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Earth's Structure Hi/Lo Curriculum Map

This program was developed to make the basic Earth Science curriculum accessible to all kinds of learners. The clear, straightforward presentation of essential facts, the colorful, highly visual elements, and the hands-on activities will capture the interest of students with a variety of learning styles and skill levels. The content supports Earth Science curriculum that covers the layers of the earth, tectonic plates and plate boundaries, mountains, earthquakes, volcanoes, rocks, minerals, fossils, and soil presented in grades 4 and up. It is useful as a reinforcement and review tool for older students who need extra help with these concepts.

Each set of facts is presented in several different ways and enhanced with photo images that bring the information to life and visually engages students in the learning process. Students will have many learning opportunities as they work with the binder materials. The short, manageable bits of important information presented in the Fast Facts Folders and Fast Facts Mini-Posters are appealing to struggling learners and pave the way for further instruction.

Teacher Notes:

- Introduction
- Words to Know – Vocabulary
- Pre/Post Test

Extras:

- Bingo Game for Earth's Structure
- Photo Activity Cards & Labels
- Mini Posters
- Reading Folders – Layed up to print as booklets

Earth Section

Lesson 1: Earth's Structure

- Earth's Structure Mini-Poster
- Fact Sheet #1: Inside the Earth
- Fact Sheet #1 Activity Page

Lesson 2: Earth's Layers

- Earth's Layers Mini-Poster
- Fact Sheet #2: Earth's Layers
- Fact Sheet #2 Activity Page

Lesson 3: Studying Earth's Crust

- Fact Sheet #3: Studying Earth's Crust
- Fact Sheet #3 Activity Page

Lesson 4: Drifting Continents

- Pangaea Mini-Poster
- Fact Sheet #4: Drifting Continents
- Fact Sheet #4 Activity Page
- Continents Puzzle Directions
- Mini-Poster: Continents Puzzle

Lesson 5: Tectonic Plates

- Tectonic Plates Mini-Poster
- Fact Sheet #5: Tectonic Plates
- Fact Sheet #5 Activity Page 1
- Fact Sheet #5 Activity Page 2

Lesson 6: Rifts & Faults

- Rifts & Faults Mini-Poster
- Fact Sheet #6: Plate Boundaries
- Fact Sheet #6 Activity Page 1
- Fact Sheet #6 Activity Page 2

Mountains Section

Lesson 7: Mountains

- Mountains Fast Facts Folder
- Fact Sheet #7: Mountains
- Fact Sheet #7 Activity Page 1
- Fact Sheet #7 Activity Page 2

- Featured Mountains: The Rockies
- Featured Mountains Activity Page

Lesson 8: Earthquakes Section

- Earthquakes Fast Facts Folder
- Fact Sheet #8: Earthquakes
- Fact Sheet #8 Activity Page
- Fact Sheet #9: Measuring an Earthquake
- Fact Sheet #9 Activity Page
- Facts Sheet #10: The Richter Scale
- Facts Sheet #10 Activity Page
- Featured Earthquake: Japanese Earthquake and Tsunami
- Featured Earthquake Activity Page
- Ring of Fire Mini-Poster:

Lesson 9: Volcanoes

- Volcanoes Fast Facts Folder
- Fact Sheet #11: Types of Volcanoes
- Fact Sheet #11 Activity Page 1
- Fact Sheet #11 Activity Page 2
- Facts Sheet #12: Predicting a Volcanic Eruption
- Facts Sheet #12 Activity Page
- Featured Volcano: Mount St. Helen's
- Featured Volcano Activity Page

Lesson 10: Rocks & Minerals

- Rocks & Minerals Fast Facts Folder
- Facts Sheet #13: Rocks & Minerals
- Facts Sheet #13 Activity Page
- Facts Sheet #14: Types of Rocks
- Facts Sheet #14 Activity Page
- Featured Mineral: Gold
- Featured Mineral Activity Page

Lesson 11: Fossils

- Fossils Fast Facts Folder
- Facts Sheet #15: Fossils
- Facts Sheet #15 Activity Page

Lesson 12: Soil – Weather & Erosion

- Weathering & Erosion Mini-Poster
- Facts Sheet #16: Soil
- Facts Sheet #16 Activity Page 1
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- Soil Mini-Poster
- Facts Sheet #17: Soil Characteristics
- Activity Page

Earth Structures Review Activities

- Review Activity #1: Make it True
- Review Activity #2: Make it True
- Review Activity #3: What Am I?
- Review Activity #4: Write About It
- Review Activity #5: Write About It
- Review Activity #6: Picture It
- Review Activity #7: Picture It

Soil Fast Facts

Soil Composition

Soil is made up of small pieces of rocks and minerals mixed with live organisms and decaying plants and animals. Air and water are also part of soil. There are different kinds and colors of soil found in different places around the world. The texture of each type of soil depends on the size of the rocks and other materials it contains.



TOPSOIL

SUBSOIL

A vertical cross-section diagram of soil. The top layer is dark brown and labeled 'TOPSOIL'. Below it is a lighter brown layer labeled 'SUBSOIL'. A dashed horizontal line separates the two layers. Green grass is growing on the surface of the topsoil.

Soil Layers

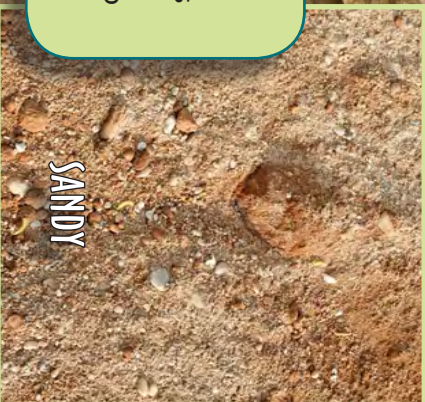
Topsoil is the very top layer of soil. It is the best soil and is where most plants are grown. The **subsoil** is a layer of soil under the topsoil. It is made up mostly of broken rock that goes down to a solid rock level.

Loam

When soil is mixed with just the right amount of sand, clay, silt, and humus, it becomes a rich soil full of nutrients called loam. Loam is the best type of soil in which to grow plants.

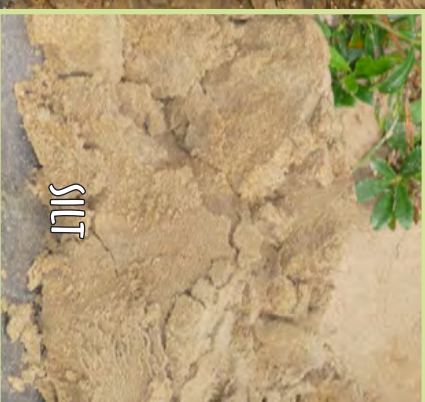
Soil Texture

Sandy soil has some visible chunks of rock in it. It has a rough, coarse feeling to it. **Silt** has smaller bits of rock and when rubbed it feels like flour. **Clay** has the smallest bits of rock. It feels sticky and is hard to squeeze. Clay is the heaviest type of soil.



SANDY

A close-up photograph of sandy soil, showing a light brown, granular texture with small, dark pebbles scattered throughout.



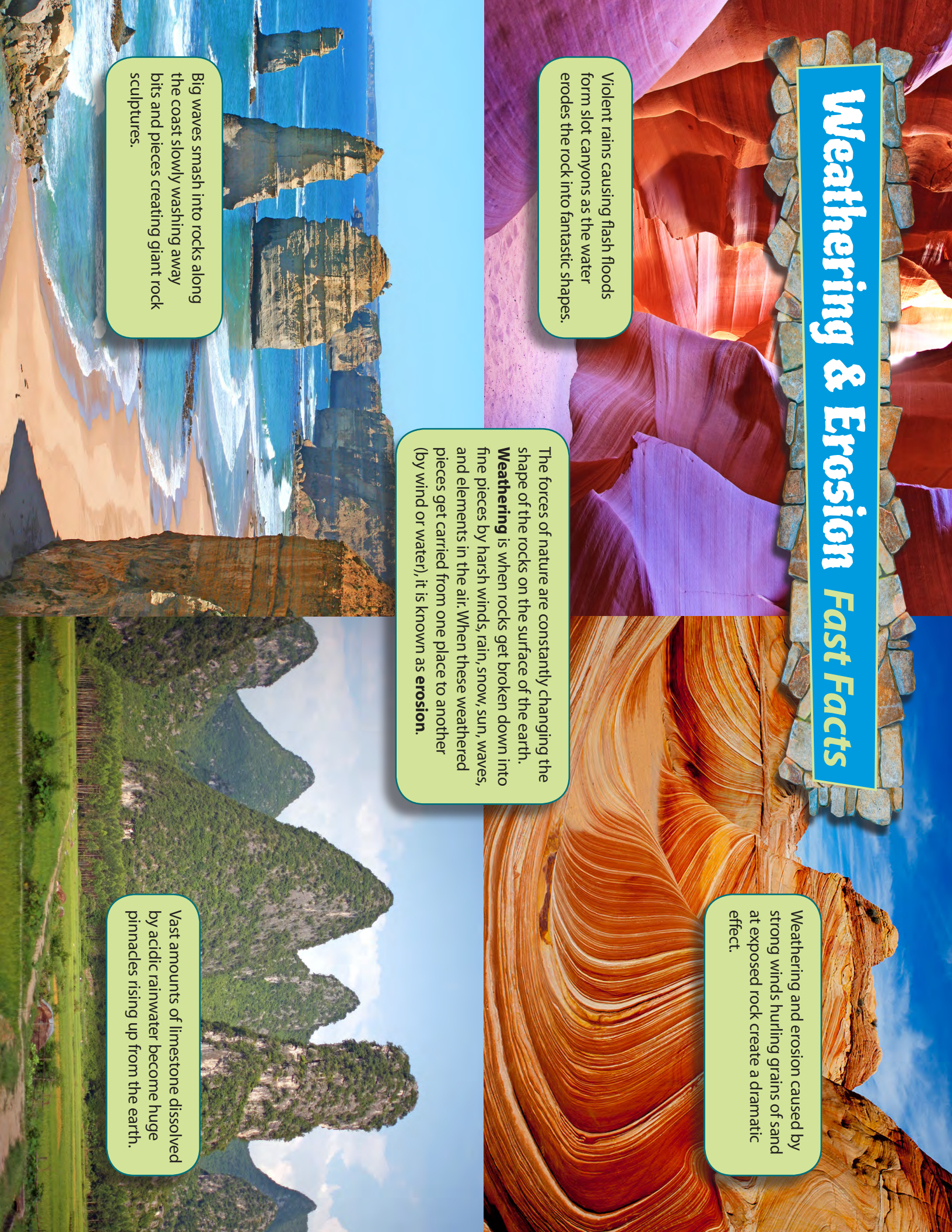
SILT

A close-up photograph of silt soil, showing a fine, light-colored, powdery texture.



CLAY

A close-up photograph of clay soil, showing a reddish-brown, crumbly texture with visible cracks and small clumps.



Weathering & Erosion Fast Facts

Violent rains causing flash floods form slot canyons as the water erodes the rock into fantastic shapes.

The forces of nature are constantly changing the shape of the rocks on the surface of the earth. **Weathering** is when rocks get broken down into fine pieces by harsh winds, rain, snow, sun, waves, and elements in the air. When these weathered pieces get carried from one place to another (by wind or water), it is known as **erosion**.

Weathering and erosion caused by strong winds hurling grains of sand at exposed rock create a dramatic effect.

Big waves smash into rocks along the coast slowly washing away bits and pieces creating giant rock sculptures.

Vast amounts of limestone dissolved by acidic rainwater become huge pinnacles rising up from the earth.

On top of the bedrock of Earth's crust is a layer of soil. Without soil there would not be any life on the planet. Plants need soil in which to grow. Without plants, most living things would not be able to exist. Soil, like air and water, is one of our most valuable resources.

Scientists have found that many things determine what type of soil will develop in a particular area. Things like **climate**, the kinds of **living organisms** in the area, the **topography** of the land, the **type of rocks** that form the soil, and the **passage of time**.



The formation of soil is usually a very slow process. It can take hundreds of years to make a layer of soil just inches (centimeters) deep. In some parts of the planet, soil is millions of years old. All soil is made of **inorganic minerals** and **organic materials** such as living organisms and the remains of dead plants and animals.

Depending on the type of bedrock it comes from, soil can vary greatly in thickness, color, and composition. Soil is formed when rocks are broken down through the processes of **weathering** and **erosion**.



Weathering happens when wind, rain, snow, sun, waves, and elements in the air break down the surface of exposed rocks. For example, when "acid rain" falls on rocks, it slowly eats away minerals in the rock, which are then carried away by erosion. Temperature and rainfall have a big effect on the amount of weathering that occurs in different parts of the world. In warm, moist climates, like rainforests, rocks decompose quickly and soil is formed at a fairly fast rate.

In hot, dry climates, like deserts, the weathering process is much slower.

Erosion happens when the weathered materials are carried from one place to another. Most erosion is caused by the flow of moving water in oceans, rivers, and streams. Over many years, the movement of the water erodes the landscape as it carries loose soil, sand, and rock along with it. Moving ice and strong winds can also erode the surface of the earth.

The types and amount of plants and animals in an area play an important role in the formation and quality of the soil. The remains of dead plants and animals decay and turn into **humus**, which enriches the soil and makes it better for growing plants. Some deserts do not have many plants and animals so the quality of the soil is not very good. A forest or jungle, with an abundance of plants and animals, has very good quality soil.

The living plants growing in the soil spread their roots downward allowing air and moisture to mix with the soil. As animals burrow, they excavate a great deal of material, which is brought to the surface. They make tunnels, which allow water to seep deep underground.



When animals make their underground nests, they carry things like leaves and twigs, which later decompose and add nutrients to lower levels of soil. Worms, ants, and beetles tunnel through the soil breaking it up allowing air and water to pass through.

Animals also expose a lot of rock to the atmosphere as they dig and burrow into the ground. This rock gets weathered and eroded and breaks up into various size chunks contributing to the texture of the soil.

Name _____

Mini-Poster
Facts Sheet #16
Activity #1

Soil

1. Name three things that will determine what kind of soil develops in different areas.

2. Why is soil important to all living things?

3. What are two main things that all soil is made of?

4. Write a description of weathering.

5. Write a description of erosion.

Name _____

Mini-Poster
Facts Sheet #16
Activity #2

Soil

1. What creates the fantastic rock shapes in slot canyons?

2. Choose the correct word to complete each sentence.

a. The remains of dead plants and animals decay and turn into _____.

(loam, humus)

b. Most _____ is caused by the flow of moving water.

(erosion, weathering)

c. A _____ usually has very good quality soil.

(desert, forest)

3. How do living plants help the quality of the soil?

4. Why is it helpful for soil when animals carry leaves and twigs into their underground nests?

5. How do buried rocks get exposed to the atmosphere?

Soil Characteristics

When scientists study soil, they look at five main characteristics: **texture**, **color**, **structure**, **chemical composition**, and **porosity**. The texture of a soil depends on the size of the rocks and other materials it contains. Soil texture can feel coarse or gravelly (**sand**), smooth and powdery (**silt**), or sticky (**clay**). Soils with a lot of sand don't retain water very well, too much of it drains away, making it hard for plants to grow. Soils with too much clay pack together very tightly and don't allow plant roots to spread. Good soils for plants have an equal mix of sand, silt, clay, and humus.



The structure of a soil is determined by how the materials it is made of are clumped together. The texture and the structure of the soil will determine its porosity, or how well it holds water. Soil that is used for growing plants has to be porous enough to allow water and air to easily reach the roots of the plant.



The color of the soil tells a bit about the soil's history and the amount of air and organic material in the soil. Black and brown soil usually has a good amount of organic materials and can be good for growing. Some plants thrive in dark soil since it absorbs more of the sun's heat and tends to be warmer. Red soil means there is a lot of iron present and may not be so good for growing.

The chemical composition of a soil is important because plants get their nourishment from the chemicals in the soil. If a soil is deficient in important nutrients like oxygen, calcium, magnesium, sodium, potassium, and nitrogen, then the plants and every living thing that eats the plants will also be deficient in these nutrients.

Well-balanced, healthy soil grows healthy plants and is important for keeping all of us healthy.

Name _____

Mini-Poster
Facts Sheet #17
Activity

Soil Characteristics

Circle the correct answer.

1. Which kind of soil feels smooth and powdery?

clay **humus** **silt**

2. What type of soil is the best to grow plants in?

sand **loam** **humus**

3. Which kind of soil has visible chunks of rock in it?

sand **silt** **loam**

4. What kind of soil absorbs more of the sun's heat?

red **black** **porous**

5. What part of the soil is where most plants grow?

subsoil **bedrock** **topsoil**

6. List the five main soil characteristics.



Answer Key

Page 3

1) climate, topography, living organisms Answers will vary.

2) Without soil, there would be no life on the planet. Plants need soil to grow, and without plants, most living things couldn't exist.

3) inorganic minerals, organic materials

4) Weathering is when wind, rain, snow, sun, waves, and elements in the air break down the surface of exposed rocks.

5) Erosion is when weathered materials are carried from one place to another.

Page 4

1) violent flash floods that erode the rock

2) a. humus
b. erosion c. forest

3) Living plants spread their roots downward allowing air and moisture to mix with the soil.

4) It adds nutrients to lower levels of the soil.

5) when animals dig and burrow into the ground

Page 6

1) silt

2) loam

3) sand

4) black

5) topsoil

6) texture, color, structure, chemical composition, porosity