

CCPS Science Unit Plan

Grade	5th	Subject	Science	Unit #	3
Unit Name	S5E1 Earth and Changes Over Time		Timeline	6 weeks	
How to use the Framework	<p style="color: red;">This Framework should be used to implement daily science instruction. The resources and instructional strategies reflected in the Framework will provide a foundation for effective implementation and student mastery of standards.</p> <p style="color: red;">Please see the hyperlinked abbreviation document to ensure understanding of all abbreviations used with this framework.</p> <p style="color: red;">CCPS Department of Science Website for access to all unit frameworks.</p>				
Unit Overview	<p>By the end of this unit, SW develops an understanding of how constructive & destructive forces shape the surface of the Earth and its features. Students will also understand how technology can be used to limit and predict the impact of constructive and destructive forces.</p> <p>Background: Constructive forces are those that work to build or create new formations. All constructive processes are not good, volcanoes are great examples. They may cause addition to the landform, but cause damage to existing terrain. Destructive forces tear down existing formations. Not all destructive processes are bad. This process can break down land, but weathering and erosion helps the formation of major land structures. Both of these forces affect all materials on the surface of the Earth. This includes rocks, metals, concrete and other related structures that are all impacted by weathering and erosion. SW finds that most changes are due to water, wind and/or ice. And that most of the processes happen over time. Some forces are both constructive and destructive. SW use models to make observations and understand how landforms can be affected by weathering, erosion and deposition by substances like water, wind and ice. SW understand constructive and destructive processes are always occurring everywhere on earth. Although a very important part of the Earth’s changing process, it can be destructive to the environment as well as the human population. This unit will show how technology can help give information about the processes and potential areas of impact.</p> <p>Teacher Behaviors: The teacher's behaviors demonstrated in this unit include:</p> <ul style="list-style-type: none"> ● providing students with opportunities to build and refine models that illustrate how establishing the See-Think-Wonder protocol to record thoughts, observations, and questions. ● guiding students through asking questions (changing “I Wonder” statements into questions.) ● providing students with multiple ways to communicate their knowledge of content (drawings, writing, and/or designing a presentation). ● explaining how to communicate through writing and speaking using the Claim-Evidence-Reasoning protocol ● establishing the protocol for reading and sharing text. <p>Student Behaviors:</p> <p>The students’ behaviors demonstrated in this unit include:</p> <ul style="list-style-type: none"> ● building and refining models that illustrate how Earth’s processes can either be constructive, destructive or both. ● using multiple resources to obtain information on weathering, erosion and deposition play a key role in the changing of Earth’s surfaces over time. ● obtain information on how some of Earth’s features can be changed in a short period of time as compared to how long it may have taken 				

	<p>Providence Canyon to be formed, to the destruction of the top of Mt. St. Helens.</p> <ul style="list-style-type: none"> communicating through writing and speaking using the Claim-Evidence-Reasoning protocol <p>Refer to Teacher Notes for more details.</p>								
<p>Lesson Plan guidance document and template</p>									
<p>Standards</p>	<table border="1"> <thead> <tr> <th data-bbox="296 516 858 578"><u>GSE</u></th> <th data-bbox="858 516 1411 578"><u>Science and Engineering Practices</u></th> <th data-bbox="1411 516 1963 578"><u>Crosscutting Concepts</u></th> </tr> </thead> <tbody> <tr> <td data-bbox="296 578 858 1404"> <p>S5E1 - Obtain, evaluate, and communicate information to identify surface features on the Earth caused by constructive and/or destructive forces.</p> <p>a Construct an argument supporting scientific evidence to identify surface features (examples could include deltas, sand dunes, mountains, volcanoes) as being caused by constructive and/or destructive processes (examples could include deposition, weathering, erosion, and impact of organisms).</p> <p>b. Develop simple interactive models to collect data that illustrate how changes in surface features are/were caused by constructive and/or destructive processes.</p> <p>c. Ask questions to obtain information on how technology is used to limit and/or predict the impact of constructive and destructive processes. (Clarification statement: Examples could include seismological studies, flood forecasting (GIS maps), engineering/construction methods and materials, and infrared/satellite imagery.)</p> </td> <td data-bbox="858 578 1411 1404"> <p>Develop and use models: A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.</p> <p>Ask questions. A practice of science is to ask and refine questions that lead to descriptions and explanations of how the natural and designed world works and which can be empirically tested.</p> </td> <td data-bbox="1411 578 1963 1404"> <p>Structure & Function: The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.</p> <p>Cause & Effect: events have causes and effects on the world around them. The causes and effects of an event can be used to link occurrences together and predict what will occur after an event.</p> <p>System & System Models: This CCC is about examining smaller pieces of the whole to make sense of the larger connections.</p> </td> </tr> </tbody> </table>	<u>GSE</u>	<u>Science and Engineering Practices</u>	<u>Crosscutting Concepts</u>	<p>S5E1 - Obtain, evaluate, and communicate information to identify surface features on the Earth caused by constructive and/or destructive forces.</p> <p>a Construct an argument supporting scientific evidence to identify surface features (examples could include deltas, sand dunes, mountains, volcanoes) as being caused by constructive and/or destructive processes (examples could include deposition, weathering, erosion, and impact of organisms).</p> <p>b. Develop simple interactive models to collect data that illustrate how changes in surface features are/were caused by constructive and/or destructive processes.</p> <p>c. Ask questions to obtain information on how technology is used to limit and/or predict the impact of constructive and destructive processes. (Clarification statement: Examples could include seismological studies, flood forecasting (GIS maps), engineering/construction methods and materials, and infrared/satellite imagery.)</p>	<p>Develop and use models: A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.</p> <p>Ask questions. A practice of science is to ask and refine questions that lead to descriptions and explanations of how the natural and designed world works and which can be empirically tested.</p>	<p>Structure & Function: The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.</p> <p>Cause & Effect: events have causes and effects on the world around them. The causes and effects of an event can be used to link occurrences together and predict what will occur after an event.</p> <p>System & System Models: This CCC is about examining smaller pieces of the whole to make sense of the larger connections.</p>		
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<p>NGSS Alignment</p>	<p>NGSS Alignment to Disciplinary Core Ideas</p>								

The Phenomenon Protocol				
Anchoring Phenomena		Learning Targets		
Phenomenon Card S5E1a		Students will construct an argument supported by scientific evidence to identify surface features as being caused by constructive and/or destructive processes.		
Phenomenon Card S5E1b		Students will develop simple interactive models to collect data that illustrate how changes in surface features are/were caused by constructive and/or destructive processes.		
Phenomenon Card S5E1c		Students will ask questions to obtain information on how technology is used to limit and/or predict the impact of constructive and destructive processes.		
Weekly Lesson Tasks				
Week 1				
GSE: S5E1b		Focused Concept: Develop simple interactive models to collect data that illustrate how changes in surface features are/were caused.		
Learning Targets:	The students will develop simple interactive models to collect data that illustrate how changes in surface features are/were caused by constructive and/or destructive processes.			
Lab Safety and Materials	W General Safety Practices for the Elementary Science Classroom- TOC.docx			
Phenomenon: S5E1b.pdf		DQ: How do constructive processes and destructive processes change the shape of the Earth over time?		
Day 1: Opening	Day 2 : Guided Practice/ Transition	Day 3: Independent Practice	Day 4: Independent Practice	Day 5: Assessment / Summary
Phenomenon Introduction Teachers will provide the following image to discuss phenomenon: S5E1b.pdf Ask the student to see, think .	Introduce the Driving Question: Have students review the driving question: <i>How do constructive processes</i>	Graphic Organizer Exposed Tree Roots Upd... Materials Exposed Tree Roots ADI kit (all materials)	Text Annotation Strategy Have students read and annotate the following text: Surface Features The teacher should facilitate the	Claim-Evidence-Reasoning Claim-Evidence-Reasoning Students will write a response to the following driving question in the CER format.

[and wonder](#) while viewing the above image. Have students record their initial ideas on post-it notes. Keep the post it notes on chart paper in an area students can revisit. Allow students to generate questions and answer as they gather new information.

*****Teacher Note:**

Teacher will ask students the following questions:

What do you know about volcanoes?

Would you consider magma/lava destructive, constructive or both

How do you think it could be constructive?

Inquiry Activity 1:

Students will learn that both destructive and constructive can cause surface feature changes. Events like volcanoes, landslides, weathering and erosion, over time changes how a mountain looks, or even how a river flows.

River Erosion GIZMO:

Teachers will share the above link or display it on board, the GIZMO *“River Erosion”*. Teachers will produce on paper or post a link to GIZMO activity

and destructive processes change the shape of the Earth over time?

Use the strategy to support students with making connections and understanding the driving question (DQ).

Visualizing the Driving Question

Click here to access [question words reference chart](#)

The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer.

Be sure to create a reference for students to have throughout the week.

****Teacher Note:** Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)

Pipe cleaners 1 package
Sand As needed
Equipment Tray
1cm grid transparency
Ruler
Plastic bottle with screw cap (holes punched in cap)
Measuring cups

Investigation Facilitation Exposed Tree Roots

Objective: Students will observe and analyze examples of weathering, erosion, and deposition, understanding how these processes alter environments. They will connect these processes to specific surface features, enhancing their comprehension of each process's function and purpose in accordance with the relevant standard.

Have students complete **The Phenomenon** Task: The teacher will provide students the following images (link images here) to determine the changes that have occurred in an environment and how that environment has changed.

The teacher should ask the questions: *What do you already know about the parts of a plant? Where do we normally see the roots of trees? What could have caused the tree roots to be above the ground? What evidence is available in the*

following process. Have the students follow the text protocol facilitation directions provided in the following strategy:

■ 3-5 Text Annotation Prot...

Students should complete the following student handout as they work through the text annotation protocol:

3-5 Information Analysis Student Organizer (editable)

■ 3-5 Information Analysis...

During the teacher-led discussion, the teacher should ask the following questions:

Of the 4 examples/pictures on page 1, which one is the most surprising to you? Why?

Can you give two examples of slow constructive process, and two examples of rapid constructive process?

We know that Earthquakes & Volcanoes are destructive, but how can they be constructive as well?

****TEACHER NOTE:** Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time

How do constructive processes and destructive processes change the shape of the Earth over time?

Review the [claim-evidence-reasoning poster](#) with the students

****TEACHER NOTE:** Provide students with sentence starters by sharing on the board:

■ 3-5 Claim-Evidence-Rea...

Have students write their claim-evidence-reasoning

writing a claim

Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence

Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning

Students will use textual evidence from the “text annotation graphic organizer” to

page "[River Erosion pdf](#)" or "[River Erosion Word Doc](#)". Teachers will instruct students to perform the GIZMO both with high vegetation and low vegetation. Both a mountain and a meandering river. As well as both short-term and long term erosion.

Teacher will ask students the following questions:

How does the flow of the river's weathering and erosion affect the area around it with low vegetation?

How does the flow of the river's weathering and erosion affect the area around it with high vegetation?

Inquiry Activity 2: [Wind Erosion](#)

Students will learn how wind plays a major role in weathering and erosion of surface features: Example... arches, sand dunes, and faces of mountains.
Materials Per group:
Container
Rocks or Gravel
Sand
Straw
Ruler
String
Cup
Goggles (each student & teacher)

Procedure:

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the [claim-evidence-reasoning poster](#) with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

[Use student sample linked here](#)

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

[Claim-Evidence-Reasoning Record Observations Document](#) (google doc)

images?

Following the phenomenon task, review the **Task** with students. Discuss the guiding question: Why can we see the roots of trees that grow near rivers and streams?

Have students engage

****TEACHER NOTE:** The teacher should have pans set up prior to the start of the lab and materials should be gathered.

■ Exposed Tree Roots Set ...

****TEACHER USE ONLY**
View the following videos to observe how to facilitate this task: **NOTE** DO NOT SHOW THIS VIDEO TO STUDENTS.**

The teacher should engage in facilitating this lab.

■ Movement of Water. Tea...

View the following video to see how students have completed the task. **NOTE** A hole should be punched in the bottom of the stream table to allow water to drain so that students can collect data.** This means that there will need to be a way for the water to be collected as it drains. Consider this prior to the lesson.

■ Movement of Water.MOV

used for transitioning.

Vocabulary Strategy

Vocabulary Words:

Mountains
Volcanoes
Landslides

Vocabulary Strategy:

Vocabulary Terms Chart

Provide students with the [graphic organizer \(editable\)](#) or [pdf handout](#), explaining its sections: word, *What did it look like in the investigation?*, meaning, image/drawing, connection

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. The teacher should provide the meaning of the word to the students and ask students to provide examples of how the word was represented during the investigation, phenomenon and/or inquiry activity. In the connection column, students should write how the word connects to concepts or observations they gathered during their classroom tasks. Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures,

generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)
[3-5 Student Writing Template \(editable\)](#)
[3-5 Student Writing Template \(pdf\)](#)

****TEACHER NOTE:** Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to another writer on the topic?
How are your thoughts or understanding different to another writer on the topic?
What would you like to learn more about? Why?

Assessment for Learning: [S5E1A & S5E1b Quiz](#)

<ol style="list-style-type: none"> 1. All don goggles for safety 2. Pour sand into the container/pan into a small hill. 3. Measure the height of the hill and the circumference of the base of the hill. <i>(Sketch/draw picture of the hill)</i> 4. using the straw, blow on the sand for 15 to 30 seconds. (Make sure not to blow sand out of the pan). 5. Measure the height & circumference again using the string. 6. Carefully pour the sand back into the cup. 7. Pour sand back into the pan into a small hill again. 8. Carefully place rocks/gravel on the sand hill. 9. Measure the height and circumference of the hill with gravel on it. <i>(Sketch/draw picture of the hill).</i> 10. Use straw again to blow on the hill for 15 to 30 seconds. Measure and draw pictures of the hill. 11. Analyze your data/sketches using math. <p>Teacher will ask the following questions to be completed on the graphic organizer.</p>	<p>■ Claim-Evidence-Reasoni... (PDF)</p> <p><i>1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.</i></p> <p><i>2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.</i></p> <p><i>3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.</i></p> <p>Ask the following questions to students as they analyze the student samples:</p> <p>■ Claim-Evidence-Reasoni...</p> <p>**Teacher Note: As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.</p>		<p>images, primary sources, charts) to build knowledge of the term.</p> <p>Have students collaborate, in groups, to complete the vocabulary terms chart for the other vocabulary terms.</p> <p>Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.</p>	
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What do you notice about the wind as an agent of erosion?

What role did/do the rocks play in erosion?

Can vegetation play the same role as the rocks? How? Where?

Week 2

GSE: [S5E1b](#)

Focused Concept: Develop simple interactive models to collect data that illustrate how changes in surface features are/were caused.

Learning Target:

The students will develop simple interactive models to collect data that illustrate how changes in surface features are/were caused by constructive and/or destructive processes.

Lab Safety and Materials

[W](#) General Safety Practices for the Elementary Science Classroom- TOC.docx

Phenomenon: [S5E1b](#)

DQ: Can you explain how constructive processes like volcanic eruptions and destructive processes like weathering and erosion work together to change the shape of the Earth over time?

Day 1: Opening

**Day 2 : Guided Practice/
Transition**

Day 3: Independent Practice

Day 4: Independent Practice

Day 5:

Phenomenon Introduction

Teachers will provide the following image to discuss Phenomenon [S5E1b](#)

Inquiry Activity

Slowing The Effects of Rain

Teacher will provide the following **materials**:
Large pan (like aluminum baking pan).
Watering can or cup with holes in the bottom of it.
Grass growing in soil or sand

Introduce the Driving Question:

Have students review the driving question:

Can you explain how constructive processes like volcanic eruptions and destructive processes like weathering and erosion work together to change the shape of the Earth over time?

Use the strategy to support

Graphic Organizer and Materials

[Save the Beach Houses](#)
[Graphic Organizer](#)

Task 1

sand, centimeter grid paper (*print laminate grid paper or printed on transparency paper*), water, building structures, pebbles, graphic organizer

Task 2

Text Annotation Strategy

Have students read and annotate the following text:

[How Water and Wind Sh...](#)

The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy:

[3-5 Text Annotation Prot...](#)

Claim-Evidence-Reasoning

Students will write a response to the following driving question in the CER format.

Can you explain how constructive processes like volcanic eruptions and destructive processes like weathering and erosion work together to change the shape of the Earth over time?

and soil.

Procedure:

1. Put a layer of sand on the bottom of a large pan.
2. A few days prior to investigation, plant some grass seeds on half the pan of soil or find a place where grass is growing on a slope with bare patches.
3. Have students sketch what they see.
4. Use the watering can or cup with holes in the bottom to “rain” on the grass and bare soil.
5. Describe in a second sketch or write a paragraph about what happened.
6. Teacher will ask questions from [graphic organizer](#).
*When did the water flow more quickly?
Was any of the soil washed away?*

How can you prevent soil loss on a bare patch in your home yard or school yard?

How does this activity help you understand the impact of vegetation on a hillside?

students with making connections and understanding the driving question (DQ).

[Visualizing the Driving Question](#)

Click here to access [question words reference chart](#)

The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer.

Be sure to create a reference for students to have throughout the week.

****TEACHER NOTE:** Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic,

popsicle sticks, glue, cardboard, ruler, string, cotton balls, pipe cleaners

Investigation Facilitation
[Save the Beach Houses](#)

Teacher Preparation before the lesson:

Build a premade model according to the images below. Pebbles, plants, man-made construction, and animal home indicators should be included in the model.

Have students follow the procedure below for Task 1

Task 1 Procedure:

(5-10 minutes)
Record a description of the model provided.

Use the model to create waves. Observe the changes to the coastline. Create small waves and big waves (the force used to manipulate the model should change)

Record changes to observations and measurements of the model in the graphic organizer. Answer discussion questions provided in the graphic organizer. Repeat steps 2 and 3 to complete three trials.

Students should complete the following student handout as they work through the text annotation protocol:

[3-5 Information Analysis Student Organizer \(editable\)](#)

■ 3-5 Information Analysis...

During the teacher-led discussion, the teacher should ask the following questions:

(Insert three questions here for the teacher to ask to check for student comprehension and understanding, unhighlight this area when done)

****TEACHER NOTE:** Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy

Vocabulary Words:

*weathering
erosion
deposition
impact
solutions
beach nourishment*

Vocabulary Strategy:

Review the [claim-evidence-reasoning poster](#) with the students

****TEACHER NOTE:** Provide students with sentence starters by sharing on the board:

■ K-2 Claim-Evidence-Rea...

■ 3-5 Claim-Evidence-Rea...

Have students write their claim-evidence-reasoning

writing a claim

Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence

Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning

Students will use textual evidence from the “text annotation graphic organizer” to generate the reasoning or justification in the CER format.

Have students use the following template to write their

initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

“Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas.”


Review the [claim-evidence-reasoning poster](#) with students.

As a class or in student groups, provide students with this week’s claim-evidence-reasoning sample.

[Use student sample linked here](#)

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

[Claim-Evidence-Reasoning Record Observations Document](#) (google doc)

 [Claim-Evidence-Reasoning...](#) (PDF)

1. Identify the student's claim in the sample and have the teacher

Vocabulary Terms Chart

Provide students with the [graphic organizer \(editable\)](#) or [pdf handout](#), explaining its sections: word, *What did it look like in the investigation?*, meaning, image/drawing, connection

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. The teacher should provide the meaning of the word to the students and ask students to provide examples of how the word was represented during the investigation, phenomenon and/or inquiry activity. In the connection column, students should write how the word connects to concepts or observations they gathered during their classroom tasks. Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term.

Have students collaborate, in groups, to complete the vocabulary terms chart for the other vocabulary terms.

Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.

[claim-evidence-reasoning \(CER\)](#)

[3-5 Student Writing Template \(editable\)](#)

[3-5 Student Writing Template \(pdf\)](#)

****TEACHER NOTE:** Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to another writer on the topic?
How are your thoughts or understanding different to another writer on the topic?
What would you like to learn more about? Why?

Assessment for Learning:

[S5E1b Quick Check](#)

or students write their observations or questions.

2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.

3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.

Ask the following questions to students as they analyze the student samples:

[Claim-Evidence-Reasoni...](#)

****TEACHER NOTE:** As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.

Week 3

GSE: S5E1.a.

Focused Concept: Surface Features caused by constructive and destructive processes

Learning Target:

Students will construct an argument supporting scientific evidence to identify surface features (examples could include deltas, sand dunes, mountains, volcanoes) as being caused by constructive and/or destructive processes (examples could include deposition, weathering, erosion, and impact of organisms).

Lab Safety and Materials:

[General Safety Practices for the Elementary Science Classroom- TOC.docx](#)

****TEACHER NOTE:** Begin collecting cardboard boxes, shoe boxes or similar material to use for model simulation on Day 3 of this week

Phenomenon: [Drone flies over Providence Canyon | Providence Canyon VIRTUAL REALITY](#)

DQ: How are changes to surface features caused by constructive and destructive processes?

Day 1: Opening

**Day 2 : Guided Practice/
Transition**

Day 3: Independent Practice

Day 4: Independent Practice

Day 5: Assessment / Summary

**Phenomenon Introduction
(5-7 minutes)**

[Drone flies over Provide...](#)

Show students the video of Georgia's Providence Canyon

See, Think, Wonder

Teachers should provide students opportunities to share observations and develop questions. The teacher should record students' observations on chart paper and refer back to initial student ideas throughout the week.

Inquiry Activity

GaDOE Phenomenon Task: Providence Canyon

[Science Phenomenon Tas...](#)

Student Graphic Organizer

[Science Phenomenon Tas...](#)

Materials

Pictures of Providence Canyon sand
straws
tubs to contain sand

**Introduce the Driving
Question:**

Have students review the driving question:

How are changes to surface features caused by constructive and destructive processes?

Use the strategy to support students with making connections and understanding the driving question (DQ).

**Visualizing the Driving
Question**

Click here to access [question words reference chart](#)

The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer.

Be sure to create a reference for students to have throughout the week.

****TEACHER NOTE:** Students should not answer the driving question at this time. Students

Graphic Organizer

- [Sand Dune Formation_St...](#)
- [Sand Dune Formation_St...](#)

Materials

[student lab sheet or graphic organizer](#) (editable) or [pdf version](#)
wind source (straws or various thicknesses of folded paper)
blue food coloring
red food coloring
sand (1 L per student group)
ruler (1 per student group)
red, blue, brown crayon, marker, or colored pencil
laminated centimeter grid paper (print grid paper template and have laminated with media specialist)

containers: collect and use cardboard boxes, shoe boxes or similar material to cut out a flap(copy paper box tops could work as a container for this activity; you will only need 5-6 per class, depending on how many groups are in the room)

Investigation Facilitation

Text Annotation Strategy

Have students read and annotate the following text:

Surface Features

The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy:

[3-5 Text Annotation Prot...](#)

Students should complete the following student handout as they work through the text annotation protocol:

[3-5 Information Analysis Student Organizer \(editable\)](#)

[3-5 Information Analysis...](#)

During the teacher-led discussion, the teacher should ask the following questions:

Where will erosion and deposition occur in the curve/bend of a river?

Claim-Evidence-Reasoning

Claim-Evidence-Reasoning

Students will write a response to the following driving question in the CER format.

How are changes to surface features caused by constructive and destructive processes?

Review the [claim-evidence-reasoning poster](#) with the students

****TEACHER NOTE:** Provide students with sentence starters by sharing on the board:

[3-5 Claim-Evidence-Rea...](#)

Have students write their claim-evidence-reasoning

writing a claim

Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity,

ice cubes
paper towels
2 pieces of sandstone (*sugar cubes could be used to represent sandstone in this activity*)
googles

Facilitation of Task

Objective: Students will carry out an investigation to model how forces construct and destroy landforms in nature. Students will use the model to explain how surface features on Earth change over time.

See the following pages of the GaDOE task for teacher's **facilitation instructions:**
■ Phenomenon Task_Teach...

Follow the procedure provided in the linked directions above.

Provided here are the **images** to show students according to the phenomenon task instructions:
■ Phenomenon Task Image...

As the students progress through the task, ensure students are completing the graphic organizer
■ Science Phenomenon Tas...

The teacher should actively monitor student progression and ask students the following questions:

What is the connection between the processes changing earth's surface and the surface feature

will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the [claim-evidence-reasoning poster](#) with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

■ Sand Dune Formation Ac...

Objective:

In this activity, students will demonstrate the concept and effects of erosion on the development of a sand dune.

Show students the **Students Group Task and Group Activity Procedure** to the students.

Students should set up their model according to the facilitation instructions. The students will use and manipulate their model according to the provided instructions. The students will record data and answer guiding questions.

The teacher should actively monitor students' progress by asking guiding students' thinking to answer guiding questions and support students through the task. Ask the following guiding questions:

How are the wind grains affected by the wind source? Are there any differences in the distributions of sand grains due to the change in wind speed? Explain. Are there any differences in the distributions of sand grains due to the change in wind direction? Explain. How is the shape of the dunes affected by wind erosion? How do changing wind directions

How will it occur? What is the difference between constructive and destructive forces?

****TEACHER NOTE:** Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy

Vocabulary Words:

*erosion
dam
glacier
moraine
volcano
earthquake
delta
sand dune*

Vocabulary Strategy:

Vocabulary Terms Chart

Provide students with the [graphic organizer \(editable\)](#) or [pdf handout](#), explaining its sections: word, *What did it look like in the investigation?*, meaning, image/drawing, connection

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. The teacher should provide the

investigation, and information analysis protocol to develop an answer to the question.

writing evidence

Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning

Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)

[3-5 Student Writing Template \(editable\)](#)

[3-5 Student Writing Template \(pdf\)](#)

****TEACHER NOTE:** Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to another writer on the topic? How are your thoughts or

formation? Are there any patterns with the processes that occur over and over again? What natural elements aid in the processes changing the earth's surface features?

****TEACHER NOTE:**

Prior to beginning the task:

The following teacher tip might assist students' thinking.

Have students think about the words constructive and destructive. Ask students to share words that come to mind when they hear constructive and destructive. Create a list of synonymous words provided by the students. Inform students that they can refer to the list as they complete the graphic organizer for the task

[Link this week's sample here and give it a title \(**still working on this\)](#)

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

****TEACHER NOTE:** As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.

affect dune erosion? How does water influence wind erosion of the dunes?

****TEACHER NOTE:**

Teacher Preparation prior to Lesson

Divide students into groups of 4-5 students (create student groups prior to lesson beginning)

Color 250 mL of sand with 7 drops of the red food coloring for each group, mix, let dry
Color another 250 mL of sand with 7 drops of the blue food coloring for each group, mix, let dry

Ensure there is enough non-dyed sand to provide 250mL of non-dyed sand to each group

NOTE: You will have to prep sand for all groups if you have multiple classes. For instance, departmentalized teachers will need to prep 250 mL of red, blue AND non-dyed sand for all groups in three classes. The sands will mix for this activity. Separating the mixtures will be difficult.

Allow the sand to dry completely before using it (this should be done the day before to allow time for sand to dry)

Place the recycled cardboard box upside down on a flat

meaning of the word to the students and ask students to provide examples of how the word was represented during the investigation, phenomenon and/or inquiry activity. In the connection column, students should write how the word connects to concepts or observations they gathered during their classroom tasks. Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term.

Have students collaborate, in groups, to complete the vocabulary terms chart for the other vocabulary terms.

Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.

understanding different to another writer on the topic? What would you like to learn more about? Why?

Assessment for Learning:

surface. Cut or tear 2 corners of the box top lip at one end of the box top. Press down on the loose section to create an opened flap. The other 3 sections of the lip should remain standing to enclose the box area.

Place laminated grid paper inside the box with the 1-CM Grid Paper 'title' on the same side as the open flap.

Week 4

GSE: S5E1a

Focused Concept:

Learning Target:

How are changes to surface features caused by constructive and destructive processes?

Lab Safety and Materials

[W](#) General Safety Practices for the Elementary Science Classroom- TOC.docx

Phenomenon: [S5E1a](#)

DQ: How are changes to surface features caused by constructive and destructive forces?

Day 1: Opening

Day 2 : Guided Practice/
Transition

Day 3: Independent Practice

Day 4: Independent Practice

Day 5: Assessment / Summary

Phenomenon Introduction
(5-7 minutes)
[Phenomenon](#)

Have students follow the directions in the phenomenon card : [Erosion SchoolYard Scavenger Hunt](#)

Use the [see, think wonder strategy](#) to guide student thinking.

Teachers should provide students opportunities to share

Introduce the Driving Question:

Have students review the driving question:

How are changes to surface features caused by constructive and destructive processes?

Students will use this week to answer the guiding question with more information from additional tasks and information.

Graphic Organizer

[Surface Features_ Graphi...](#)

Materials

[Surface Features_Group ...](#)
(think about laminating the task cards)
pencil or chromebook
sticky notes
graphic organizer

Investigation Facilitation

Objective: Students will

Text Annotation Strategy

Have students read and annotate the previous week's text. Ask students to think about if there is any additional information they are able to connect more understanding to:

[Surface Features Text.pdf](#)

The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided

Claim-Evidence-Reasoning

Claim-Evidence-Reasoning

Students will write a response to the following driving question in the CER format. The students should provide a revised response to this week's guiding question.

How are changes to surface features caused by constructive and destructive processes?

observations and develop questions. The teacher should record students' observations on chart paper and refer back to initial student ideas throughout the week.

Have students record their observations with drawings and labels. Students will need clipboard, scavenger document,

****TEACHER NOTE:**

Consider capturing images of the evidence students find around the school grounds. Compile all images into a google slides presentation so that students may discuss throughout this week's lesson.

Take a water bottle outside on a dry day. Simulate rain by pouring a bit of water over a mostly dirt area or rocky area going downhill. Have students observe if there were any changes to the soil and rocks (i.e. focus more on if there was any movement of soil and rock, student language should reflect changes in movement instead of if the area became more muddy)

Ask the following questions:
How do we know the image is an example of erosion? How are the images similar? How are the images different?

Also, consider having students

Inquiry Activity

Use the strategy to support students with making connections and understanding the driving question (DQ).

[Visualizing the Driving Question](#)

Click here to access [question words reference chart](#)

The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer.

Be sure to create a reference for students to have throughout the week.

****TEACHER NOTE:** Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their

construct an argument supporting scientific evidence to identify surface features as being caused by constructive and/or destructive processes.

Place students in groups to work with peers. Assign each group one of the five surface features. If you have more than five groups, try to provide multiple groups with the more difficult surface features to allow students to gather as much information as possible.

(Most difficult surface features to understand are moraines, mountains, and volcano (island) formation)

Students will observe images and diagrams to discuss how surface features are formed. Have students answer the guiding questions with their peers. The students should record observations and discussions on sticky notes.

Allow students to place the sticky notes on the task card images to annotate their thinking.

The teacher should actively monitor students' progress and ask the following questions to guide student thinking:

What do you see, think, wonder? How has this landform changed over time? What has to

in the following strategy:

3-5 Text Annotation Prot...

Students should complete the following student handout as they work through the text annotation protocol:

[3-5 Information Analysis Student Organizer \(editable\)](#)

3-5 Information Analysis...

During the teacher-led discussion, the teacher should ask the following questions:

****TEACHER NOTE:** Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy

Vocabulary Words:
*constructive Processes
destructive Processes
landslides
volcanoes*

Vocabulary Strategy:

Vocabulary Terms Chart
Provide students with the [graphic organizer \(editable\)](#) or [pdf handout](#), explaining its

Students CER should provide more insightful understandings and information for the guiding question.

Review the [claim-evidence-reasoning poster](#) with the students

****TEACHER NOTE:** Provide students with sentence starters by sharing on the board:

3-5 Claim-Evidence-Rea...

Have students write their claim-evidence-reasoning

writing a claim

Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence

Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning

Students will use textual evidence from the "text annotation graphic organizer" to

NOTE** The phenomenon task will serve as the inquiry activity. Therefore, the inquiry activity for this lesson will focus on making connections between the task and student idea. Complete the following with students:

peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

“Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas.”

Review the [claim-evidence-reasoning poster](#) with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

[Link this week's sample here and give it a title \(**still working on this\)](#)

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

[Claim-Evidence-Reasoning Record Observations Document](#) (google doc)

[Claim-Evidence-Reasoning... \(PDF\)](#)

occur to cause this change? Is this an example of constructive or destructive forces? Explain your reasoning.

As students work through and discuss each task card, have students answer the questions on the graphic organizer.

How was the landform created? (This will come from your group's or another group's observations) Is the surface feature the result of constructive or destructive processes? Explain.

Allow students time to present their surface features to the class. As groups present, other groups should record information from the presenting groups. Students should collect this information from other groups.

Provide students with an opportunity to switch task cards and discuss if they have any other details to contribute to the initial group's explanation. As students have more details to provide, ask the class to record their thoughts on the graphic organizer.

****TEACHER NOTE:**

sections: word, *What did it look like in the investigation?*, meaning, image/drawing, connection

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. The teacher should provide the meaning of the word to the students and ask students to provide examples of how the word was represented during the investigation, phenomenon and/or inquiry activity. In the connection column, students should write how the word connects to concepts or observations they gathered during their classroom tasks. Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term.

Have students collaborate, in groups, to complete the vocabulary terms chart for the other vocabulary terms.

Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.

generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)

[3-5 Student Writing Template \(editable\)](#)
[3-5 Student Writing Template \(pdf\)](#)

****TEACHER NOTE:** Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to another writer on the topic? How are your thoughts or understanding different to another writer on the topic? What would you like to learn more about? Why?

Assessment for Learning:

	<p>1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.</p> <p>2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.</p> <p>3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.</p> <p>Ask the following questions to students as they analyze the student samples:</p> <p>Claim-Evidence-Reasoni...</p> <p>**Teacher Note: As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.</p>	<p>TEACHER USE ONLY: The following information is provided to inform the teacher of how each surface feature is formed. This information is not to be shared directly with students. However, the teacher needs to ensure students are guided to think and consider the following details. As students present their landforms, listen for explanations that sound similar or different from the provided explanations.</p> <p>If students are off, ask students questions to direct their thinking and consider any details not mentioned.</p> <p>Surface Features: Teacher Notes</p> <p>Surface Features_ Teache...</p>		
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Week 5

GSE: S5E1c

Focused Concept: Asking questions to obtain information on how technology is used to limit and/or predict the impact of constructive and destructive processes.

Learning Target:

Students will ask questions to obtain information on how technology is used to limit and/or predict the impact of constructive and destructive processes.

Lab Safety:	W General Safety Practices for the Elementary Science Classroom- TOC.docx			
Phenomenon: Phenomenon Card S5E1c		DQ: How is technology used to limit or predict the impact of constructive and destructive processes?		
Day 1: Opening	Day 2 : Guided Practice/ Transition	Day 3: Independent Practice	Day 4: Independent Practice	Day 5: Assessment / Summary
<p>Phenomenon Introduction Show students the Phenomenon Card S5E1c Use the See-Think-Wonder protocol to guide student thinking.</p> <p>Teachers should provide students opportunities to share observations and develop questions. The teacher should record students' questions.</p> <p>Inquiry Activity (15 - 20 minutes) Gizmo Earthquake 1 Recording Station</p> <p>Use the modified Gizmo Directions that are linked here.</p> <p>Objective</p> <p>In this Gizmo, students will...</p> <p>Understand that an earthquake releases several different types of seismic waves.</p> <p>Locate the P- and S-waves on a seismogram.</p> <p>Observe that as the distance to</p>	<p>Introduce the Guiding Question:</p> <p>Introduce the Driving Question:</p> <p>Have students review the driving question:</p> <p><i>How is technology used to limit or predict the impact of constructive and destructive processes?</i></p> <p>Use the strategy to support students with making connections and understanding the driving question (DQ).</p> <p>Visualizing the Driving Question</p> <p>Click here to access question words reference chart</p> <p>The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer.</p> <p>Be sure to create a reference for students to have throughout the week.</p> <p>**Teacher Note: Students should not answer the driving question at this time. Students</p>	<p>Graphic Organizer and Materials (2 - 3 minutes) NSF website</p> <p>Directions and Student Observation Recording Sheet</p> <p>Investigation Facilitation Earthquake Observations</p> <p>During the investigation, students will ask questions to determine how technology is used to limit or prevent the impact of constructive and destructive processes.</p> <p>Objective: Students will observe map data of earthquakes to gather information on location, time, magnitude, and images of the seismograph in order to determine how technology is used to limit or prevent the impact of constructive and destructive processes.</p> <p>Students will work in groups to view the earthquake map data.</p> <p>The teacher will support students in accessing the website.</p>	<p>Text Annotation Strategy</p> <p>Have students read and annotate the following text from ReadWorks: Earthquakes: Tremors from Below - How Do Scientists Study Earthquakes</p> <p>The teacher should facilitate the following process. Have the students follow the text protocol facilitation directions provided in the following strategy:</p> <p>3-5 Text Annotation Prot...</p> <p>Students should complete the following student handout as they work through the text annotation protocol:</p> <p>3-5 Information Analysis Student Organizer (editable) 3-5 Information Analysis...</p> <p>During the teacher-led discussion, the teacher should ask the following questions:</p> <p><i>Describe two tools scientists use to record, measure, and study the earth's movement.</i></p>	<p>Claim-Evidence-Reasoning</p> <p>Students will write a response to the following driving question in the CER format.</p> <p><i>Write the driving question here</i></p> <p>Review the claim-evidence-reasoning poster with the students</p> <p>**TEACHER NOTE: Provide students with sentence starters by sharing on the board:</p> <p>K-2 Claim-Evidence-Rea...</p> <p>3-5 Claim-Evidence-Rea...</p> <p>Have students write their claim-evidence-reasoning</p> <p>writing a claim Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.</p> <p>writing evidence</p>

the epicenter increases, the time difference between the arrival of the first P-wave and the first S-wave also increases.

Have students use the [Gizmo Modified Exploration Sheet for Earthquakes 1 Recording Station](#) to complete the Prior Knowledge and Warm-up activity.

Discuss what was learned.

Then, have students complete Activity A only.

Upon completion of Activity A, ask the following questions:

What technology is used to study and measure earthquakes?

How does using this technology help to limit the impact of a future earthquake?

Draw a model of the tool used to measure the strength of an earthquake.

Teacher Note:**

Students are not to memorize how P and S waves behave. This is foundational knowledge of how these waves are seen on seismographs as earthquakes are being measured. The key point is seismic waves are shown on seismographs which are used to help learn about earthquakes

will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning (CER)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

“Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas.”

Review the [claim-evidence-reasoning poster](#) with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

Model how to use the site and how to locate the time/date, region, seismograph, and how to take a screenshot.

Explain the directions to the students.

Focus of the observations by the students should be asking questions on how seismographs are used to limit or predict the impact of earthquakes. Make sure students understand that scientists are concerned with the amount of energy that is released during an earthquake.

Scientists use tools to measure, record, and study Earth's movements. Explain how this work may help people who could be affected by earthquakes.

What question can be asked to help scientists limit the impact of earthquakes to communities?

****TEACHER NOTE:** Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Vocabulary Strategy

Vocabulary Words:

earthquake
fault line
seismograph
seismogram

Vocabulary Strategy:

Vocabulary Terms Chart

Provide students with the [graphic organizer \(editable\)](#) or [pdf handout](#), explaining its sections: word, *What did it look like in the investigation?*, meaning, image/drawing, connection

Use a Think Aloud to demonstrate how to use the

Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning

Students will use textual evidence from the “text annotation graphic organizer” to generate the reasoning or justification in the CER format.

Have students use the following template to write their claim-evidence-reasoning (CER)

[3-5 Student Writing Template \(editable\)](#)

[3-5 Student Writing Template \(pdf\)](#)

****TEACHER NOTE:** Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to another writer on the topic? How are your thoughts or understanding different to another writer on the topic? What would you like to learn more about? Why?

and how their impact can be limited or prevented when using a technology tool as such.

Lesson Practices and Concepts

The teacher will pull students samples from earlier in the unit for peer review. Be sure to hide student names.

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

[Claim-Evidence-Reasoning Record Observations Document](#) (google doc)

Claim-Evidence-Reasoning... (PDF)

1. Identify the student's claim in the sample and have the teacher or students write their observations or questions.
2. Identify the student's evidence in the sample and have the teacher or students write their observations or questions.
3. Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.

Ask the following questions to students as they analyze the student samples:

Claim-Evidence-Reasoning...

graphic organizer with one of the provided vocabulary words. The teacher should provide the meaning of the word to the students and ask students to provide examples of how the word was represented during the investigation, phenomenon and/or inquiry activity. In the connection column, students should write how the word connects to concepts or observations they gathered during their classroom tasks. Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term.

Have students collaborate, in groups, to complete the vocabulary terms chart for the other vocabulary terms.

Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.

Have students collaborate, in groups, to complete the strategy for the other vocabulary terms.

Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.

Assessment for Learning:

****Teacher Note:** As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.

Week 6

GSE: S5E1c

Focused Concept: How is technology used to limit or predict the impact of constructive and destructive processes?

Learning Target:

Students will obtain information on how technology can be used to limit or predict the impact of constructive and destructive processes.

Lab Safety:

[W](#) **General Safety Practices for the Elementary Science Classroom- TOC.docx**

Phenomenon: [Phenomenon Card S5E1c](#)

DQ: How is technology used to limit or predict the impact of flooding?

Day 1: Opening

**Day 2 : Guided Practice/
Transition**

Day 3: Independent Practice

Day 4: Independent Practice

Day 5: Assessment / Summary

Phenomenon Introduction

Show the students the [Phenomenon Card S5E1c](#)

Use the [See-Think-Wonder](#) protocol to guide student thinking.

Teachers should provide students opportunities to share observations and develop questions. The

Introduce the Guiding Question:

Claim-Evidence-Reasoning

Introduce the Driving Question:

Have students review the driving question:

Graphic Organizer and Materials

[Investigation Graphic Organizer/Student Observation Sheet](#)

[Material List and Preparation](#)

Investigation Facilitation

Text Annotation Strategy

Have students read and annotate the following two texts in ReadWorks:

[Reducing the Impact of Flooding](#)

[The Variety of Maps](#)

The teacher should facilitate the

Claim-Evidence-Reasoning

Claim-Evidence-Reasoning

Students will write a response to the following driving question in the CER format.

How is technology used to limit or predict the impact of flooding?

teacher should record students' questions.

Inquiry Activity

Can We Prevent the Rising Water?

****TEACHER NOTE**

The teacher will introduce the Rising Water investigation to students today by presenting the Problem and the Challenge to the students.

Have students recall what they have learned about types of destructive and constructive processes especially, flooding.

Ask:

As an engineer, construction contractor, homeowner, or scientist, what would you be most concerned about in a flood? (Student answers might include: water, how much rain/water falls, ability of dam control, etc)

Why would water be a concern? (Student answers might include: too much water causes damage to land, homes, plants, animals, businesses; causes flooding)

How do you think engineers, contractors, homeowners, scientists know how to limit or prevent the impact of water in a geographical area? (Students may not know the answer to this. This is the time

How is technology used to limit or predict the impact of flooding?

Use the strategy to support students with making connections and understanding the driving question (DQ).

Visualizing the Driving Question

Click here to access [question words reference chart](#)

The process can be recorded on chart paper with the students or the teacher can complete the graphic organizer.

Be sure to create a reference for students to have throughout the week.

****Teacher Note:** Students should not answer the driving question at this time. Students will need to collect information, data and understanding from the phenomenon strategy, inquiry activity, investigation, text or video protocol and vocabulary strategy to develop a response in the claim-evidence-reasoning format.

(3-5 teachers and students should focus on developing claim, evidence, and reasoning)

Claim-Evidence-Reasoning

During the investigation, have students ask questions to obtain information on how technology can be used to limit or prevent the impact of constructive and destructive processes as they design or build their models.

Can We Prevent the Rising Water? (35-40 minutes)

Objective

Students will design a way to effectively protect New Orleans from future flooding events like Katrina.

If students maintained their copies of the directions, investigation sheet, and GIS Map from Day 1 have them access them. If not, provide students with the directions, the investigation sheet, and GIS map. Students should have already answered questions 1 - 3.

Do a quick review of the problem and the challenge 3-5 minutes.

Explain the task by using the following link from Day 1: [Can We Prevent the Rising Water?](#)

Let students develop their own ideas based upon the directions and materials provided.

Students should:

following process. Have the students follow the text protocol facilitation directions provided in the following strategy:

3-5 Text Annotation Prot...

Students should complete the following student handout as they work through the text annotation protocol:

3-5 Information Analysis Student Organizer (editable)

3-5 Information Analysis...

During the teacher-led discussion, the teacher should ask the following questions:

How can humans prevent flooding?

How is technology used to predict flooding or other constructive and/or destructive processes?

What type of map is used

****TEACHER NOTE:** Read and review the annotation protocol prior to providing this lesson to students. Students will need to be placed in groups or have an understanding of how the groups will change to limit time used for transitioning.

Review the [claim-evidence-reasoning poster](#) with the students

****TEACHER NOTE:** Provide students with sentence starters by sharing on the board:

K-2 Claim-Evidence-Rea...

3-5 Claim-Evidence-Rea...

Have students write their claim-evidence-reasoning

writing a claim

Have students develop a claim which is their answer to the driving question, claim. Students should use all their knowledge from the phenomenon, inquiry activity, investigation, and information analysis protocol to develop an answer to the question.

writing evidence

Students should provide observational or numerical data as their evidence from their investigation and write a short caption or brief description of the data they provide to support their claim.

writing the reasoning

Students will use textual evidence from the "text annotation graphic organizer" to generate the reasoning or justification in the CER format.

that teachers will introduce the GIS Map that will be used during the investigation on Day 3.

Show image of [GIS Map](#) and discuss by asking questions such as:

When have you seen a map similar to this?

What do you think it's used for?

How can a map like this impact, stop, or limit the damage caused by flooding?

State:

"It will be your job to ask questions about how flooding can be limited or prevented in a city like New Orleans in order to save lives, prevent loss of animals, and homes. **You will make a note of the questions that you ask on Question 2 found on your investigation sheet.**"

Have students discuss their initial thoughts in their groups.

Have students answer questions 1-3 on the [investigation sheet](#).

TEACHER NOTE:

Walk around the room and talk to students within each group. Ask questions to understand their thinking. Ask questions to guide their thinking as needed.

(CER)

Objective: Expose students to claim-evidence-reasoning (CER) student samples below to review and understand their peers' thoughts on the topic, initiating the process of developing skills for effective argumentation.

The teacher should state the following to students:

"Claim-Evidence-Reasoning or CER is a way of writing that helps students understand and explain what they learn in science investigations and science ideas."

Review the [claim-evidence-reasoning poster](#) with students.

As a class or in student groups, provide students with this week's claim-evidence-reasoning sample.

[The teacher will pull students samples from earlier in the unit for peer review. Be sure to hide student names.](#)

The teacher or students should read over student sample(s) to analyze claim-evidence-reasoning protocol. Ask students to use the CER observations chart to complete the following analysis protocol:

draw a prototype of their structure

determine how many miles long their structure will be

calculate the cost of the project

explain how their design/technology will limit or prevent the impact of future flooding events.

Upon completion of the structures, allow students to do a gallery walk to view and ask questions about the other groups.

Have students explain what questions they asked to determine how they would build their structure.

Vocabulary Strategy

Vocabulary Words:

dam

Vocabulary Strategy:

Vocabulary Terms Chart

Provide students with the [graphic organizer \(editable\)](#) or [pdf handout](#), explaining its sections: word, *What did it look like in the investigation?*, meaning, image/drawing, connection

Use a Think Aloud to demonstrate how to use the graphic organizer with one of the provided vocabulary words. The teacher should provide the meaning of the word to the students and ask students to provide examples of how the word was represented during the investigation, phenomenon and/or inquiry activity. In the connection column, students should write how the word connects to concepts or observations they gathered during their classroom tasks. Allow students to work in collaborative groups. Actively monitor and facilitate small group discussions and review various artifacts (pictures, images, primary sources, charts) to build knowledge of the term.

Have students use the following template to write their claim-evidence-reasoning (CER)

[K-2 Student Writing Template \(editable\)](#)

[K-2 Student Writing Template \(pdf\)](#)

[3-5 Student Writing Template \(editable\)](#)

[3-5 Student Writing Template \(pdf\)](#)

****TEACHER NOTE:** Have students review the student sample(s) of claim-evidence-reasoning on Day 2. Have students compare their writing to those students' samples. Ask the following questions:

How are your thoughts or understanding similar to another writer on the topic?
How are your thoughts or understanding different to another writer on the topic?
What would you like to learn more about? Why?

Assessment for Learning:

S5E1c Quick Check

Have students complete the following assessment to conclude this week's lesson.

(Download and create a pdf for

Teachers will facilitate the remainder of the investigation on Day 3.

Lesson Practices and Concepts

[Claim-Evidence-Reasoning Record Observations Document](#) (google doc)

■ Claim-Evidence-Reasoni... (PDF)

1. *Identify the student's claim in the sample and have the teacher or students write their observations or questions.*

2. *Identify the student's evidence in the sample and have the teacher or students write their observations or questions.*

3. *Identify the student's reasoning in the sample and have the teacher or students write their observations or questions.*

Ask the following questions to students as they analyze the student samples:

■ Claim-Evidence-Reasoni...

****Teacher Note:** As students review the student samples, they will begin to see or read vocabulary. Begin or continue a reference chart of questions or observations about vocabulary. Students will explicitly learn vocabulary on Day 4.

Have students collaborate, in groups, to complete the vocabulary terms chart for the other vocabulary terms.

Allow groups to share their thinking through academic dialogue and compare their completed task with members of other groups.

printing and online editable document)

Prepare students for assessment by reviewing the following Assessment Prep Presentation.

Provide the following guidance:

Ask the students to use what they know about the tasks completed to answer the provided assessment prep question.

- What is the question asking you?
- What do you know about the vocabulary or concept in the question?
- Is this question similar to any investigations or tasks we've completed?
- How can what you've done help you answer this question?
- Just view the assessment question: What is the question asking you?

Guide students to think about how their experience connects to the question.

Using the answer choices provided, ask the students the following:

- Identify a wrong answer: How do I know this answer is incorrect?
- Identify the right answer: How do we know this answer is correct?

Allow the students time to discuss in collaborative groups.

TEACHER NOTE: If students struggle with the question, review it the next day. Do not rush to the next question; instructional time is the only time they have to prepare for the end-of-year assessment.

Labs / Investigations

Labs / Investigations		
Mandatory Labs	Explore Learning Gizmo	Pivot Interactives/Phet
<p>Exposed Tree Roots Wind Erosion. Slowing The Effects of Rain Saving the Beach House Erosion School yard Scavenger Hunt Surface Features Earthquake Recording Station Can We Prevent The Rising Water?</p>	<p>River Erosion GIZMO: Gizmo Earthquake 1 Recording Station</p>	

Additional- Resources/Tasks

Supplemental Labs	<p>Stop Disaster Game</p>
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Culminating Performance Task	<i>CER - How do constructive processes and destructive processes change the shape of the Earth over time?</i> <i>CER - Can you explain how constructive processes like volcanic eruptions and destructive processes like weathering and erosion work together to change the shape of the Earth over time?</i> <i>CER - How are changes to surface features caused by constructive and destructive processes?</i> <i>CER - How is technology used to limit or predict the impact of constructive and destructive processes?</i> <i>CER - How is technology used to limit or predict the impact of flooding?</i>
STEM Activities	