

Grade 4	Lesson 7: Soil Components	Reference to English Interconnections Lesson None
Science Standard(s): Standard 3 Objective 3 a,c,		
Content Objective(s):		Language Objective(s):
Students will observe and identify the four basic components of soil by working with a partner and completing an exit ticket independently. <i>I can identify the four basic components of soil and give examples of each with my partner in a lab and independently on my exit ticket.</i>		Students will be able to orally state what the four basic components of soil are and give examples of each to a partner and then write them on their exit tickets. <i>I can tell a partner what the four basic components of soil are and give examples of each of them from my soil sample, and then write them on my exit ticket.</i>
Essential Questions: What are the four basic components of soil?		Required Academic Vocabulary for Word Wall: Listen: Components, Soil , formation, Sediments, Organic Matter, Water, Air, Time Zuhören: die Bestandteile, die Erde/der Erdboden, die Entstehung/Formation, die Ablagerungen/Sedimente, das organische Material, das Wasser, die Luft, die Zeit Speak: Components, Soil , formation, Sediments, Organic Matter, Water, Air, Time Sprechen: die Bestandteile, die Erde/der Erdboden, die Entstehung/Formation, die Ablagerungen/Sedimente, das organische Material, das Wasser, die Luft, die Zeit Read: Components, Soil , formation, Sediments, Organic Matter, Water, Air, Time Lesen: die Bestandteile, die Erde/der Erdboden, die Entstehung/Formation, die Ablagerungen/Sedimente, das organische Material, die Luft, die Zeit Write: Sediments, Organic Matter, Water, Air, Time Schreiben: die Ablagerungen/Sedimente, das organische Material, das Wasser, die Luft, die Zeit Sentence Frames: (Sediments, air, water, and organic matter) is/are a basic component of soil. This/These _____ is/are an example of _____ (sediments, water, air, and organic matter) because _____. Satzbau: (Ablagerungen, Luft, Wasser und organisches Material) ist/sind ein Hauptbestandteil/Hauptbestandteile im Erdboden. Das/Die _____ ist/sind ein Beispiel für _____ (Ablagerungen, Wasser, Luft und organisches Material), weil _____.
Materials: 1 rock per table—any type - Vocabulary Cards - Cake mix, bowl, eggs, oil, water, mixer - Containers (one per group) of sediments—small pieces of rock and minerals, gravel, etc. - Containers (one per group) of leaf mold—the decaying leaves on the ground - Cup of sandy soil - Cup of Water - Newspaper (1 sheet per student) - Soil (@ 1 tablespoon per student)		Additional Lesson Vocabulary: Basic, process, material, leaves/leaf mold, ingredients, wet, dry, category, circle graph, portion, evidence, represent grundlegend/basisch, der Prozess, das Material, die Blätter/Lauberde, die Inhaltsstoffe, nass, trocken, die Kategorie/Rubrik/Gruppe, das Kreisdiagramm, die Menge/der Anteil/der Teil, der Beweis, darstellen

- Small Paper Plate (1 per student)
- Hand Lens (1 per student)
- Tweezers (1 per student)

Lesson:

Instructional Time: 50 Minutes

Opening: (5 minutes)

- It will save you time if you put the 1 tablespoon of soil on a paper plate in the corner of each student's desk. They do not need it until later in the lesson, so you have to instruct them to leave it there. Make sure they know that, if they decide to touch it before instructed to do so, they will lose the privilege of doing the science lab with it later.

T: "We have been learning about the rock cycle and have studied the formation of rocks. We learned that igneous rocks form from extreme heat, sedimentary rocks form with extreme pressure, and metamorphic rocks need extreme heat and pressure. We have also learned that rocks are weathered, broken down, and then moved by different forces of erosion. So, what happens next? We don't just have broken pieces of rocks everywhere. What happens to the rock pieces that are broken off?" Wait five seconds and/or accept answers as they come.

S: They break down more and more. They become dirt.

T: "Those are excellent ideas and you are right. Weathered and eroded rocks become dirt. That is the last step in the rock cycle. We are going to use the word scientists would use and call it, soil. Today we are going to learn how soil is made by studying the components of soil." Post component vocabulary card. **"There are 4 main components, or different parts, of soil."**

- Give each table/group a rock and a "Making Soil" sheet to record their answers on.

T: Hold up one of the rocks as you give directions. "Ok, class you have an interesting task today. Your assignment is to turn your rock into soil. I'm not going to give you any more information or instructions because I want you to really discuss this with your group. I will give you 2 minutes make a plan. You need to decide, with your group, how you will turn your rock into soil. To explain your plan, you can use pictures, words, phrases, or sentences. After 2 minutes you will explain your plan to the class. Do you have any questions?" Answer procedural questions, but don't give them any hints about how this would be done. **"Ok. Ready? Begin."**

- Walk around the room to ensure that they are on task and using the target language. Do not tell them what it would take to turn their rocks into soil. After two minutes, ask them to stop—even if their plans are incomplete.

T: "You have wonderful plans! Let's share them quickly."

- Let them show their diagrams on the document camera and share their ideas with the class. Do not give feedback beyond complimenting their ideas.

T: "Great job! Now, let's take a look at our learning objective today." Point to the student objective and read, **'I can identify the four basic components of soil and give examples of each with my partner in a lab and independently on my exit ticket.' In your partnership, I want one of you to be partner 1 and one of you to be partner 2. Take 5 seconds to decide."**

- Students turn to their neighbors and decide who is partner 1 and who is partner 2. Then regain their attention.

T: "Partner 1, when I say 'go' you will ask your partner, 'What is our learning objective today?'" Write the question on the board. **"Partner 2, you will read the objective on the board."** Point to the objective. **"Then Partner 2, you will ask, 'How will we know that we met our objective?'"** Write the question on the board. **"Partner 1 will respond to the question by explaining how they will know they learned our objective. You have done this before. Begin"**

- Students will discuss the objective. After 1 minute regain their attention
- Draw an **unlabeled** circle graph matching the attached graph on the board large enough to fit your vocabulary cards.

Introduction to New Material (15 minutes)

T: "We will talk about your plans again at the end of the lesson." Show them the cake mix. **"Making soil is similar to making a cake. Think about it. When you make a cake, can you just put this box into the oven and then immediately pull out a delicious cake? I wish! What do we need to do to make this cake?"**

S: Put the mix in a bowl, add other ingredients, and bake it.

T: "Making soil from rocks is a process much like this. You have to add other things, mix them together, and it takes time to make it."

- Pass out the containers of sediments for students to look at and touch. You may need to review information about weathering and erosion in more detail depending on their understanding from the previous two lessons.

T: "Remember that rocks are broken down by weathering and then moved all over the place by erosion? We call those broken down rocks sediments." Post your sediments vocabulary card in the part of the circle graph representing 45%. **"The sediments in the container on your tables are piled up. Is it soil or is it just a pile of sediments?"**

S: Some may say that it is already soil, and others may say that it is just sediments.

T: "Think about the cake mix again." Pour the mix into the bowl. **"This cake mix will represent our sediments. It isn't a cake yet just like the sediments aren't soil yet. Hmm. What do we need to add to make this a cake?"**

S: Add other ingredients.

- Add eggs and oil

T: "The eggs and oil are going to represent what we call organic matter." Post Organic Material vocabulary card in the part of the circle graph representing 5%. **"Organic Matter is the material in the soil that is alive, or was alive once. What do you think might be in soil that is alive or was once alive? Brainstorm with your partners for thirty seconds. Go."**

S: Bugs. Leaves. Plants. Flowers.

- Invite 2-3 students to share their ideas.
- Pass out the containers of leaf mold

T: "There are so many organic parts, or components, in soil. You guys came up with quite a few! The containers that I gave you have 'leaf mold' in them. This is what leaves look like after they have started to decay. As you look at them. I want you to discuss with your groups, where you think the parts of the leaves that are gone went."

- Give them a minute to look at the leaf mold and discuss the question. Regain their attention.

T: "Did you see the holes in them? Where do you think the parts of the leaves that are gone went?"

S: Into the ground.

T: "Right! The parts of the leaves that are gone are now in the soil. We will talk more about organic matter tomorrow and how it helps our soil. So, if organic matter gets mixed in with our pile of sediment, then they combine and we are getting closer to making soil, just like we are closer to turning this" refer to the bowl "into cake."

- Add water.

T: "Water is another important part of making this cake, and it is a big part of making a soil too. Soil has water." Post the water vocabulary card in one part of the circle graph representing 25%. Gently move the moist soil off the paper towel and show them that the paper towel is not a little wet. **"Rain and snow seep into the pile of sediments and organic matter."**

- Mix up the cake mix.

T: "Why do we have to mix up the ingredients in this cake?"

S: To combine them and make them taste blended. They will have various answers.

T: "Yes, it is important to have all the ingredients combined together, but it also adds another important component to the cake. Mixing the ingredients adds air." Post your air vocabulary card in one part of the circle graph representing 25%. **"That's why you have to mix the ingredients together for several minutes. You need to add plenty of air into it or your cake will look like pancake! Soil is the same way. It needs air. That's why we dig, plow, or till the soil before we plant."**

- Use your document camera and the following dialogue to help you explain the procedure as you do it.

T: "As I pack this soil down, I am removing as much air as I can. I am pushing it out. Then I am going to loosen and the air will go back in. Watch what happens if I pour water into the soil. The bubbles tell us that there was air in the soil. When we pour water into the cup, the water takes the place of the air and pushes the air out as bubbles. If we have more water, than we have less air. If you have more air and drier, we have less water. That is why we see lots of worms on the top of the soil after a big rainstorm. There isn't enough air!"

- On your circle graph, draw arrow showing movement between air and water.
- With a finger, loosen the soil so it is near the top of the cup again.
- Pour water slowly into the soil until it starts collecting on the top. Observe the air bubbles rising to the top.
- On your circle graph, draw arrow showing movement between air and water.

T: "Air is added to soil over time and that is the last thing that we need to make soil and this cake. Time." Post your time vocabulary card next to your circle graph. **"Making soil isn't nearly as fast as making a cake. The cake only needs to cook for twenty or thirty minutes. Soil takes hundreds of years to make."**

Guided Practice: (20 minutes)

- Post your sentence frames on the board.
- Pass out your soil samples on small plates to each student if you haven't done so (see note at the start of lesson).
- Pass out a lab sheet, tweezers, and hand lenses to each student.

- Use your document camera for the modeling cycle.

T: “It is finally time for us to use our soil samples. Listen carefully to the instructions and then you will be ready to work with your partners.”

- Show students a cup or pile of soil.

T: “You are all going to examine a sample of soil and see if you can really determine what its components are. You have to look closely and work carefully. Please try not to move the soil off the plate, or there could be a big mess for you to clean up afterwards! As you observe your soil you will work with your group to identify the basic components of soil, one at a time, and record them on your lab sheet. Let’s do one together so that you know what to do.”

Use the modeling cycle:

T: “We are going to use the hand lens to examine our soil. First, let’s look for air. One of the basic components of soil, and maybe the hardest to identify because we can’t actually see it.”

Teacher Does:

T: “When I say ‘Go!’ both Partner 1 and Partner two will look carefully at the soil and Partner 1 will say, ‘Air (point to air on your components graph so they know that you are using it to fill in the blank on the sentence frame) is a basic component of soil.’ Partner 2 will then find an example of air in the soil sample and will answer using the second sentence frame to identify it. Next Partner 2 will use the first sentence frame and the same component. They will say, ‘Air (point to air on your components graph again) is a basic component of soil.’ and Partner 1 will use the second sentence frame to talk about the evidence of air that they found. I am Partner 1 and this is my imaginary Partner 2 (you could also use a puppet, stuffed animal or other object to represent partner 2).

- Refer to the sentence frames throughout the modeling cycle.

T(1): “Air (point to air on your components graph so they know that you are using it to fill in the blank on the sentence frame) is a basic component of soil.”

T(2): “These holes are an example of air, because I know that air fills empty spaces.”

T(2): “Air (point to air on your components) is a basic component of soil.”

T(2): “This dry part of the soil is example of air, because I know that air fills the space where water will be later.”

T: “When we are sure that we have found all of the evidence for the category of ‘air,’ we will each write them on our individual lab sheets. You can write these on your lab sheet as I write them on mine.”

- Put a lab sheet under your documents camera and write “holes” on one line and “dry spots” on the second line under “air”.
- Refer to the components graph as you talk about the components they need to cover.

T: “As a partnership, we need to cover all four of the basic soil components. My partner and I will now do ‘air’ again. Watch carefully!”

Teacher Does with a Student:

- Refer to the sentence frames throughout the modeling cycle. Call on a student to help model the process for you.

T: “Air (point to air on your components graph so they know that you are using it to fill in the blank on the sentence frame) is a basic component of soil.”

S: These holes are an example of air, because I know that air fills empty spaces.

S: Air is a basic component of soil.

T: “This dry part of the soil is example of air, because I know that air fills the space where water will be later. We would now continue this process, looking for more examples, and then write all of our examples on our lab sheets.”

Two Students Do:

- Call on another student to model it for the class with the student you worked with.

S1: Air (point to air on your components graph so they know that you are using it to fill in the blank on the sentence frame) is a basic component of soil.’

S2: These holes are an example of air, because I know that air fills empty spaces.

S2: Air is a basic component of soil.

S1: This dry part of the soil is example of air, because I know that air fills the space where water will be later.

T: “And they would now continue looking for more examples and then write them on their lab sheets. Great! Now, it is time for you to try this with your partners. I will give you at least 5 minutes to do this. You might not believe me now, but it can be a lot of fun to look for things in even a tablespoon of soil. If you are all on task, I will give you an additional 5 minutes. Ready? Go!”

All Students Practice:

- Walk around the room observing and helping where needed. Ensure students are staying in the target language.

- They will need to full ten minutes if you encourage them to really look hard for the different elements. Help them organize what they are finding. For example, put living or once living in a pile, and sediments in another pile. They may struggle finding examples of water—remind them of the experiment that you did and show them that their paper plates are a little moist under the soil.
- Get the students' attention and have a few partnerships share on or two of the components that they found interesting. Show their lists on your document camera and/or have them show their paper plates with the components separated. You may need to spend a lot of time on this. Make sure that they can identify how each element is an example of a different component.

Independent Practice: (5 minutes)

- Remove the vocabulary cards that you have posted on the graph that you have drawn on the board
- Place the exit ticket under the document camera for the class to see.

T: "To see if we met our objective, we're going to complete this exit ticket. There are two parts. Part one says, 'Write the components in the correct portion of the circle graph.' So, in each of these portions, you need to write the correct label." Refer to the vocabulary cards of the components. "You can use these cards to help you correctly write the words. Part two says, 'List two elements that would represent each component.' Since you have all looked so closely for these elements, this should be really easy for you. You will work on this independently. Your papers will be passed out and when I say, 'Go' you will write your names and begin. Turn your paper over when you are finished."

- Pass out the exit tickets to the students.

T: "Go!"

- Give students 5 minutes to write their five sentences. Walk around the class and ensure students understand the directions. After five minutes, collect students' papers.

Closing: (5 minutes)

T: "On the board you will see our learning objective for today. Let's see if we met our objective."

Point and refer to the objective on the board **'I can identify the four basic components of soil and give examples of each with my partner in a lab and independently on my exit ticket.'**

T: "When I say 'go' you will turn to your partner and you will both read the objective on the board together. Go." Give the class 20 seconds.

Students read the objective.

T: "When I say 'go' Partner 1 will turn to Partner 2 and explain what they learned today in their own words."

S1: I learned about the components of soil and identified them in my own soil sample.

- Get the students' attention.

T: "When I say 'go' Partner 2 will turn to Partner 1 and explain what they learned today in their own words."

S2: I learned that soil isn't just broken down rocks. It has other parts as well.

- Call on a high, medium and low student in that order to share what they learned.
- When applicable, ask students the question, "How do you know that you learned that?"

T: "Okay, just as a final assessment, let's see how good we feel about what we learned today. If you feel like you can meet the objective independently, put your thumb up. So if you could tell me what the four basic components of soil are, put your thumb up. If you could do it with a little help, you'll put your thumb sideways. If you cannot do it at all, even with some help, or if you feel like you need a lot of help put your thumb down. When I say, 'Go' you will put your thumb up, sideways, or down. Go!"

- Students show their level of mastery.

T: "If you feel like you could tell me at least one thing found in a soil sample for each category, put your thumb up. If you could do it with a little help, you'll put your thumb sideways. If you cannot do it at all, even with some help, or if you feel like you need a lot of help put your thumb down. When I say, 'Go' you will put your thumb up, sideways, or down. Go!"

- Commend students on their hard work and their honesty in showing you how confident they feel with the content. Take note of the students who need a little or a lot of help.

T: "Great! Remember the plans for turning a rock to soil that you made at the beginning of our lesson? How close were you? With your groups, look at your plan and see if there is anything that you want to add. You have 1 minute to talk about this with your group. Think about our cake, and what it needed. Ready? Begin."

S: We need to add time, organic matter, etc.

- Regain their attention and have all groups share briefly.
- Pass out cake (made previously).

T: "Nice job! Before you eat this cake, you need to tell me what each part represents in our soil. The cake mix represented what?"

S: Sediments.

T: "The eggs and oil?"

S: Organic matter.

T: "The water?"

S: Water

T: "You can't be tricked! Now what did mixing the cake have to do with soil?"

S: It was the air component.

T: "And baking it?"

S: Time!

T: "You are so smart! In our next lesson we are going to look a little closer at why soil is so important to us."

Assessment:

Observe students in the guided practice and watch for language production and errors in reasoning

Lab sheets

Exit Tickets

Extra Ideas:

- Have your English Counterpart read the book *Dirt* by Steven "The Dirtmeister" Tomecek aloud to the class

Soil contains Water:

- Another component of soil is water.
- Have students place their soil on a paper towel. Fold it in half and gently press. Return the soil to the plate. Examine the towel. Ask them to describe the condition of the towel. They should observe that it is wet.
- Ask what ingredient was removed from the soil? (water)
- Place one cup of damp soil in a container. Weigh it. Record its weight in their "My Rocks and Soil Book." Place the soil in a sunny window. Weigh it again after a few days and record the new weight.
- Discuss how much water was in the soil. How can they tell?

Air in Soil

- Give each student a straw and give each group a container of water.
- Tell them to blow bubbles in the water. Ask what made the bubbles. (air)
- Challenge the class to think of other examples of bubbles being evidence of air. (fish tanks, scuba divers, bubblegum, etc.)

der Erdboden machen

Stellt einen Gruppenplan auf, in dem ihr darstellt, wie ein Stein zu Erde wird. Ihr könnt Bilder, Wörter, Satzteile oder Sätze dazu verwenden.

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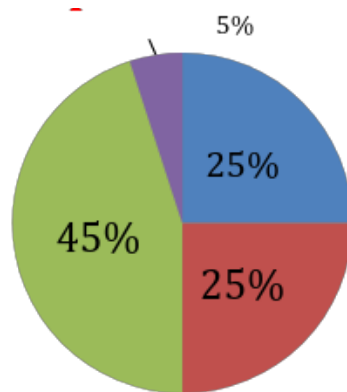
Name_____

Datum_____

Exit-Ticket

1. Schreibe die Komponenten im richtigen Teil des Kreisdiagramm.
2. Führe eine Sache auf, die jede Bestandteil repräsentieren würde.

die Bodenbestandteile



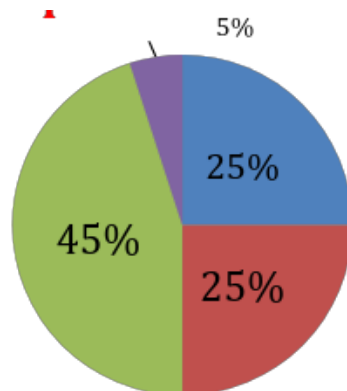
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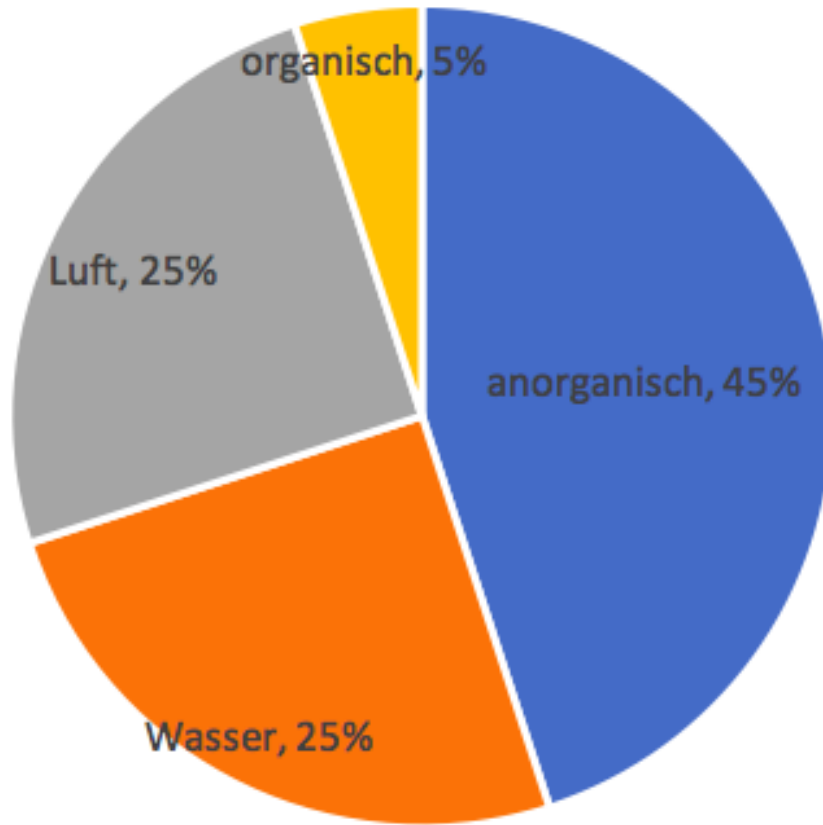
Exit-Ticket

1. Schreibe die Bestandteilen im richtigen Teil des Kreisdiagramm.
2. Führe eine Sache auf, das jede Bestandteil repräsentieren würde.

die Bodenbestandteile



Bodenbestandteile



das Bodenlab

Unser Boden enthält Beweise für all Bodenbestandteile:

Sedimente

Wasser

Luft

organisches Material

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das Bodenlab

Unser Boden enthält Beweise für all Bodenbestandteile:

Sedimente

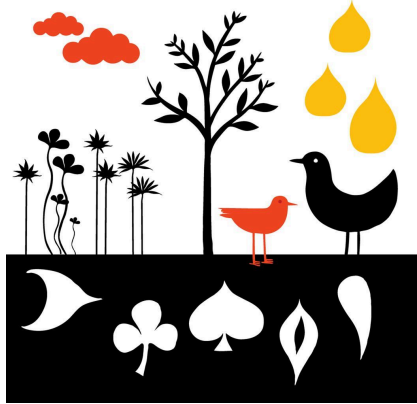
Wasser

Luft

organisches Material

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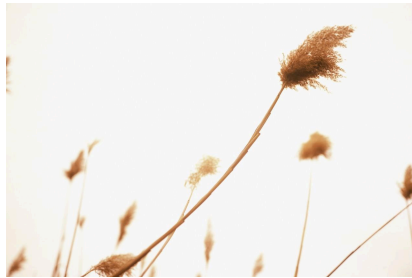
das organische Material



das Wasser



die Luft



die Sedimente



die Zeit



der Boden



das Bestandteil—ein Teil
oder Inhaltsstoff

