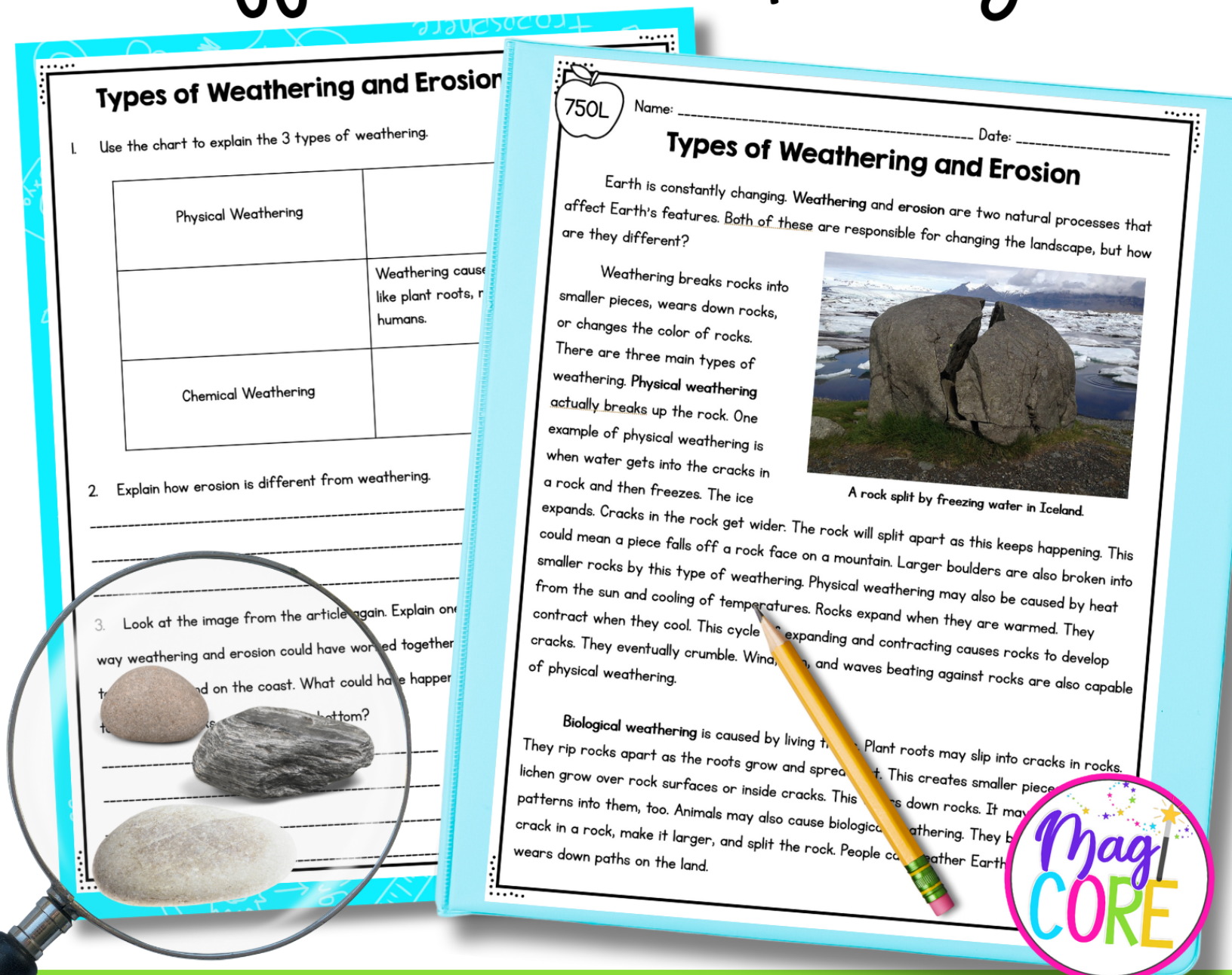
WEATHERING & EROSION

differentiated passages

LEXILE



Mag CORE

4th Grade NGSS 4-ESS2-1

ABOUT LEXILE LEVELS

MagiCore Learning, LLC is a certified Lexile® Partner. These texts are officially measured and approved by Lexile and MetaMetrics® to ensure appropriate rigor and differentiation for students.

The Lexile Framework® for Reading measures are scientific, quantitative text levels. When the Lexile of a text is measured, specific, measurable attributes of the text are considered, including, but not limited to, word frequency, sentence length, and text cohesion. These are difficult attributes for humans to evaluate, so a computer measures them.

Common Core State Standards uses Lexile level bands as one measure of text complexity. Text complexity ranges ensure students are college and career ready by the end of 12th grade. Lexile measures help educators scaffold and differentiate instruction as well as monitor reading growth.

Grade Band	Lexile® Bands Aligned to Common Core Expectations
K-1	N/A
2-3	420L-820L
4-5	740L-1010L
6-8	925L-1185L

Keep in mind when using any leveled text that many students will need scaffolding and support to reach text at the high end of their grade band. According to Appendix A of the Common Core Standards, "It is important to recognize that scaffolding often is entirely appropriate. The expectation that scaffolding will occur with particularly challenging texts is built into the Standards' grade-by-grade text complexity expectations, for example. The general movement, however, should be toward decreasing scaffolding and increasing independence both within and across the text complexity bands defined in the Standards."

Weathering and Erosion

4th grade

Table of Contents

Each passage set includes two differentiated passages on a fourth-grade level (one at the beginning of the band, one towards the end) and a question set geared towards comprehension and science mastery. The first question is differentiated to include a fill-in-the-blank diagram (lower complexity) or an open-ended diagram (higher complexity).

How to Use This Resource

This resource was created with the NGSS Science Standards in mind. It includes six differentiated passages aligned to the following standard:

4-ESS2-1: Weathering and Erosion

Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. (Cause and Effect)

Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.

Assessment Boundary: Assessment is limited to a single form of weathering or erosion.

Here are some suggestions for using these passages:

- Use as independent work after you have taught an overview of this standard. Assign the different levels based on the passage students can read and comprehend independently.
- Use as a reading center to reinforce key comprehension and science concepts at the same time!
- Use as a homework or review packet.
- Use as an intervention for students who need to revisit science concepts.

770L

Name: _____ Date: _____

Curving Rivers

If you were to view a section of a river from its bank, you might think it flows in a straight line. Getting an **aerial** view of the river from a height, however, will show that the river curves. It bends along its length. **Geologists** call these loops **meanders**.

Aerial view of the meanders in the Mississippi River.

A bend in a river, the erosion on the right side is caused by swift flowing water.

Rivers such as the Mississippi and the Ohio, along with thousands of others, have a steady flow of water over nearly flat land. This land includes soft, loose soil. Such soil is easily **eroded** by swiftly moving water. The landscape is changed when this soil shifts and crumbles. Rivers naturally have small bends. Water traveling around these bends is thrown to the outside of the turn. That water chips away at the riverbank on the outside of the bend. The land is worn down and widened over time. The water gets deeper here. Water flows more slowly on the inside of the bend. **Sediment** traveling in the water tends to settle there. This builds up the riverbank and makes the water shallower. The eroding at the outside of the bends and the **depositing** at the inside of the bends causes the river to create loops in the land.

Bigger loops are made as the river travels through these curves. Eventually, the water will find the shortest distance across the loops. It will cut across the narrowest part. The eroding and depositing process will start again once this happens. The part of the river that got cut off forms an **oxbow lake**. The pattern will continue if nothing interferes with this process. The river will make more curves.

A river flowing through a rocky, mountain area.

Rivers flowing through mountain areas such as Vermont have a harder time shaping the land in this fashion. Their riverbanks are often rocky. Their courses are more set in stone. Rocky coasts are able to be **weathered** and eroded to create curves, though. It is a longer process than in places where the land is flat and the riverbanks are made of more moldable soil.

The power of moving water is another force that changes planet Earth. Rivers shape the land through which they travel. They alter the landscape in many ways.

Curving Rivers Questions

1. Look at the image below again. Is the water moving faster at point A or point B? Explain how you know.

---

2. Explain why mountain rivers cannot shape the land as easily as rivers in other, flat areas.

---

3. Imagine you are a paleontologist looking for fossils in and near the river above. Based on the following sentence, where do you think you would find the most fossils? Explain why.

*"Water flows more slowly on the inside of the bend. **Sediment** traveling in the water tends to settle there."*

970L

Name: _____ Date: _____

Curving Rivers

If you were to view a section of a river from its bank, you might get the impression that it flows in a straight line. Getting an **aerial** view of the river from a height, however, will reveal that the river curves and bends along its length. Geologists call these loops **meanders**.

Aerial view of the meanders in the Mississippi River.

A bend in a river, the erosion on the right side is caused by swift flowing water.

Rivers such as the Mississippi, the Alabama, and the Ohio, along with thousands of others, have a steady flow of water over nearly flat land. This land includes soft, loose soil that is easily **eroded** by swiftly moving water. When this soil shifts and crumbles, the landscape is changed. Rivers naturally have small bends. Water traveling around these bends is thrown to the outside of the turn. Over time, that water chips away at the riverbank on the outside of the bend, wearing it down and widening it. The water gets deeper here. Water flows more slowly on the inside of the bend. **Sediment** traveling in the water tends to settle there, building up the riverbank and making the water shallower. The eroding at the outside of the bends and the **depositing** at the inside of the bends causes the river to create loops in the land.

As the river travels through these curves, it makes the loops bigger. Eventually, the water will find the shortest distance across the loops and cut across the narrowest part. The eroding and depositing process will start again once this happens. The part of the river that got cut off forms an **oxbow lake**. If nothing interferes with this process, the pattern will continue, and the river will make more curves.

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Rivers flowing through mountain areas such as Vermont have a harder time shaping the land in this fashion. Their riverbanks are often rocky, and their courses are more set in stone. Rocky coasts are able to be **weathered** and eroded to create curves though. It is a longer process than in places where the land is flat and the riverbanks are made of more moldable soil.

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760L

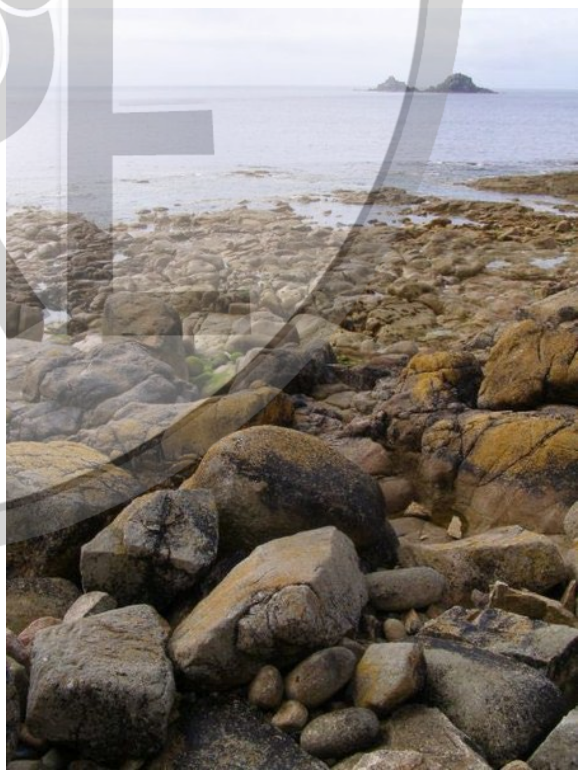
Name: _____ Date: _____

Shoreline Weathering

Sand dunes with some erosion at a beach.

The **shoreline** is where land meets water. You've seen **weathering** and **erosion** at work if you've ever gone to the beach and watched waves roll onto the land. Winds, currents, and tides weather and erode the shore. Waves flowing over rocks wear the surfaces away over time. Cracks occur in the rocks. Bits of rock break free and are carried away. This changes the shore's appearance on a regular basis.

A special kind of **physical weathering** happens at the shoreline. This is because of the salt in the ocean water. **Salt weathering** occurs when salty seawater enters cracks in rocks on the coast. The water **evaporates**, but the salt crystals are left behind in the rock cracks. These salt crystals grow and expand inside the rocks when there is a change in temperature or humidity. As the salt crystals get bigger, they press against the sides of the rock. The cracks widen as a result. When the rock can't take the pressure anymore, it may break. Pieces are released onto the land or into the water. The coast's **profile** can be changed by salt weathering.



A rocky beach. The stones are small and smooth due to weathering.

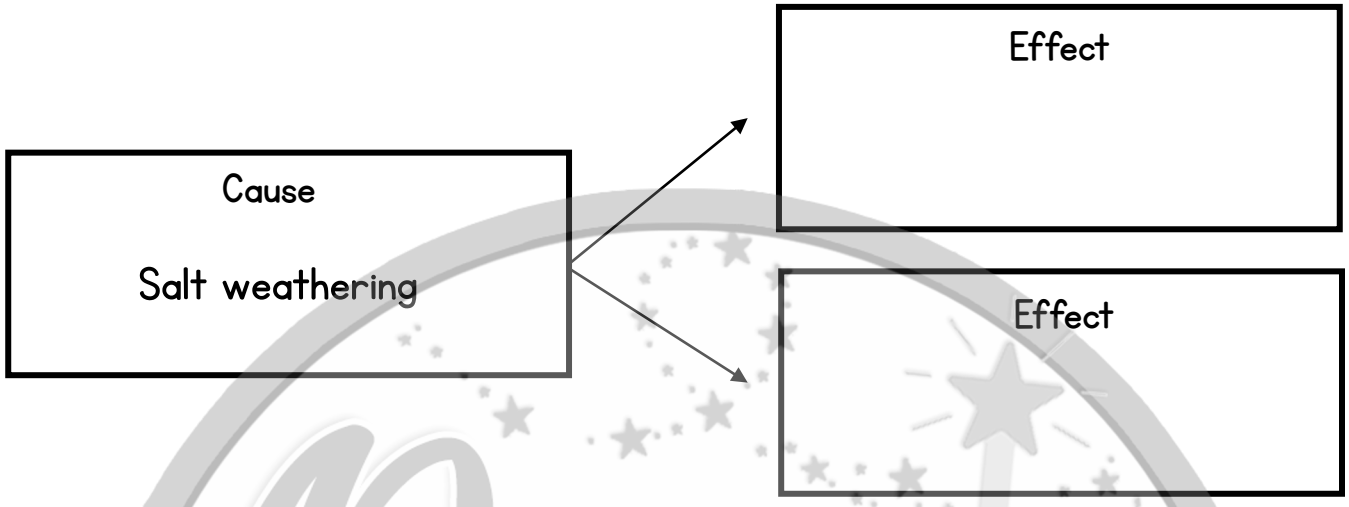
Tafoni pores at Pebble Beach, California.

Salt weathering can cause **tafoni** to form. Tafoni form when salt works its way into rock **pores**. The salt crystallizes and pushes the pores open wider. Rocks with tafoni have a bunch of holes in them. This gives them a Swiss cheese or sponge-like look. Others have compared their appearance to lace or a honeycomb. Tafoni leave rocks open to other kinds of weathering, as well. Animals may get into the holes. This makes the holes bigger. Plants may also attempt to grow there. The holes leave the rock vulnerable to breakage. Tafoni can be seen on the rocky shorelines of Vancouver Island in Canada. Seawater hits sandstone **outcrops** there.

The coasts are not immune to weathering and erosion. These both change the shorelines. Beach erosion wears down properties built on the coast. It also affects the marine life that lives there. This is why people put effort into protecting wetlands, caring for beaches and waterways, and repairing damaged structures on the coast.

Shoreline Weather Questions

1. Fill in the effects of salt weathering in the chart below:



2. Explain what happens when salty seawater gets inside cracks in rocks.

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3. Which of the following are effects of tafoni forming on rocks? (choose all that apply)
   a. Animals can get in the holes and make them bigger.
   b. Plants can grow inside the holes.
   c. The sun can cause the rocks to become brittle and dry.
   d. The rocks become vulnerable to breakage.

4. Describe how a large storm like a hurricane could change a shoreline very quickly. Use evidence from the passage to support your answer.

960L

Name: _____ Date: _____

Shoreline Weathering

Sand dunes with some erosion at a beach.

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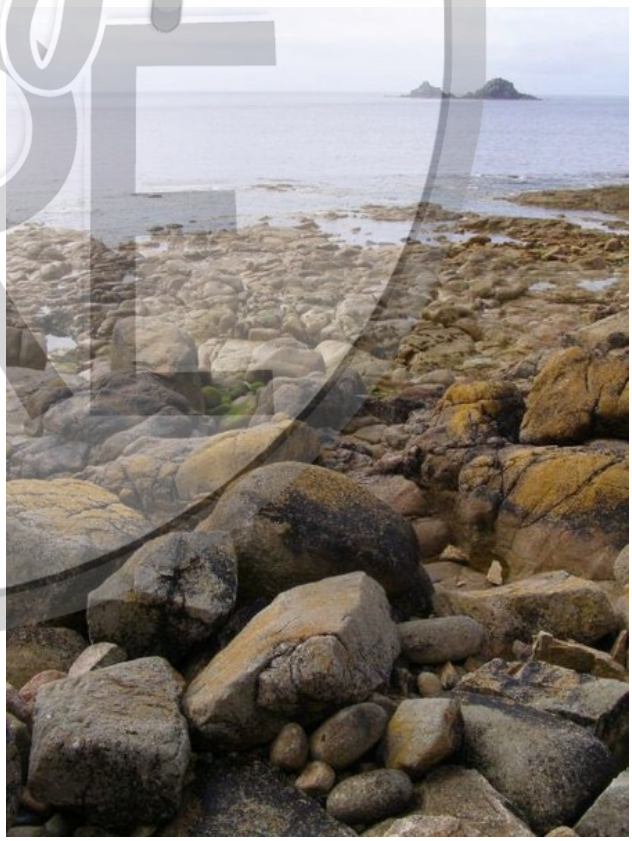

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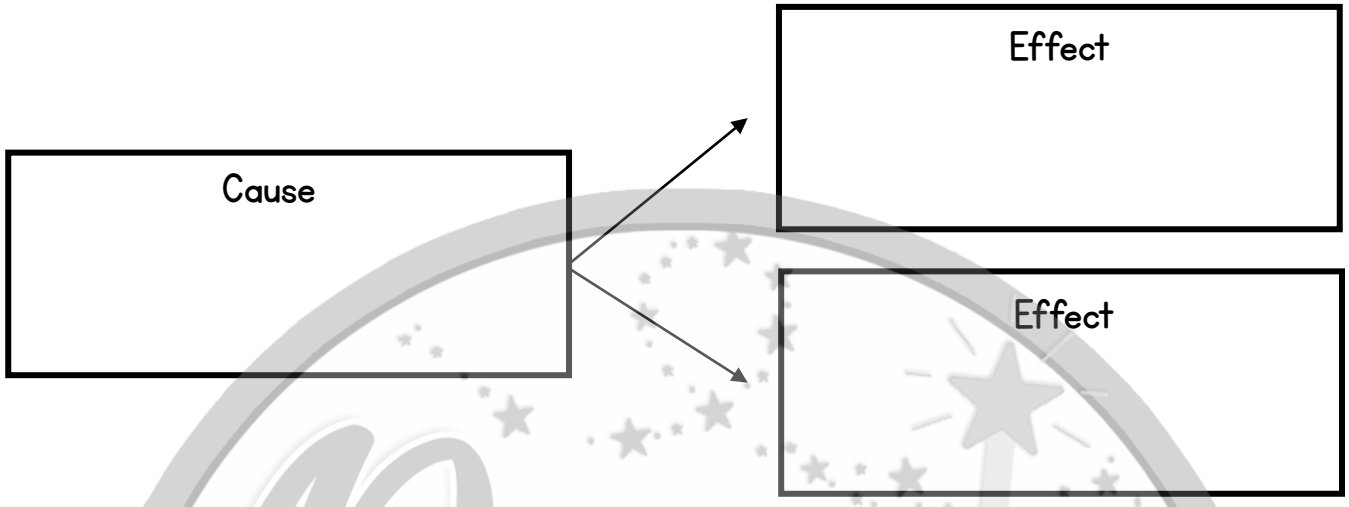

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