

## Photo Description



This image shows a cross-section of soil with different layers visible. At the top, we can see green grass and plant roots growing down into the dark soil. Below that are layers of darker soil and reddish-brown material, showing how soil is made of many different things mixed together.

## Scientific Phenomena

**Anchoring Phenomenon:** Soil has visible layers and contains living things (plants, roots, organisms) and non-living materials (rocks, minerals, decomposed matter).

**Why This Happens:** Soil forms over long periods of time as rocks break down into tiny pieces and mix with dead plants and animals. Gravity pulls heavier materials down, creating natural layers. Plants grow roots down into the soil to find water and nutrients they need to survive. Living organisms in the soil help break down dead material and create a rich environment where new plants can grow.

## Core Science Concepts

- \* **Soil Composition:** Soil is made up of many things—rocks, minerals, dead plants, dead animals, water, and air all mixed together.
- \* **Soil Layers:** Different materials settle in different places, creating layers in soil. Darker soil near the top usually has more organic material (dead plants and animals), while deeper layers may have more rocks and minerals.
- \* **Living Things in Soil:** Plants, worms, bugs, and microorganisms live in soil. Plant roots grow down into soil to absorb water and nutrients.
- \* **Weathering and Decomposition:** Over time, large rocks break into smaller pieces, and dead organisms break down, becoming part of the soil.

### Pedagogical Tip:

For Kindergarteners, focus on observable, hands-on exploration rather than abstract concepts. Use sensory language: "Feel the bumpy rocks," "Smell the earthy soil," "See the roots." Avoid overwhelming them with terminology; instead, repeat simple phrases like "Soil is made of tiny pieces" throughout the lesson.

### UDL Suggestions:

**Multiple Means of Representation:** Provide real soil samples students can examine with magnifying glasses, plus large photographs and videos showing soil close-up. Some students may understand soil better through tactile exploration than visual observation alone.

**Multiple Means of Engagement:** Connect soil to their lives: "Plants in our classroom need soil to grow!" or "Worms live in soil and help gardens." Allow choice in how they explore—some students may prefer digging, others drawing or discussing.

**Multiple Means of Expression:** Accept varied responses: drawing soil layers, building a soil model, acting out plant roots growing, or verbally describing what they observe. Don't require only one type of answer.

### Discussion Questions

1. What do you see in different parts of the soil? (Bloom's: Remember | DOK: 1)
2. Why do you think plant roots grow down into the soil instead of up into the air? (Bloom's: Infer | DOK: 2)
3. What do you think happens to a leaf after it falls to the ground and stays in the soil for a long time? (Bloom's: Analyze | DOK: 2)
4. How do you think soil helps plants grow? (Bloom's: Explain | DOK: 3)

### Extension Activities

1. Soil Jar Exploration: Fill a clear jar with soil from outside. Let students observe and describe what they see using magnifying glasses. Ask them to draw the different colors and materials they observe. (Supports observation and descriptive language skills)
2. Plant a Seed in Soil: Give each student a small cup with soil and a bean or grass seed. Have them water it, observe daily, and draw pictures of the root growing down into the soil over 2-3 weeks. Connect to: "The roots need soil to help the plant grow!" (Supports understanding of plant-soil relationships)
3. Soil Sensory Bin: Create a sensory exploration station with clean soil, rocks, sticks, leaves, and worms (if available). Let students dig, feel, and observe. Discuss: "What do you feel? What do you see living in the soil?" (Supports tactile and observational learning)

### NGSS Connections

Relevant Performance Expectation:

- K-ESS2-1: Use and share observations of local weather conditions to describe patterns over time.
- K-LS1-1: Use observations to describe patterns of what plants and animals (including humans) need to survive.

Disciplinary Core Ideas:

- K-ESS2.A (Earth Materials and Systems)
- K-LS1.A (Structure and Function)

Crosscutting Concepts:

- Patterns (Layers in soil follow patterns)
- Systems and System Models (Soil is a system with living and non-living parts)

### Science Vocabulary

- \* Soil: The dark material on the ground made of tiny pieces of rock, dead plants, and animals all mixed together.
- \* Roots: The parts of a plant that grow down into the soil to drink water and get food for the plant.
- \* Layer: A flat sheet or level of something, like the different levels you see when you look at soil from the side.
- \* Decompose: When dead plants and animals slowly break down and become part of the soil.
- \* Organism: Any living thing, like plants, animals, bugs, or worms.

## External Resources

### Children's Books:

- The Tiny Seed by Eric Carle (demonstrates seed growth and plant life cycles)
- Dirt by Maya Gottfried, illustrated by Robert Andrew Parker (celebrates soil and exploration)
- Plants Can't Sit Still by Rebecca Hirsch (explains how plants use soil and roots)

### YouTube Videos:

- "How Do Plant Roots Grow?" by National Geographic Kids (2:30 minutes) — Shows time-lapse video of roots growing down into soil. <https://www.youtube.com/watch?v=example-roots>
- "What's In Soil?" by Crash Course Kids (4:00 minutes) — Explores soil composition with engaging visuals and simple explanations. <https://www.youtube.com/watch?v=example-soil>