPop Video on Erosion
- NPS
- The Science Penguin
-
- Primary Source Analysis Tool: http://www.loc.gov/teachers/usingprimarysources/resources/Primary_Source_Analysis_Tool.pdf
- KWL chart like the one found here: https://sarahsanderson79.weebly.com/k-w-l-strategy-chart.html
- Primary Source Analysis Tool: Teacher's Guide for Analyzing Photographs & Prints: http://www.loc.gov/teachers/usingprimarysources/resources/Analyzing_Photographs_and_Prints.pdf
- IRubic
- Laura Candler
- bottle of water, 3 foil trays, sand, water, measuring cup, 1 bag of rocks, 5 popsicle sticks, and a cup of dirt, and a straw.
- 5 sugar cubes, a plastic container with a lid, pebbles, and a bottle of water.

- **Teacher background materials.**
  - About Next Generation Science Standards (NGSS): http://ngss.nsta.org/About.aspx
  - Understanding Three-Dimensional Learning of NGSS: http://www.nextgenscience.org/three-dimensions
  - Access the NGSS by Topic: http://ngss.nsta.org/AccessStandardsByTopic.aspx
  - Classroom resources for NGSS 3-Dimensional Instruction: http://ngss.nsta.org/Classroom-Resources.aspx
  - Professional Learning on NGSS standards: http://ngss.nsta.org/Professional-Learning.aspx

- Shasta Dam



- Steam Shovel and Dump

- Winter supply of coal

- Sand dunes in Southern California

- Hell's Half Acre

Scenery at Colorado National Monument

- Prince William Sound, Alaska
- Sand dunes in Southern California

- Soil blow by “dust bowl” winds piled up in large drifts near Liberal, Kansas

Lesson Plan: Introduction to Weathering	Lesson Length: 6 days; 40 minutes per day
Grade Level: 4th grade	Related Unit: Weather and Climate
Enduring Understandings	Essential Questions

• Erosion affects the physical characteristics of the Earth.(4-ESS2-1)	▯ How does weathering affect the earth over time?(4-ESS1-1) ▯ How can we prevent or slow down weathering?

Transfer Goals

- Asking questions (for science) and defining problems (for engineering)
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations (for science) and designing solutions (for engineering)
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

Learning Objectives

- I can explain the process of weathering.
- I can make observations and measurements to prove the effects of weathering or the rate of evolution by erosion, weathering, glacier, sediment, and acid rain.
- I can describe the difference of chemical and physical weathering.
- I can model to demonstrate landform changes.
- I can model to design a solution to a problem.
- I can find evidence in text and videos to support a claim.
- I can write my thinking about science investigations and concepts in as a 4th grader.

Library of Congress: Primary Sources	**Materials/Supplies/Resources**
•  **Puck's Political Weather Forecast** • **A Winter Day in Apsaroke** 	• **Weathering Video** • **Quizlet on Weathering and Erosion Vocabulary** • Brain Pop video on Weathering • Primary Source Analysis Tool: http://www.loc.gov/teachers/usingprimarysources/resources/Primary_Source_Analysis_Tool.pdf • KWL chart like the one found here: https://sarahsanderson79.weebly.com/k-w-l-strategy-chart.html • Primary Source Analysis Tool: Teacher's Guide for Analyzing Photographs & Prints: http://www.loc.gov/teachers/usingprimarysources/resources/Analyzing_Photographs_and_Prints.pdf

- **A Stretch of the Colorado River**

- **Weathered Structure**

Lesson Plan

Engage: How can I get students interested in this?

Day 1:

- Students will look at the 4 primary source photographs and fill out the analysis tool. Students will gather information and brainstorm what they know is occuring in the photographs. What do they see? What do they know by looking at the photos? What do they wonder?
- Discuss as a class

Explore: What tasks/questions can I offer to help students puzzle through this?

Day 2:

- Students will fill out a pre-assessment chart in their science notebooks on what they know about weathering, erosion, glaciers, sediments, acid rain, and deposition. (see handout titled Pre-assessment)
- Students will watch the Brain Pop video on Weathering. As they watch they will fill out the movie note sheet. Finally students will draw an example of how tree roots can cause weathering.

Day 3:

- Students will start by watching the video on Weathering. When completed have students write a summary on what they have learned about weathering.
- Students will create a poster showing weathering. Students need to keep in mind what weathering is: The process in which rocks are slowly broken down into smaller pieces over time. - Chemical: Chemicals break down and change minerals in rocks - Physical: Ice, wind, water & temperature break down rocks into smaller bits. (See attached rubric called Weathering Poster)

Day 4:

- Teacher will take the class outside with their chromebooks to look at things around the park, school, and neighborhood that show weathering- Chemical and Physical.
- Teacher will put the students with a partner and they will take pictures of things around the area that show weathering. Teacher can even ask the towns Parks Leader to come and talk about what he/she does to help or stop weathering in our community parks.

Day 5:

- Students will continue to work on their slideshows with partners.

Day 6:

- Students will present the slideshows to the class. See rubric titled Weathering Slideshow.
- Students also have a peer to peer exit slip to fill out about this lesson.

Explain: How can I help students make sense of their observations?

- Have the students reflect upon their experiences and the Primary Source(s).
- Have the students write down questions they wondered about and want more information on.
- Teacher will help students go over their slideshow presentations to discuss the why and how those pictures they took are examples of weathering. Students can reflect in their science journals.

Extend/Elaborate: How can my students apply their new knowledge to other situations?

- Students can create a poem on weathering.
- Weathering and Erosion game from NE Geology Kids
- Students can create a flipbook showing example photographs of weathering- chemical and physical.

Evaluate: How can I help my students self-evaluate and reflect on the learning?

- Using their knowledge from the lesson students can create a video from their slideshows describing the photographs they took around the park, school, and neighborhood and how they are examples of weathering.
- Students can present this to their parents as well as other classes in 4th grade.
- Go over pre-assessment chart to see what the students have learned.

Lesson Plan: Introduction to Erosion	**Lesson Length: 6-7days; 40 minutes per day**
Grade Level: 4th grade	**Related Unit: Weather and Climate**
Enduring Understandings	**Essential Questions**
• Erosion affects the physical characteristics of the Earth.(4-ESS2-1) • Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2)	• How are Earth's landforms broken down? • How long does it take to change the shape of the lands on Earth? • How can we design an object to solve a problem? • How can we protect our Earth?

Transfer Goals

- Asking questions (for science) and defining problems (for engineering)
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations (for science) and designing solutions (for engineering)
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

Learning Objectives

- I can explain the process of erosion.
- I can make observations and measurements to prove the effects of weathering or the rate of evolution by erosion, weathering, glacier, sediment, and deposition.
- I can model to demonstrate landform changes.
- I can model to design a solution to a problem.
- I can find evidence in text and videos to support a claim.
- I can write my thinking about science investigations and concepts in as a 4th grader.

Library of Congress: Primary Sources	**Materials/Supplies/Resources**
• Erosion On Land  • San Simon Wash  • Erosion on Farmland  • Eroded Land 	• Newsela article- (can adapt for student's lexile level) What Causes Landslides and Mudslides? • 4 cut water bottles, plastic tray, rocks, gravel, soil, plants • Newsela article- How Does Erosion Happen? • BrainPop Video on Erosion • NPS • A Guide to WebRangers Activities for Educators • National Park Teachers Ning Site • National Park Service @Education Twitter Feed • LearnNPS • National Park Photos and Multimedia • Views of the National Parks • The Science Penguin • Primary Source Analysis Tool: http://www.loc.gov/teachers/usingprimarysources/resources/Primary_Source_Analysis_Tool.pdf • KWL chart like the one found here: https://sarahsanderson79.weebly.com/k-w-l-strategy-chart.html • Primary Source Analysis Tool: Teacher's Guide for Analyzing Photographs & Prints: http://www.loc.gov/teachers/usingprimarysources/resources/Analyzing_Photographs_and_Prints.pdf

Lesson Plan

Engage: How can I get students interested in this?

Day 1:

- Have the 4 primary sources from the Library of Congress around the classroom so the students and their partners can go on a gallery walk. Poster size the primary sources in color so the students can see the details clearly.
- Once students have the analysis tool filled out go over it with the class. How are these pictures different from the previous lesson on weathering? How are they similar?
- Ask the students to look up pictures on erosion and create a picture Prezi.

Explore: What tasks/questions can I offer to help students puzzle through this?

Day 2:

- Show the Prezi's to the class so we have a great understanding of what erosion looks like.
- Watch the video **BrainPop Video on Erosion**. As the students are watching the video they will complete an Erosion Worksheet. (See attachment called Video worksheet Erosion.) BrainPop has a game at the end of the video. Complete this with the class.
- Complete a Sum it up in their science journals! What is the difference between weathering and erosion? Write answer in complete sentences.

Day 3:

- Students will read Newsela article- (can adapt for student's lexile level) What Causes Landslides and Mudslides? and Newsela article- How Does Erosion Happen?
- As students are reading the articles they will fill out the online questions. Teacher will be able to look at their scores for an assessment grade.

Day 4:

- Students will go to NPS and watch the video, play the game, and fill out the worksheet about erosion around the park.
- Students will create a Cause and Effect worksheet for erosion using a breakdown of the erosion agents and how they affect Earth's surface/landforms.
- Students will be given different landforms and asked to identify if the landforms were created by wind or water erosion.

Day 5:

- Students will create an erosion experiment that looks something like this:

- Put students in groups of 4 and give each student 4 cut water bottles. Have students fill them evenly with soil. Put plants in 1, large rocks in one, gravel in the next, and only soil in the last one.
  Give each student a try to set their bottles on and an empty bowl. Ask students to predict which landscape allows sediment to erode most easily? Have students record in their science journals.
  Draw a picture in the science journals of what the bottles with dirt, etc look like before the water is added.
  Next have the students in groups 1-2 complete the experiment by pouring 100ml of water into each bottle and observe the effects. Have the students in groups 3-4 shower affect the water on the bottles and groups 5-6 pick any method of pouring the water on the bottles. Will the eroding change by how the water is poured in?
  Finish emptying out the excess water that runs off into the bowls and set them out to allow the water to evaporate overnight.

Day 6:

- The next day draw what your groups bottles look like and draw what is left in the bowls. Then weigh the amount of dirt or sediment left. Write your findings in science journals.

- Report to the group what your groups finding are and the pictures of the experiment. Do they look different? Why?

Explain: How can I help students make sense of their observations?

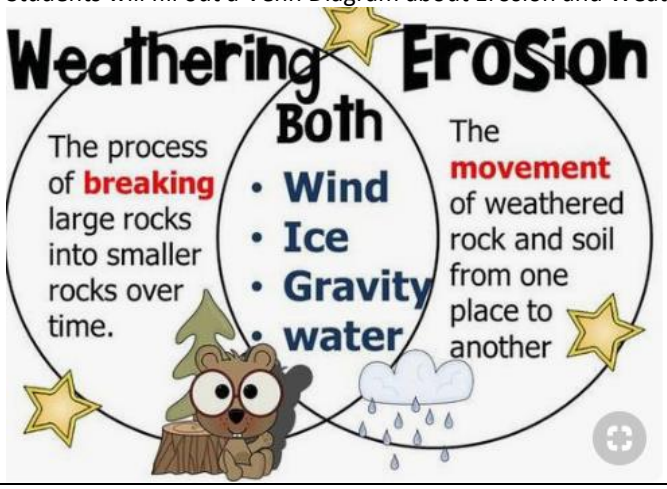
- Have the students reflect upon their experiences and the Primary Source(s).
- Have the students write down questions they wondered about and want more information on.
- Have students make a bar graph showing the date. Then write a conclusion on what occurred.

Extend/Elaborate: How can my students apply their new knowledge to other situations?

- Research- Where in the world do we have erosion issues? How can we help solve these issues? Write an essay to persuade the president to help fix this issue.
- Watch the Bill Nye Erosion Video and write a reflection.

Evaluate: How can I help my students self-evaluate and reflect on the learning?

- Students will fill out a Venn Diagram about Erosion and Weathering. Example:



- Students can match cards on Weathering and Erosion like these:

Lesson Plan: Introduction to Deposition	**Lesson Length: 4 days; 40 minutes per day**
Grade Level: 4th grade	**Related Unit: Weather and Climate**
Enduring Understandings	**Essential Questions**
• Erosion affects the physical characteristics of the Earth.(4-ESS2-1)	How does weathering affect the Earth over time?(4-ESS1-1) When Earth's landforms broken down where do they go? How long does it take to change the shape of the lands on Earth? How can we design an object to solve a problem? How can we protect our Earth?

Transfer Goals

- Asking questions (for science) and defining problems (for engineering)
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations (for science) and designing solutions (for engineering)
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

Learning Objectives

- I can explain the process of deposition.
- I can model to demonstrate landform changes.
- I can model to design a solution to a problem.
- I can find evidence in text and videos to support a claim.
- I can write my thinking about science investigations and concepts in as a 4th grader.

Library of Congress: Primary Sources	**Materials/Supplies/Resources**
Shasta Dam	• Weathering and Deposition • Primary Source Analysis Tool: http://www.loc.gov/teachers/usingprimarysources/resources/Primary_Source_Analysis_Tool.pdf • KWL chart like the one found here: https://sarahsanderson79.weebly.com/k-w-l-strategy-chart.html • Primary Source Analysis Tool: Teacher's Guide for Analyzing Photographs & Prints: http://www.loc.gov/teachers/usingprimarysources/resources/Analyzing_Photographs_and_Prints.pdf

Steam Shovel and Dump

Winter supply of coal

Lesson Plan

Engage: How can I get students interested in this?

Day 1:

- Students will look at the 3 primary source photographs and fill out the analysis tool. Students will gather information and brainstorm what they know is occuring in the photographs. What do they see? What do they know by looking at the photos? What do they wonder?
- Discuss as a class how this relates to deposition.

Explore: What tasks/questions can I offer to help students puzzle through this?

Day 2:

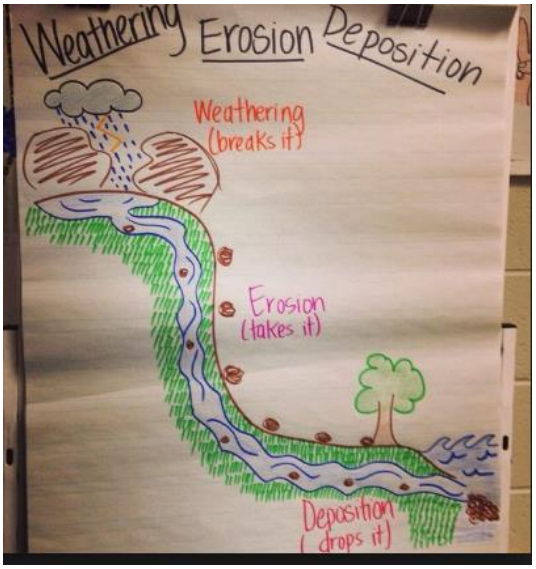
- Take notes over Deposition in the students science notebooks.
- Deposition is the dropping of new sediment in a new place. Example is a formation of a sand dune.
- Have students brainstorm with a partner what are some effects of deposition in our world.
- Students will create a poster showing 3 examples of deposition. Draw and label on poster correctly. Be able to explain how we can stop this from occurring.

Day 3:

- Present the posters to class.
- Students will watch the video Weathering and Deposition
- Students can complete a journal entry discussing what they learned from the video.

Explain: How can I help students make sense of their observations?

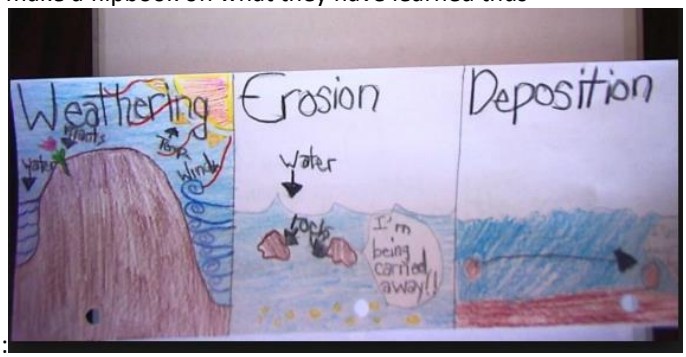
- Have the students reflect upon their experiences and the Primary Source(s).
- Have the students write down questions they wondered about and want more information on.
- Students will draw a picture to model deposition. Example:



- Students will then come up with a creative story using at least 5 counts of dialogue throughout their story.

Extend/Elaborate: How can my students apply their new knowledge to other situations?

- Students can create an acrostic poem on Deposition.
- Students can make a flipbook on what they have learned thus far. Example:



Evaluate: How can I help my students self-evaluate and reflect on the learning?

- Teacher will assess the flipbook for understanding of weathering, erosion, and deposition.
- Teacher will also use the creative story about weathering affects as an assessment grade.

Lesson Plan: Weathering and Erosion	**Lesson Length: 7 days; 40 minutes per day; with 4-5 day extension activity**
Grade Level: 4th grade	**Related Unit: Weather and Climate (ESS1-1) (ESS2-1)**
Enduring Understandings	**Essential Questions**
• Erosion affects the physical characteristics of the Earth.(4-ESS2-1) • A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions).(4-ESS3-2)	• How does weathering affect the earth over time?(4-ESS1-1) • How are Earth's landforms broken down? • How long does it take to change the shape of the lands on Earth? • How can we design an object to solve a problem? • How can we protect our Earth?
Transfer Goals	

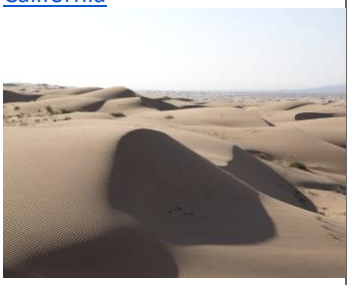
- Asking questions (for science) and defining problems (for engineering)
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations (for science) and designing solutions (for engineering)
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

Learning Objectives

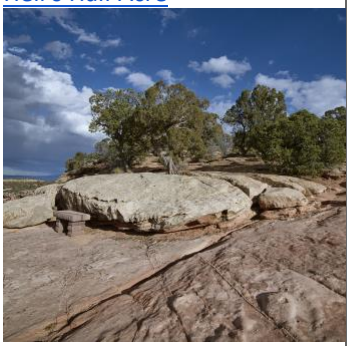
- I can make observations and measurements to prove the effects of weathering or the rate of evolution by erosion, weathering, glacier, sediment, and acid rain.
- I can analyze and interpret data from maps and graphs to describe patterns of Earth's features.
- I can model to demonstrate landform changes.
- I can model to design a solution to a problem.
- I can find evidence in text and videos to support a claim.
- I can write my thinking about science investigations and concepts in as a 4th grader.

Library of Congress: Primary Sources

- Sand dunes in Southern California



- Hell's Half Acre



- Scenery at Colorado National Monument

Materials/Supplies/Resources

- IRubric.com
- Primary Source Analysis Tool: http://www.loc.gov/teachers/usingprimarysources/resources/Primary_Source_Analysis_Tool.pdf
- KWL chart like the one found here: https://sarahsanderson79.weebly.com/k-w-l-strategy-chart.html
- Primary Source Analysis Tool: Teacher's Guide for Analyzing Photographs & Prints: http://www.loc.gov/teachers/usingprimarysources/resources/Analyzing_Photographs_and_Prints.pdf
- Weathering, Erosion, Deposition Slideshow notes
- Laura Candler
- bottle of water, 3 foil trays, sand, water, measuring cup, 1 bag of rocks, 5 popsicle sticks, and a cup of dirt, and a straw.

- Prince William Sound, Alaska

Lesson Plan

Engage: How can I get students interested in this?

Day 1:

- Each student will get a copy of the 4 primary sources above. Students will complete a turn and talk discussing what they know and want to know about each primary source. Students take turn talking making sure only one person speaks at a time, every person contributes, eyes are on the speaker, comments and suggestion are presented respectfully.
- As the students are doing the turn and talk the teacher will circulate the room to check for understanding.

Explore: What tasks/questions can I offer to help students puzzle through this?

Day 2:

- Teacher will engage critical thinking as students understand the impact of weather and erosion on landforms.
- Teacher will ask the class: What are landforms? What problems does weather sometimes cause the landforms of the Earth?
- Students will respond and discuss as a class.
- Teacher will go through this detailed slideshow of notes Weathering, Erosion, Deposition Slideshow notes asking the students questions.

Day 3:

- The teacher will ask the students to make a diagram in their science notebooks with 3 boxes. One labeled Weathering, one erosion, and one deposition.
- As the teacher reads some statements about each topic the students will mark which box it should go in.
- For example, Is the movement of weathered materials. This one goes in erosion. Occurs when gravity's downward pull on sediment is greater. This is an example of deposition.
- To make sure the students have mastered the 3 types give them a sorting activity to play with a friend. I have scanned it in. It is a free resource from Laura Candler. It is called Sorting Activity.

Day 4-5

- Put the students into groups of 4 and assign roles. Example roles could include: Manager who reviews directions, Material Manager who is the only student out of her seat getting materials, Reporter who make sure everyone is writing down finding and discussing, and Technician who keeps time of activities so there's no one messing around.
- Have the groups each get their materials: bottle of water, 3 foil trays, sand, water, measuring cup, 1 bag of rocks, 5 popsicle sticks, and a cup of dirt, and a straw.
- Ask students to create a model of a hill by using sand then carefully blow towards the hill. Observe and reflect in journals. Pour ¼ cup of a cup of water over it. Observe and write down what occurs. Ask the students to create a larger hill using sand and dirt in a new foil tray. First blow using the straw, then pour ¼ cup of water over the hill and observe and reflect in their journals.
- Ask students to use the wet sand and dirt and make a hill in one of the used pans use the straw to blow write in their journals. Then pour ¼ cup of water over the top. Observe and reflect in their journals.
- What was the same in all experiments? What was different? How can we slow down erosion?
- Have the students make a plan in their journals of how they can use the other materials to stop the erosion. Have students get their model approved by the teacher before they create it in the final tray.
- Students will make the hands on experiment, then perform the blowing test and the water test while recording it on their chromebook. After students have reflected each group will come to the front of the room and show us their models. We will watch their videos. They will explain why their model is the best for preventing erosion.

- For fun, at the end of class we will vote on the best presentation.

Explain: How can I help students make sense of their observations?

- Have the students reflect upon their experiences and the Primary Source(s).
- The teacher will provide feedback to the students after the KWL is completed during class discussion.
- Students often have difficulty believing that rocks and major landforms can change or be worn down through the process of weathering because they are so massive. Make sure they understand the difference between weathering (the physical or chemical breakdown or rock) with erosion (the process of transporting sediments).

Extend/Elaborate: How can my students apply their new knowledge to other situations?

- Weathering and Erosion game from NE Geology Kids

This next activity might take 4-5 days to complete:

- Weathering challenge writing activity: The President of the United States is very concerned about the beach erosion along the coast. Many people visit these tourist attractions each year enjoying the beaches and every year, more and more beaches are eroding away. It is up to you to think of a plan to slow down the erosion of the beaches around our coast.
- Students will need to build a model of their plans using toothpicks, popsicle sticks, gravel, straws, and trees.. You only have $30,000 to spend on your plan. Look at the material list and develop a plan of what you will use. Plan your attack, get it approved by your teacher, then start building.
- Materials: Small wood stabilizing beams are toothpicks for $2,000 each, large wood stabilizing beams are popsicle sticks at $8,000 each, large rocks are gravel $1,000 for a Tablespoon, Trees at $2,000 each, and flexible fencing is straws at $4,000 for a set of 4.
- After students are finished creating, test the structure using water and wind.
- Reflect in their journals.

Example HOT Questions:
How would the world be different if weathering and erosion did not occur?
How are erosion and depositions related?
How do water erosion and deposition change earth's surface?

Evaluate: How can I help my students self-evaluate and reflect on the learning?

- Have students answer this question: Can you think of some advantages of weathering and erosion?
- Assess the students video and presentation.
- Assess the students beach activity by grading their project as well as their journal reflections.
- Students will reflect on their model writing in their journals. Was their plan successful? How do you know? What were the similarities between the first and second beach built? What worked well in your plan? What would you do differently?

Lesson Plan: Weathering and Erosion- Changing Land	**Lesson Length: 5-6 days; 40 minutes per day**
Grade Level: 4th grade	**Related Unit: Weather and Climate (ESS1-1) (ESS2-1)**
Enduring Understandings	**Essential Questions**

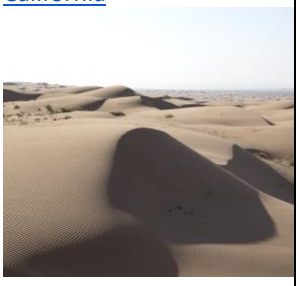
• Erosion affects the physical characteristics of the Earth.(4-ESS2-1) • A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions).(4-ESS3-2)	• How does weathering affect the earth over time?(4-ESS1-1) • How are Earth's landforms broken down? • How long does it take to change the shape of the lands on Earth? • How can we design an object to solve a problem? • How can we protect our Earth?

Transfer Goals

- Asking questions (for science) and defining problems (for engineering)
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data
- Using mathematics and computational thinking
- Constructing explanations (for science) and designing solutions (for engineering)
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

Learning Objectives

- I can make observations and measurements to prove the effects of weathering or the rate of evolution by erosion and weathering.
- I can model to demonstrate landform changes.
- I can model to design a solution to a problem.
- I can find evidence in text and videos to support a claim.
- I can write my thinking about science investigations and concepts in as a 4th grader.

Library of Congress: Primary Sources	**Materials/Supplies/Resources**
• Sand dunes in Southern California  • Soil blow by "dust bowl" winds piled up in large drifts near Liberal, Kansas 	• Primary Source Analysis Tool: http://www.loc.gov/teachers/usingprimarysources/resources/Primary_Source_Analysis_Tool.pdf • KWL chart like the one found here: https://sarahsanderson79.weebly.com/k-w-l-strategy-chart.html • Primary Source Analysis Tool: Teacher's Guide for Analyzing Photographs & Prints: http://www.loc.gov/teachers/usingprimarysources/resources/Analyzing_Photographs_and_Prints.pdf • 5 sugar cubes, a plastic container with a lid, pebbles, and a bottle of water. • Book Creator

Lesson Plan

Engage: How can I get students interested in this?

Day 1:

- The teacher will project the LOC images and ask students to complete the primary source analysis tool.
- As a class the teacher will discuss the students findings.
- The teacher will explain that this is our last week on weathering and erosion and they need to use their background knowledge to finish the last discovery activity.

Explore: What tasks/questions can I offer to help students puzzle through this?

Day 2:

- Students will get a partner to complete an experiment on how rocks slowly break down through collisions. Example: in streams, rivers, or large bodies of water.
- Students will get 5 sugar cubes, a plastic container with a lid, pebbles, and a bottle of water.
- Students will take the empty container and fill it ¾ the way full with the rocks.
- They will take the 4 cubes of sugar and put them in the rocks, put the lid on and shake, shake, shake, shake, shake.
- Open the lid and find the sugar (if you can). What happened to the sugar cubes? Have the students turn and talk then reflect in their science journals.
- Next take the container and put ½ cup of water in the bottom. Place the last sugar cube in the container, put the lid on and shake, shake, shake, shake, shake.
- Open the lid and observe. Reflect in journals.
- Discuss with the class how the rocks in a body of water move around, bumping into one another which causes them to break down. When water is added the softer rocks weather differently.

Day 3-4

- Give students a comic strip so they can come up with a weathering and erosion story. What is the difference between weathering and erosion. (Rubric attached called Comic Rubric.)
- Students could also use Book Creator to create this comic.

Explain: How can I help students make sense of their observations?

- Have the students reflect upon their experiences and the Primary Source(s).
- Have the students write down questions they wondered about and want more information on.
- Have the students answer how the experiment they performed similar to the process of rocks weathering in a stream, river, or body of water.

Extend/Elaborate: How can my students apply their new knowledge to other situations?

- Students will be able to relate to the LOC image and what they see in their own environment/lives.
- This unit will lead into our next unit on landforms.
- Students can download Google Earth on their chromebooks and choose a landform like mountains, volcano, canyon, glacier, mesa, etc and locate it on Google Earth. Students will research and record how this landform was created. Students will share their finding with the class and show where it is located using Google Earth and the promethean board.
- Weathering and Erosion game from NE Geology Kids

Evaluate: How can I help my students self-evaluate and reflect on the learning?

- Give students a quiz over weathering and erosion vocabulary.
- Have students take out their Pre-Assessment chart and fill it in as a Post- Assessment to see what the students have mastered.