

The Formation of Soil

Teacher Facilitation Notes

In General . . .

- Project the slide deck in edit mode—do not show it as a slideshow.
- Hide the speaker notes before projecting. (View/Show Speaker Notes)
- Hide the toolbar. (Click on the up arrow at the right end of the tool bar.)
- Call on students to read the various content shown on slides.
- For each investigation, assemble the needed materials for each group and place in a central location for ease of distribution.
- Duplicate copies of the data sheets for each student.

Materials Needed:

Engage: What is Soil? (Per group)

Silt soil	Clay soil	Sandy soil
Top soil (loam)	Baggies, 4	Sharpie™
Hand lenses, 1 per student		

Explore/Explain: How are Rocks Weathered? (Per group)

Pieces of chalk, 2, broken	Plastic containers with lids, 2	
Pebbles	Stopwatch or timer	Water
Paper towels	Beaker, 50 mL	

Explore/Explain: What is Decomposition? (per group)

Ripe Tomatoes**	Hand lens, 1 per student	Container with lid
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Additional Materials:

Science notebooks, 1 per student	Pencils
<i>Student Data Sheet</i> , 1 per student	<i>Student Evaluation</i> , 1 per student

**Allow time for the tomatoes to fully ripen and begin to decompose. Put a decomposing tomato in a plastic container with a lid for each group.

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Engage: What is Soil?

- Before beginning this lesson, Label 4 baggies for each group with sand, loam, clay, and silt. Put a small sample (50-60 mL) of soil in each of the baggies. Make sure hand lenses are available for each student.
- Read through and discuss the properties and types of soil as desired.
- Have students observe the properties of the soil samples through the baggies with their hand lenses. Discuss the similarities and differences.
- Tell students that during the rest of this lesson, they will be learning how soil is formed.

Explore/Explain: How Are Rocks Weathered on the Earth's Surface?*

- Have all of the necessary materials available in a central location for ease of distribution.
- Read through the question with the students and have them record their hypotheses on their data sheets.
- Depending on student ability level, have groups work through the investigation independently or as a whole class.
- Facilitate a discussion of how the "rocks" (chalk) were changed by shaking, or weathering.
- Watch the video and discuss as desired.

*Rocks can be weathered mechanically (by wind, water, impacts, plant roots, etc.) or chemically (acid rain, etc.) . At this grade level for this Student Expectation, focusing on mechanical weathering by impacts is a good introduction to mechanical weathering. Students will learn more about weathering in 4th and 5th grade.

Explore/Explain: What is Decomposition?

- Give each group a container with a decomposing tomato. Make sure each student has a hand lens.
- Show the slide with the tomato video. Have students look at their tomato and make observations. Show and discuss the time lapse video of a rotting tomato.
- Read and discuss the slides about decomposition as desired.

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Elaborate: How Does Soil Form?

- Call on a volunteer to read the first slide. Discuss as desired.
- On the barn slide, drag and drop the terms that cause weathering to the green oval. Discuss.
- Read and discuss the remainder of the slides as desired. On the last slide of this section call on volunteers to tell what they learned as you type their responses in the text boxes.

Evaluate: Why is Soil Important?

- Read and discuss the slides about the importance of soil.
- Let students complete the quiz independently.
- Discuss as desired.

The Formation of Soil

Name: KEY

Evaluation

- Weathering is–
 - the decay and rot of dead plants and animals
 - the breaking apart of rocks into smaller pieces
 - the amount of waste products left by organisms
 - the result of fungi and bacteria in the soil
- Which of the following are necessary for the formation of soil? Mark all that apply.
 - Small bits of rock
 - Earthworms and bacteria
 - Dead organic matter
 - Concrete sidewalks
 - Water, snow, and ice
 - Plastic bottles
 - Houses and large buildings
- Which of the following is not a reason soil is important to organisms on Earth?
 - Soil provides nutrients for organisms.
 - Soil is a home for many organisms.
 - Water is stored in soil until it can be used.
 - Many organisms eat soil to survive.
- Soil is–
 - piles of dirt and rocks found all over the ground
 - a mixture of tiny rocks, minerals, and decayed organic matter
 - made up of dust, air, water, and very small animals
 - formed on the Earth's surface in a short period of time

The Formation of Soil

Name: KEY

Evaluation

5. Which best explains how soil is formed?
- A Farmers add fertilizer to dirt
 - B People dig up the dirt to plant roses
 - C Weathered rocks mix with water, minerals, and organic matter
 - D Dirt that gets used up is moved by the wind to deserts and under the ocean
6. During a science class, a student used a hand lens to look at a natural material. She wrote in her journal, "The material has very small pieces that look like tiny rocks. There are also bits of dead leaves. The material is a dark color." The student was most likely looking at—
- F different fossils
 - G a pile of minerals
 - H pieces of plastic
 - J a sample of soil
7. Why is decomposition important to the formation of soil? Decomposition—
- A adds nutrients to make the soil
 - B causes dead things to disappear
 - C gets rid of pollution and wastes
 - D only happens above the ground
8. Clay and sand are two types of soil. Clay has very small pieces of rock while sand has larger pieces. What process produces the pieces of rock found in each type of soil?
- F Decay
 - G Decomposition
 - H Freezing
 - J Weathering

The Formation of Soil

Name: _____

Explore: The Weathering of Rocks

Question

How are rocks weathered by Earth's natural processes?

My Hypothesis

1. Record your observations of changes to the pieces of chalk.

2. What is weathering? _____

3. How does weathering change rocks? _____

My Conclusions: How does weathering affect the formation of soil?

The Formation of Soil

Name: _____

Evaluation

1. Weathering is–
 - A the decay and rot of dead plants and animals
 - B the breaking apart of rocks into smaller pieces
 - C the amount of waste products left by organisms
 - D the result of fungi and bacteria in the soil

2. Which of the following are necessary for the formation of soil? Mark all that apply.
 - F Small bits of rock
 - G Earthworms and bacteria
 - H Dead organic matter
 - J Concrete sidewalks
 - K Water, snow, and ice
 - L Plastic bottles
 - M Houses and large buildings

3. Which of the following is not a reason soil is important to organisms on Earth?
 - A Soil provides nutrients for organisms.
 - B Soil is a home for many organisms.
 - C Water is stored in soil until it can be used.
 - D Many organisms eat soil to survive.

4. Soil is–
 - F piles of dirt and rocks found all over the ground
 - G a mixture of tiny rocks, minerals, and decayed organic matter
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The Formation of Soil

Name: _____

Evaluation

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