

Sample Science Learning Plan

Big Idea/ Topic

Rocks and Soils of Georgia

Standard Alignment

- S3E1. Obtain, evaluate, and communicate information about the physical attributes of rocks and soils.**
- Ask questions and analyze data to classify rocks by their physical attributes (color, texture, luster, and hardness) using simple tests. (Clarification statement: Mohs scale should be studied at this level. Cleavage, streak, and the classification of rocks as sedimentary, igneous, and metamorphic are studied in sixth grade.)
 - Plan and carry out investigations to describe properties (color, texture, capacity to retain water, and ability to support growth of plants) of soils and soil types (sand, clay, loam).
 - Make observations of the local environment to construct an explanation of how water and/or wind have made changes to soil and/or rocks over time. (Clarification statement: Examples could include ripples in dirt on a playground and a hole formed under gutters.)

Crosscutting Concepts: Patterns, Cause and Effect, Structure and Function, Stability and Change

Connections to Other Content Standards:

ELAGSE3RI4: Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 3 topic or subject area.

ELAGSE3SL1: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.

- Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others.
- Explain their own ideas and understanding in light of the discussion.

Instructional Design

Science Journaling: Utilizing a science notebook or journal is a longstanding practice in science classrooms. These can also be used in a distance learning format. Photos of actual journal pages could be submitted or turned in periodically. There are also several ways to incorporate this practice in an online format. Be sure to check with your system regarding student privacy and signing up.

Teacher Notes

The focus of S3E1 has two key components: the focus on classification and the introduction to the core idea of physical properties. Rocks, and that includes minerals, are used just because they are something concrete that

the students can see, touch, and are familiar with. At this level of student development, the objective is to develop the skills necessary for students to use classification as a method to identify patterns that will later lead them to make claims, explanations or generalizations that could become laws.

Classifying rocks using physical properties that can be observed will not get them to differentiate between their process of formation, but that is okay at this level. Students are not ready to understand the rock cycle as they are still missing several core ideas like energy flow, energy transformations, relationships between pressure and energy, and plate tectonics. These are some of the reasons why the writers of the third-grade standards decided to include in the clarification statement that the classification of rocks due to their process of formation was left to sixth grade. An additional clarification for this standard is in relation to the distinction between minerals and rocks. The modern understanding of this core idea is that all minerals are rocks, but not all rocks are minerals.

Soil is rock material that has been altered. Plants and animals live in it. The major components of soils include rock fragments, plant material, air, and water. Texture is determined by the size of the mineral and rock fragments in the soils. Size composition is important because it determines how much air or water a soil can hold. Sand is the smallest in grain size and feels gritty, clay has a smooth feel. Loam is dark brown due to the high organic content. Loam has the greatest capacity to hold water. Sandy and clays soils have low water-holding capacities because water flows through sand and clay blocks the flow of water. These are the types of things you want students to observe and wonder about. In 3rd grade, we focus on these 3 types and these observable physical attributes. This is a great excuse to play in the mud!

Phenomena: What is in a rock? What is soil?

Engage

Begin this lesson by showing the [What's in a Rock](#) PowerPoint (7 pictures) and discuss how the items came to be in the rocks, and what effect the items might have on the rock in the future. Students could record their responses in a journal and/or share in live/posted discussions. **Teacher note:** Items growing in rocks, water frozen in rocks, water flowing over rocks, and wind blowing against rocks cause the rocks to break down and become different types of soil. At this point we want students to be curious about the pictures, ask questions, and think about what impact the items might have on the rock. Students' responses will likely lead into some questions about damage or breaking of the rock. You will want to build on these observations and discussions. You can introduce the idea of fossils here, but this segment sample does not address SE32.

Generate a space for students to post questions and observations.

In a live or recorded session, read the book [Everybody Needs a Rock](#) by Byrd Baylor or a similar book about a rock. You can do your own reading if you are working in a synchronous format with students or select from various online versions if posting for an asynchronous session:

- https://www.youtube.com/watch?v=tOK_5tV_jaw

Have students share what they see, what they think, and what they wonder about land and water forms after sharing the book. (Point out the cleverly illustrated, paired nature of some of these forms).

With adult supervision, students may go on a rock hunt to select their own rock. Send the [Dear Parent Letter](#) (along with other handouts) explaining this process to families. Students should select a rock and make careful notes in their science journal about the color, shape, size texture, and any details that might help them identify their rock. If possible, they should take a photo and upload this so the teacher can make a class collection or collage. Each photo should be numbered by the teacher. Allow each student to describe (synchronous) or submit their description (asynchronous) of their rock and allow classmates try to identify each person's rock from the description.

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Unplugged:

Provide the PowerPoint as printed notes and have students respond via email, journal etc. With adult supervision, students may go on a rock hunt to select their own rock from their yard. If everyone in the family selects a rock and picks up a few extra, students and their families can examine their rock and make careful notes in their science journal about the color, shape, size, texture, and any details that might help them identify their rock from the others. Then they may place all the rocks together in a common space. Everyone one can take turns reading about their rock, and then try to identify each person's rock based on their description. If that is not possible, provide students with [Pictures of Rocks Cards](#). They can turn the cards face down and draw one, observe, and return to the deck. When everyone is ready, turn all the cards over and take turns describing your rock while other try to select which one you had. You could also begin by having all cards facing up. Each player can pick their favorite without touching it or moving the cards. They then describe their rock as above while others try to guess the rock they selected.

REMINDER - There are some public places in which it is against the law to remove natural objects from the environment. Additionally, we do not want student to trespass on private property. Students could also take photos or make observations of their rocks and leave them on site.

Get to know your rock!

Using several rocks, provide students with common items to use to try to scratch their rocks (fingernail, penny, paper clip or steel nail- no knife!). Hardness is a mineral's ability to resist being scratched. Students will use [Moh's Scale](#) to compare the hardness of their rocks to the hardness of minerals and other common objects indicated on Moh's Scale. They should keep a record of what object was able to scratch their rock. If students are using rocks, which contain more than one mineral, they may make an observation that the rock is harder in some areas than in others. This can give them some idea of what minerals may be in their rocks. Luster refers to how a mineral reflects light. Third graders use words like shiny, dull, or metallic to describe luster. Students will sort their rocks according to their luster and record it in their science journal. **The modern understanding of this core idea is that all minerals are rocks, but not all rocks are minerals.**

Writing Connection

Plugged: In [Everybody Needs a Rock](#), Byrd Baylor shares 10 rules for selecting a rock. Write your own set of 10 rules for selecting a friend, a teacher, a dessert, etc.

Unplugged: Ask students to write an explanation describing how they found and selected their rock.

Exploring

Students will form an explanation about how rocks become soil.

Probe Students:

- Are rocks the same in all parts of Georgia?
- How are they the same?
- How are they different?
- Does the type of rocks found in a Georgia region help you figure out what type of soil is there?
- Can you predict the types of plants in a region if you know the types of rocks found there? Why?



Earth Changes Over Time

Begin by asking students what they think comes first, rocks or soil. Show them rock and soil? Student can carefully rub rocks together to notice that rocks break apart.

Students will look at pictures (**plugged and unplugged**) and videos (**plugged**) of rocks and processes that break rock down to soils: [Rocks Become Soil](#) and [Water Flows over Rock](#).

As students to think about how the playground or their yard/neighborhood may look after a heavy rain. Some changes to the Earth's surface happen quickly.

Day after day, rocks on the surface of the Earth are worn down by water, wind, ice, etc. Think back to the [What's in a Rock](#) PowerPoint too. Some changes happen slowly over long periods of time. Forming soil happens very slowly.

You can make rocks with students using salt dough. The flour can represent a soft mineral like talc.

Salt dough recipe: 1-part salt, 2-parts flour

Form the dough into a rock shape and insert a straw, toothpick, or skewer into it. Make a mark on the straw/skewer to indicate the highest point of the rock. Let the dough harden. Once hardened, pour water on the dough rock to simulate rain and observe. The rock will get shorter and the flour will be visible at the base of the rock and where the water flowed. The students can see that the line they drew is now above the dough. This may take repeated "rain" sessions.

Ask student to think about a time they had a piece of hard candy in their mouth? Think about color coated candies, and how they change over time. How is that similar to what water is doing to rocks in nature? They could be encouraged to place unwrapped candy to represent rocks in a plastic container with a lid. Then they could shake the candy so that the "rocks" bounce against each other. They could observe the "dust." Discuss how that relates to rocks changing. The term "weathering" could be introduced here but is not required.

Plugged: Watch: [How Soil is Created](#) (5:28 total length – stop at 4:10). Some of the vocabulary and concepts will be above grade level, but students can get an understanding of the long process required in making soil. Additionally, it might provoke them to ask questions that they can explore.

Unplugged: Provide the [Rocks Become Soil](#) handout. Provide printed materials they can use for research. A service like <http://rewordify.com/> can assist in modifying text for various reading abilities. Share salt dough recipe with families.

Soil Texture

Students will investigate soil texture.

Pass out small individual samples of soil (sand, clay, loam). Currently, we do not suggest students share materials. Students will observe the soil: 1. Students will roll the soil between their fingers and record the texture. They can use words like gritty, smooth, grainy, etc. 2. Students will use a hand lens to look at the grains of soil. Students will write their findings on the recording sheet, [My Soil Record](#).

Unplugged: Encourage students to collect some soil from a plant or their yard with adult supervision. You may also want to provide the [Soil Samples](#) handout so that they can observe the varying colors and grain sizes in the photos of the 3 types of soil you are studying.

Students will investigate water-holding capacity of soils.

Water-Retention Lab

Provide students with at least 1/8- 1 cup of each soil (clay, sand, loam). You can give more just be consistent and use the same amount of each soil. Give each group a container (or 3 like containers to conduct all 3 at once) and three coffee filters. Containers can be made by cutting the top portion off a soda bottle and turning upside down into the bottom portion. You can also use jars, glasses, etc.

1. Place a coffee filter into their container.
2. Pour (amount determined by teacher) clay into the filter.
3. Pour 50mL (for at home ¼ cup) of water into the soil and set a timer for 2 minutes.
4. After 2 minutes, students will measure the amount of water that clay allowed to pass through to the bottom of the soda container. Students will write data on their recording sheet [My Soil Record](#). (For at home use, students could visually compare the amounts of water in each, especially if using clear containers, or use a measuring cup.)
5. Repeat the process with sand.
6. Repeat the process with loam.
7. Students will discuss the results with their group and how the amount of water a soil will hold could affect the types of plants that could grow in each type of soil.
8. Students write their ideas in their student journal [My Soil Record](#).

Plugged: Show student samples of soils and conduct the experiments as demonstrations encouraging them to recreate or follow along at home. Tip: Use food coloring in the water so students can see the water.

Unplugged: Encourage families to collect samples of any soils (look for varying colors/types to compare). Ideally you want them to do the experiment. You should print the [Water Retention Lab Set-Up for Home Use](#). If students are unable to conduct the experiment at home, they can analyze the photos and results and compare the amount of water that passed through each sample using the [Water Retention Lab Results to Analyze](#) handout.

Now that students have some knowledge of rocks and soils, it is time to plant. Students will investigate soils ability to support the growth of plants. Using seeds (such as lima bean, corn, pumpkin, radish) or seedlings, complete the following lab:

Plant Lab

1. Students will need 3 containers for growing plants (cups, small empty containers, egg cartons, etc.), sand for one container, clay for one container, loam for another, and seeds or seedlings to plant.
2. Teacher note: Put a few small holes in the bottom of the container and line the bottom with a piece of coffee filter or paper towel so the excess water can drain through into another container or plate.
3. Label the first container as SAND.
4. Students will place sand in the first container and follow the directions for the seeds provided to plant them in the sand.
5. Label the second container as CLAY.
6. Students will place clay in the second container and follow the directions for the seeds provided to plant them in the clay.
7. Label the third container as LOAM.
8. Students will place loam in the third container and follow the directions for the seeds provided to plant them in the clay.
9. Students will write observations in their student journals and draw a picture or take a digital picture to show their “plants” on day 1.
10. Students should water each plant the same amount daily (careful not to overwater) and record growth every other day on their [My Plant Record](#).



Unplugged: Encourage families to conduct the above experiment with at least two different soils if possible. The main thing is that they observe and explore noticing differences. Consider providing soils and seeds in family packets.

Elaborating

Some plants thrive in specific types of soils and cannot grow in others. Ask students how they think the type of soil will affect the types of plants found in the regions. (This can be connected to S3L1.)

Students will research the types of rocks and soils found in each region of Georgia using the [GA Regions Research Guide](#). [Rocks in Regions of Georgia](#) is a PowerPoint depicting some of the different types of rock found in Georgia regions.

Teacher Resource: Georgia Geological Society, <https://www.westga.edu/~ggsweb/>

The [Georgia Encyclopedia](#) has information regarding the geologic regions of Georgia.

Evaluate

Journal responses, [My Soil Record](#), [My Plant Record](#), and the [Georgia Regions Research Guide](#) can all be used to evaluate students understanding of the key concepts addressed in this segment.

Evidence of Student Success

- Student journals
- Recording sheets and drawings
- Students can classify rocks by their physical attributes (color, texture, luster, and hardness)
- Students can identify properties of soils (color, texture, capacity to retain water, and ability to support growth of plants).
- Students can describe soil types (sand, clay, loam).
- Students can explain how water or wind have made changes to soil or rocks over time.
- Students ask questions, plan and carry out investigations and make observations.

Student Learning Supports

The goal for science education in the state of Georgia is as follows: All Students, over multiple years of school, actively engage in science and engineering practices and apply crosscutting concepts to deepen their understanding of the core ideas in these fields.

The learning experiences provided for students should engage them with fundamental questions about the world and with how scientists have investigated and found answers to those questions.

This lesson includes the disciplinary core ideas, science and engineering practices and crosscutting concepts to actively engage students in exploring science concepts with real world topics. As part of the vision we must support the inclusion of all students in science learning.

Some **general** things to consider when planning for students supports include the following;

- Provide positive and consistent feedback.
- Keep directions brief and clear.
- Make sure parents and students know schedules, due dates, requirements, expectations, and how assignments/tests are going to be collected.
- Share evaluation results in a timely manner to students and parents.
- Package assignments in a way that students know the sequence, what is required, when it is required, what is available as choice and what is for fun.



- Provide/encourage organizational strategies such as where to work, store work, when and where to turn in assignments, graphic organizers, etc.
- Provide reminders of important dates and requirements.
- Go over notebook and journal ideas and share your entries with students so they can see what you expect.
- Allow dictation and/or text to speech software programs and tools.
- Check in with students by phone or online to answer questions, give reminders, and check progress.
- Provide parents with updates on progress and upcoming assignments. Communicate often.
- Provide resources that students can access offline.
- Allow students to give information orally or in drawings.
- Model expectations and demonstrations in video/online/phone.

Some considerations, **specific to this lesson**, are as follows:

- The teacher should provide information to students in multiple formats to allow students to access information in ways that work for them. These formats could include videos, audio recordings, articles, or class notes.
- The teacher should consider providing students with multiple formats to share their knowledge. These formats could include recording video, recording audio, writing, or drawing.
- The teacher should provide students with closed captions for all videos that are used in class.
- The teacher should consider providing students with a graphic organizer to record the different characteristics of the rocks that they chose.
- The teacher should consider showing students examples of the different characteristics that they are looking at when examining their rock specimens.
- The teacher should consider providing students with sentence frames to help students get started on writing assignments.
- The teacher should consider providing students and parents with directions for the activities that are contained in the lesson in advance. This should allow students and parents to have ample time to prepare supplies, conduct the activity and make observations.
- The teacher should consider read alouds for any articles or books that are provided to students for the lesson. This could be done using video or the teacher reading aloud in a format that meets district guidelines for student communication.
- The teacher should consider providing students with discussion, images and other information about the plants that grow in different soils.

Engaging Families

- [Georgia Home Classroom](#)
- [Sample Learning Menu Strategies](#)
- Sandersville, GA is known as the [Kaolin Capital of the World](#).
- Elberton, GA is known as the [Granite Capital of the World](#).
- [Providence Canyon](#) is often referred to as the Little Grand Canyon



Dear Parent/Caregiver:

We are going on a rock hunt! With adult supervision, students may go on a rock hunt to select their own rock to observe. Students could also take photos or make drawings of their rocks and leave them on site.* If obtaining a real rock is not possible, use the included **Picture of Rocks Cards**.

Using the Picture of Rocks Cards, cut the cards out and place them in a stack face down. Each member of the household should select a rock and study it well enough to describe it. Do not let anyone see your card! Return all the cards to the deck and shuffle them. Then turn them all over so that all can be seen. Take turns identifying your rock and having others guess which one you selected. You can also start with all the cards facing up and pick your favorite. Again, do not tell anyone. Then describe it and have your playmates determine which rock you selected as your favorite.

Our goal is to help students observe and to group rocks and soils by physical characteristics such as color and texture. Helping young scientist learn to observe and group objects based on common characteristics is an important skill that will help them formalize classification systems in later grades. So, your goal is to have fun! Pay attention to the rocks and soils in your yard or neighborhood. What colors do you notice? If possible, consider starting a collection of rocks and soils.

We also want students to start noticing how soils feel and look differently. Some soils are better at supporting plant life. Some let all the water pour through (like sandy soil), red Georgia clays feel slick when wet and water will puddle on it. A nice dark colored loam will hold some water and allow some to pour through. Let them feel it between their fingers when it is dry and when it is wet. Make observations. Notice how rain impacts the soils around your home or in your neighborhood. The Soil Pictures included in this letter will show you the 3 types of soils students learn about in third grade: sand, clay, and loam. Even in the pictures, students can observe differences. Refer to the **Water Lab** resources included to explore the water holding capacity of soils.

Rock and soil types vary across our State. Some interesting facts about Georgia that you may want to explore:

- Sandersville, GA is known as the Kaolin Capital of the World.
- Elberton, GA is known as the Granite Capital of the World.
- Stone Mountain is known for being the largest piece of exposed granite in the world.
- Erosion in the Providence Canyon of Georgia's Coastal Plain has exposed a thick section of shale overlain by sand and then limestone.

Here are the materials needed for this segment in science:

- A journal or notebook for data collection and recording observations
- A rock or several (if possible) and/or the included **Rock Cards** handout
- A collection of various soils (look for varying colors) and the included **Soil Samples** handout
- A magnifying glass (optional) for observing soils & rocks. Directions for making your own from a plastic water bottle can be found here: <https://www.science-sparks.com/make-your-own-magnifying-glass/>
- 3 clear containers
- 3 coffee filters and rubber bands/string/tape to secure them to the containers
- Water
- Soils and containers for planting (egg carton, etc.)
- Seeds
- Flour
- Salt
- Ruler

**When on a rock hunt, do remember that there are some public places in which it is against the law to remove natural objects from the environment.*

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Pictures of Rock Cards

1



2



3



4



Rock Cards

5



6



7



8







SAND

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CLAY

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LOAM

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Mohs Hardness Scale

	Mineral Name	Scale Number	Common Object
↑ Increasing Hardness	 → Diamond	10	
	 → Corundum	9	←  Masonry Drill Bit (8.5)
	Topaz	8	
	 → Quartz	7	←  Steel Nail (6.5)
	Orthoclase	6	
	Apatite	5	
	 → Fluorite	4	←  Copper Penny (3.5)
	Calcite	3	
	Gypsum	2	
	 → Talc	1	←  Fingernail (2.5)

My Soil Record

Name: _____ Date: _____

1. What is the texture of the soil?

Sand _____

Clay _____

Loam _____

2. What is the grain size of the soil?

Sand _____

Clay _____

Loam _____

3. How much water can the soil hold?

	Sand	Clay	Loam
Amount of water poured into soil			
Amount of water that passed through the soil			
Amount of water that stayed in the soil			



Water Retention Lab Set-up For Home Use



Water Retention Lab: Students need 1/8 - 1 cup of each soil (clay, sand, loam – soils of 2 different color can suffice). Just give the same amount of each soil. Use 3 containers (if you only have one, you can do each sample at a time) and three coffee filters. Containers can be made by cutting the top portion off a soda bottle and turning upside down into the bottom portion. You can also use jars, glasses, etc.

1. Place a coffee filter into the container.
2. Pour (amount determined by teacher- or whatever you have) of clay into the filter.
3. If using 1 cup of soil, pour 50mL (for at home ¼ cup) of water into the soil and set a timer for 2 minutes. If using less soil, reduce the amount of water but stay consistent for each soil test.
4. After 2 minutes, students will measure the amount of water that clay allowed to pass through to the bottom of the soda container. Students will write data on their recording sheet **My Soil Record**. (students could visually compare the amounts of water in each, especially if using clear containers, or use a measuring cup.)
5. Repeat the process with sand and then loam
6. Students will discuss the results with their group and how the amount of water a soil will hold could affect the types of plants that could grow in each type of soil.
7. Students write their ideas in their student journal.

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Water Retention Lab Results to Analyze



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Rocks Become Soil



My Plant Record

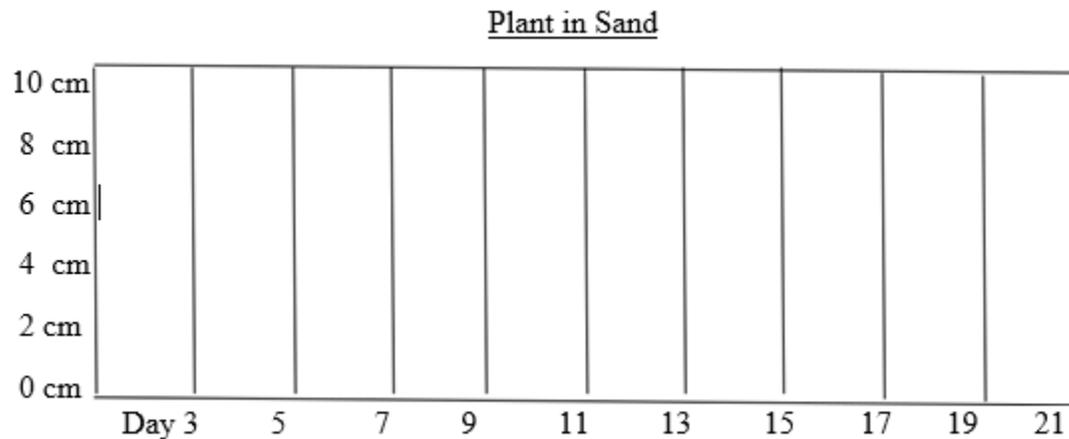
Name: _____ Date: _____

I planted _____ seeds in sand, clay, and loam to find out which will grow the best.

Directions: Measure your plants every other day and write the measurements in the correct boxes.

Soil	Day 1	Day 3	Day 5	Day 7	Day 9	Day 11	Day 13	Day 15	Day 17	Day 19	Day 21
Sand											
Clay											
Loam											

Directions: Use a crayon or colored pencil to chart the growth of each plant on the days listed.



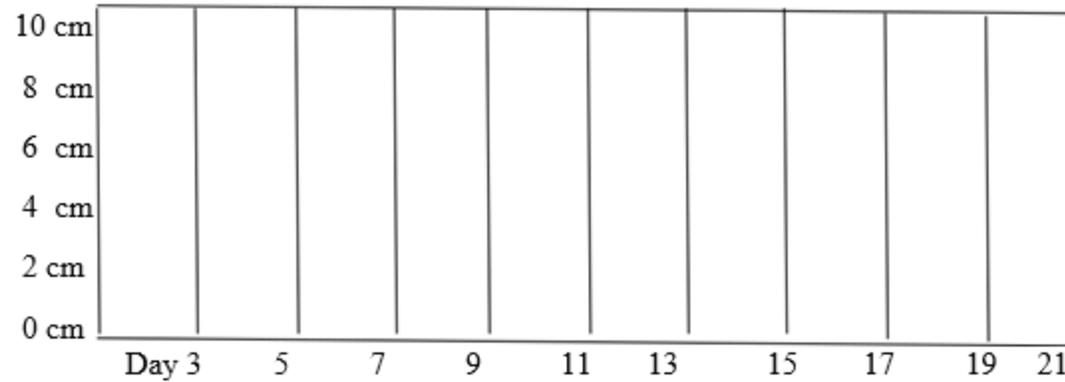
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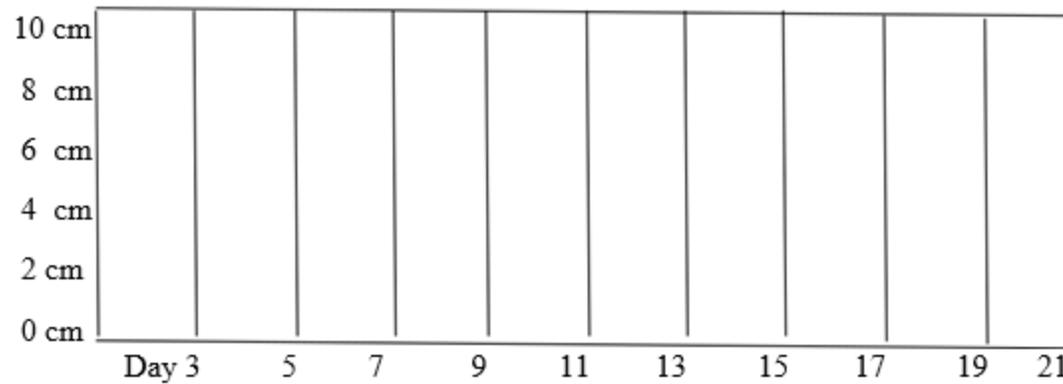
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Plant in Clay



Plant in Loam



Compare the growth of each plant on your graphs to answer the questions below in your journal.

1. Which plant grew the slowest?
2. Which plant grew the fastest?
3. Do any of the plants look healthier than the others?
4. Make a claim about which soil is the best for growing plants? Use evidence to support your answer.



Georgia Regions: Research Guide

Name:

Region:

Directions: Locate your region on the map below and draw a star on it.



1. What types of rock can you find in your region?
2. When the rocks in your region are broken down by wind and water, what kind of soil do they become?
3. What type of plants can live in the soil from your region?
4. What special features do the plants have that allow them to survive in your region?

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