What caused these changes to the Earth's surface?
Cause ➔ Effect

Linguistic Patterns

• _______ because _________.

• _____, so _________________.

• Since __________, _____________.

• Due to the fact ________, ____.

• ______, therefore _____________.

• ______, consequently _______.

• _______.
# Geologist Observation Process Grid

<table>
<thead>
<tr>
<th>Rock Number and Sketch</th>
<th>Color &amp; Size</th>
<th>Pattern</th>
<th>Luster</th>
<th>Texture</th>
<th>Questions and Wonderings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>What color(s) is it? What size is it? (Is it light brown?)</td>
<td>What patterns or designs does it have?</td>
<td>How does it look? (Is it shiny or dull?)</td>
<td>How does it feel? (Is it rough, smooth, or bumpy)?</td>
<td></td>
</tr>
<tr>
<td>Rock # ___</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rock # ___</td>
<td></td>
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<tr>
<td>Rock # ___</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Rock # ___</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3
Our Earth

Our planet Earth is sphere-shaped and composed of four different layers: the crust, the mantle, the outer core, and the inner core.

Crust: The part of Earth that you can see, touch, and walk on is called the surface or crust. It is the thinnest of the four layers. The crust is composed of rock and soil. Decayed plants and leaves are part of the soil. The crust is divided into huge plates, or pieces like a jigsaw puzzle, that are always moving. They move just about as fast as your fingernails grow!
Mantle: Under the crust is a layer called the mantle. It is composed of rocks and metals. No one has ever gone down into the mantle, but we have been able to drill into the top edge of it. Sometimes the hot melted rocks in the mantle push up through cracks in the crust. This is called a volcano.

Core: Under the mantle is the core, which is the center of the earth. The core has two parts; the outer core and the inner core. The outer core is so hot that the rocks and minerals that make it up are liquid. The inner core is extremely hot, but it is solid. No one has ever been to the core; it is so deep that even our strongest drills cannot reach it.
**The Mighty, Mighty Earth!**

Chanting directions

(CORE students chant and stomp feet)
We are the **core** the mighty, mighty core!
Who are we?
(All other students respond)
You are the **core** the mighty, mighty core!

(MANTLE students chant and snap fingers)
We are the **mantle** the mighty, mighty **mantle**!
Who are we?
(All other students respond)
You are the **mantle** the mighty, mighty **mantle**!

(CRUST students clap that hands)
We are the **crust** the mighty might **crust**!
Who are we?
(All other students respond)
You are the **crust** the mighty, mighty **crust**!
(All students chant and tap top of thighs)

WE ARE THE EARTH, **THE LAYERS OF THE EARTH!!!**
Who are we?
(All students shout)
WE ARE THE EARTH, **THE LAYERS OF THE EARTH!!!**
Name

What did you learn today?

One thing I learned was

One fact I found interesting was
Extended Response: Be a Geologist

<table>
<thead>
<tr>
<th>geologist</th>
<th>property</th>
<th>mineral</th>
</tr>
</thead>
<tbody>
<tr>
<td>hardness</td>
<td>luster</td>
<td></td>
</tr>
</tbody>
</table>

1. Draw a picture of your rock.
2. Describe the rock as a geologist. Use the word bank above.
Discussion Time

• I underlined______because________.
• I was confused by________.
• I was surprised to read________.
• I wonder why______________.
• I circled this word because______________.
• I think___________means___________because________________.
The Changing Earth *(chanted to Military Cadence)*

We know Earth changes fast and slow  
**Weathering** is a force you know  
Changing the shapes and sizes of rocks  
Slowly breaking, carving blocks

Sound off: **Weathering**!  
Sound off: **Changing Earth**!

**Water** freezes in rocks’ cracks  
Breaking them apart, never going back  
**Waves** eat away at rocks and land  
Turning sea cliffs into beach sand

Sound off: **Weathering**!  
Sound off: **Changing Earth**!

**Wind** blows sand and wears rocks too,  
Like sandpaper, changing rough to smooth  
The wind has such amazing power  
It carves arches and rock towers

Sound off: **Weathering**!  
Sound off: **Changing Earth**!
Earthquakes shake causing plates to collide  
Mountains are formed, side by side  
Volcanoes erupt and lava flows  
That’s how islands begin to grow

Sound off: Earthquakes, Volcanoes!  
Sound off: Changing Earth!

Plants in rocks grow very long  
Roots grow down, big and strong  
The rock begins to crack and break  
Soon one rock, two pieces make

Sound off: Plants  
Sound off: Changing Earth!

People walk and ride on a path  
Wearing down the land, just do the math  
Building roads, just you think  
Causes land to change, quick as a wink

Sound off: People!  
Sound off: Changing Earth!
How do rocks change?

Most rocks are very hard, but did you know that they can change size and shape? The way water and sand change rocks is called weathering. When water gets into the cracks of rocks, it can freeze and push against the rocks. The cracks get bigger and then the rocks break.

When rocks slide down a hill, they may break and become smaller. The smaller rocks can then break down into sand. Tiny rocks can become part of the soil.

Strong winds can blow sand against rocks. Wind and sand wore this rock into an arch.

How does weathering change the shape and size of rocks?
What other ways can rocks change?

Weathering is not the only thing that causes rocks to change. Earthquakes can change rocks, too. When Earth shakes, rocks rub against each other. They can break into smaller pieces.

Plants can also change rocks. Plants can grow in soil inside the cracks of rocks. Sometimes the roots are so strong, they cause the rocks to break.

You know that rocks are made of minerals. Water can cause some minerals to change.

Water caused this copper penny to turn green and the copper in these rocks.

What are some ways rocks can change?
Name ______________________________

How do rocks change? Draw a picture in the box and answer the question below. Remember to cite evidence from the text.

_____________________________
_____________________________
_____________________________
_____________________________
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_____________________________
Erosion
(sung to Row, Row, Row Your Boat)

Erosion slowly changes the land
By moving rocks and sand
Deposit them in another place
Changing Earth's face

Moving water changes the land
It moves the soil and sand
Rivers carry the rocks down the course
Erosion is a force

Rainfall pitter-patters the ground
It carries rocks around
Into rivers and streams rocks fall
Erosion changes it all

Moving wind changes the land
Making piles of sand
Wind builds sand dunes everywhere
Erosion happens there

A moving glacier changes the land
A powerful sheet of ice
Moving rocks over the land
Isn't Erosion grand?
What is Erosion?
Note Taking Guide

<table>
<thead>
<tr>
<th>Interesting Facts</th>
<th>Text Dependent Questions</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Circle the landforms.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>How do you know something is a landform?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water cuts and carves the earth to create different landforms. What is this process called?</td>
<td></td>
</tr>
<tr>
<td>Interesting Facts</td>
<td>Text Dependent Questions</td>
<td>Answers</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------</td>
<td>---------</td>
</tr>
<tr>
<td></td>
<td>How does Billy's example of sucking on a lollipop help you understand erosion?</td>
<td><img src="image1.png" alt="Image" /></td>
</tr>
<tr>
<td>Identify what mother nature uses to change the surface of the Earth?</td>
<td><img src="image2.png" alt="Image" /></td>
<td></td>
</tr>
<tr>
<td>How does water help a tiny piece of rock get all the way to the ocean?</td>
<td><img src="image3.png" alt="Image" /></td>
<td></td>
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</tbody>
</table>
Collaborative Matching Game

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image 1]</td>
<td>![Image 2]</td>
</tr>
<tr>
<td>![Image 3]</td>
<td>![Image 4]</td>
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<tr>
<td>![Image 5]</td>
<td>![Image 6]</td>
</tr>
<tr>
<td>![Image 7]</td>
<td>![Image 8]</td>
</tr>
<tr>
<td>![Image 9]</td>
<td>![Image 10]</td>
</tr>
<tr>
<td>![Image 11]</td>
<td>![Image 12]</td>
</tr>
</tbody>
</table>
Collaborative Matching Game
Before and After Images of Erosion
<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>Before</td>
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</tbody>
</table>
Extended Response: Erosion

Tell about the three ways that erosion can change the earth.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Draw a picture to explain your thinking.
The Changing Earth *(charted to Military Cadence)*

We know Earth changes fast and slow
**Weathering** is a force you know
Changing the shapes and sizes of rocks
Slowly breaking, carving blocks

Sound off: **Weathering**!
Sound off: **Changing Earth**!

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Sound off: Earthquakes, Volcanoes!
Sound off: Changing Earth!

Plants in rocks grow very long
Roots grow down, big and strong
The rock begins to crack and break
Soon one rock, two pieces make

Sound off: Plants
Sound off: Changing Earth!

People walk and ride on a path
Wearing down the land, just do the math
Building roads, just you think
Causes land to change, quick as a wink

Sound off: People!
Sound off: Changing Earth!
Earthquakes
Forces That Rock the Earth

Have you ever been busy doing something when the ground around you started shaking? Earthquakes destroy buildings and roads. They can also cause injury to many people. Scientists know what causes earthquakes, but they can’t predict them fast enough to give people warning.

What causes earthquakes?

Earth’s crust is made up of enormous pieces called plates. These plates fit together just like pieces of a gigantic puzzle. The difference is that the earth’s pieces are constantly moving. This happens because they float on a layer of hot, soft rock. Sometimes plates can slide past one another. Other times, they can move away from each other or crash into each other. This movement causes earthquakes.

How do earthquakes change the earth’s surface?

Earthquakes change the Earth’s surface in many ways. The plates are always moving which causes slow earthquakes. These slow earthquakes can create new mountains over many, many, years. Stronger earthquakes can cause quicker changes, such as landslides.

This is a landslide caused by a 6.5 earthquake in Taiwan.
Also, the ground may split apart at the surface and the land may become uneven. When earthquakes occur in the ocean, they cause tsunamis which are strong waves. Tsunamis also change the earth’s surface when they crash into the land. Whether earthquakes change the earth quickly, or over long periods of time, they have an impact on earth’s surface.
1. Listen carefully & look at the speaker.
2. Share and explain your ideas.
3. Build on each other’s ideas.
4. Ask questions to understand others.
5. Agree or disagree respectfully.
6. Speak loudly and clearly.
Extended Response:
What did you learn today about the causes of earthquakes and how they change the earth’s surface?

Today I learned

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
What is a volcano?

Have you ever wondered about volcanoes? A volcano is not just a mountain. A volcano is an opening in the Earth’s crust.

How are volcanoes formed?

Volcanoes are formed when magma from inside the earth’s mantle makes its way to the surface through an opening. Gases and a hot liquid rock called magma, flow through this opening. Magma is called lava when it reaches earth’s surface. As the molten rock and ash cool, they form a volcano. Over time as the volcano continues to erupt, it will get bigger and bigger.

Why do volcanoes erupt?

The pressure inside a volcano causes a volcano to erupt. When a volcano erupts, or explodes, it sends out rocks, fire, and smoke into the sky. Some eruptions have the power to blast apart an entire island.

How do volcanoes change the earth’s surface?

When volcanoes erupt, they change the Earth’s surface. Lava flows from the volcano and cools as it touches the ground. This produces solid rock and makes the Earth’s surface appear rough and uneven.
As these new materials build upon the Earth’s surface, they create the cone-shape of volcanoes. This build-up of material can happen quickly or over long periods of time. The lava not only changes the appearance, but also the texture of the Earth’s surface. In addition, the heat of the lava causes fires, which can change the surface of the Earth. These fires can destroy forests and communities.

There are other ways in which a volcanic eruption can impact the Earth’s surface. Volcanoes can cause mudflows, avalanches, tsunamis, and cracks in the Earth’s surface.

Whether volcanoes change the earth quickly or slowly, their impact has an effect on the earth’s surface.
Extended Response
Name

Before | After

Explain what happens when a volcano erupts.

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________
I’m a paleontologist and I’m here to say
I love to dig for fossils everyday
Sometimes I find a skeleton with lots of bones
Or just a small leaf that’s turned to stone

Dinosaur eggs, animal bone, hardened tracks too
Looking for fossils, Bugaloo.

Fossils can be found all around
In rocks or mountains in the ground
They tell about life long ago
How things lived so now we know

Hardened shells, footprints, skeletons too
Looking for fossils, Bugaloo.
Make Your Own Imprints

It’s easy to make your own imprints. When you’re finished, have your classmates guess what the imprints are from.

**What You Need**

- Poster paint
- Paper Towels
- White Paper
- Different Objects – sponge, leaf, button, small towel, cotton ball, shell

**What to Do**

1. Dip an object into the paint.
2. Dab the object on a paper towel to remove the extra paint.
3. Press the object onto your paper.
4. Do this with each of your objects.
Extended Response: How do fossils help us learn about our changing Earth? Cite evidence for the text.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
### How are Fossils Formed?

#### Note Taking Guide

<table>
<thead>
<tr>
<th>Interesting Facts</th>
<th>Text Dependent Questions</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What are fossils?</strong></td>
<td>![Image of fossils]</td>
<td><strong>Fossils are the remains of ancient [_____ and _____].</strong> They are at least [_<strong><strong>] years old. They are found in the [</strong></strong>__].</td>
</tr>
<tr>
<td><strong>What can we learn from studying trace fossils?</strong></td>
<td>![Image of trace fossils]</td>
<td><strong>By studying trace fossils we can learn how it [<em><strong><strong>] and cared [</strong></strong></em>].</strong></td>
</tr>
</tbody>
</table>

*Note: [Blank lines should be filled in as per the guidelines]*
<table>
<thead>
<tr>
<th>Interesting Facts</th>
<th>Text Dependent Questions</th>
<th>Answers</th>
</tr>
</thead>
</table>
| Franny tells us there are three types of fossils. What are they? | The three types of fossils are: | 1. ____________  
2. ____________  
3. ____________ |
| Dinosaur fossils remain hidden for millions of years. What causes the bones to be exposed? | 1. ____________  
2. ____________  
3. ____________ |
How Body Fossils are Formed

Millions of years go by covering the fossil with dirt and mud.

Rain, wind, and ice expose the bones.

Mud covers the bones.

An animal dies near water.
Pretend you are a geologist working out in the hot desert sun. You uncover a fish fossil. Explain how this fish ended up in the middle of the desert. What caused this to happen?
Your team of geologists has been asked by a local museum to design an exhibit entitled, “The Earth is Constantly Changing.”

Your job is to create an artifact, or poster, that identifies the following:

1. A “before and after” picture of a change in the Earth’s surface.
2. What caused this change?
3. Did this change happen quickly or slowly? About how long did it take?
4. Are there any clues from the past that help us understand this change?

Work with your team of geologists to create a colorful, detailed, and interesting artifact that includes all of the important information. Create something you would be proud to display at the museum! Have fun!
Collaborative Presentation Rubric

Geologists: ________________________________

Content: The Artifact/Poster

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Yes ☺</th>
<th>No ☹</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The artifact, or poster, includes a <strong>title</strong>.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>There is a “<strong>before</strong>” picture.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>There is an “<strong>after</strong>” picture.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>The <strong>cause</strong> of the change is identified.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>The artifact shows whether this happened <strong>quickly or slowly</strong>.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>The artifact is <strong>neat and colorful</strong>.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Delivery: The Presentation

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Yes ☺</th>
<th>No ☹</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The geologists made <strong>eye contact</strong>.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>The geologists spoke <strong>loudly and clearly</strong>.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>The geologists <strong>introduced themselves</strong>.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>The geologists <strong>described their artifact/poster</strong>.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>The geologists had a <strong>conclusion</strong>.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Our Changing Earth**

<table>
<thead>
<tr>
<th>Cause</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>The land eroded, or was swept away, by the wind, water, and waves of the ocean.</td>
<td>This kind of change to the earth happened very slowly. It would take thousands of years.</td>
</tr>
</tbody>
</table>
Collaborative Project: Our Changing Earth

Outline

Greetings and Introductions

❖ Hi. My name is_______________. This is ____________, ____________, and ______________.

❖ We’re here today to talk about our changing Earth.

✓ Tell about what your “before” picture shows.

❖ Before, the Earth may have looked like this…(describe picture)

✓ Tell people about what caused the Earth to change.

❖ The Earth changed because _________________.

(volcano, wind, rain, ice, erosion, weathering, earthquake, etc.)
Something like this might happen
____________________(where?). (In the desert, near the water, by a volcano, etc.)

✓ Tell about what your “after” picture shows.

✓ After the__________, the Earth may look like this…(describe picture)

✓ Tell how long a change like this might take to happen.

✓ This kind of change takes________________.

✓ Conclusion

✓ Thank you for listening. We hope you enjoyed learning more about___________________.


Throughout this unit, you have learned how the Earth is constantly changing. Answer the questions below.

1. What causes the Earth to change?

2. Do all of Earth’s changes take the same amount of time to happen?

3. What clues from the past help us understand our Earth in the past and today?
Post-Assessment
Study and discuss the photographs with a partner. Use the questions in the box below.

Before

After

- How did the earth change?
- What might have caused the change?
- How long did the change take?
- What might happen in the future?
With your partner, complete the one-sided cause and effect map to show what might have caused the change.

On your own, write a paragraph to explain what happened to the earth. Make sure to answer these questions.

- How did the earth change?
- What might have caused the change?
- Was the change fast or slow?
- What might happen in the future?
# Checklist for Revising and Editing

## Revising

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>My topic sentence tells how the earth changed.</td>
<td></td>
</tr>
<tr>
<td>I have at least two causes for the change.</td>
<td></td>
</tr>
<tr>
<td>I told if the change was fast or slow.</td>
<td></td>
</tr>
<tr>
<td>I used cause and effect language.</td>
<td></td>
</tr>
<tr>
<td>My concluding sentence told what might happen in the future.</td>
<td></td>
</tr>
</tbody>
</table>

## Editing

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>I capitalized the beginning word in each sentence.</td>
<td></td>
</tr>
<tr>
<td>I wrote complete sentences.</td>
<td></td>
</tr>
<tr>
<td>I ended each sentence with punctuation.</td>
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</tr>
<tr>
<td>I checked my spelling.</td>
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</tbody>
</table>