

## Photo Description



A seed is growing into a new plant on a white paper towel. The seed has a long green stem with two small leaves at the top. White roots are growing out from the seed and spreading across the paper.

## Scientific Phenomena

This image shows seed germination - the process where a seed begins to grow into a new plant. The seed absorbed water, which activated enzymes inside that broke down stored food (starches and proteins). This provided energy for the embryo inside the seed to begin growing. The radicle (first root) emerged first to anchor the plant and absorb water, followed by the shoot that grows upward toward light. This is a fundamental life process that allows plants to reproduce and continue their species.

## Core Science Concepts

1. **Seed Structure and Function:** Seeds contain an embryo (baby plant), stored food, and a protective coat that allows plants to reproduce and spread to new locations.
2. **Plant Growth Requirements:** Plants need water, air, and warmth to begin growing from seeds, though they don't need soil or sunlight until after germination begins.
3. **Root and Shoot Development:** The root system grows downward to anchor the plant and absorb water and nutrients, while the shoot grows upward toward light for photosynthesis.
4. **Life Cycles:** This represents the beginning stage of a plant's life cycle, showing how living things grow and change over time.

### Pedagogical Tip:

Have students draw and label their observations daily when growing seeds. This helps them notice small changes and builds scientific observation skills while reinforcing vocabulary.

### UDL Suggestions:

Provide multiple ways for students to document observations: drawing, taking photos, using voice recordings, or dictating to an adult. This supports diverse learning needs and communication styles.

## Zoom In / Zoom Out

1. **Zoom In:** Inside the seed, cells are rapidly dividing and growing. Water enters through the seed coat and activates special proteins called enzymes that break down stored starches into sugars, providing energy for the tiny plant embryo to grow.

2. Zoom Out: This germinating seed is part of a larger plant life cycle that connects to entire ecosystems. When this plant matures, it may produce flowers, fruits, and new seeds that feed animals, provide oxygen, prevent soil erosion, and continue the cycle of life in nature.

### Discussion Questions

1. What do you think the plant needed to start growing from the seed? (Bloom's: Analyze | DOK: 2)
2. Why do you think the roots grew before the leaves appeared? (Bloom's: Evaluate | DOK: 3)
3. What might happen if we put this growing plant in a dark closet for a week? (Bloom's: Predict | DOK: 2)
4. How is this baby plant similar to and different from a baby animal? (Bloom's: Compare | DOK: 2)

### Potential Student Misconceptions

1. Misconception: Seeds need soil to start growing.  
Clarification: Seeds have their own stored food and only need water, air, and warmth to begin germinating. Soil becomes important later for continued growth.
2. Misconception: The roots and leaves grow at the same time.  
Clarification: The root (radicle) almost always emerges first to anchor the plant and absorb water before the shoot with leaves appears.
3. Misconception: All seeds look the same inside.  
Clarification: Different plants have different sized seeds with varying amounts of stored food, but all seeds contain the same basic parts: embryo, stored food, and seed coat.

### NGSS Connections

- Performance Expectation: 2-LS2-1 - Plan and conduct an investigation to determine if plants need sunlight and water to grow
- Disciplinary Core Idea: 2-LS2.A - Plants depend on water and light to grow
- Crosscutting Concept: Patterns - Patterns in the natural world can be observed and used as evidence

### Science Vocabulary

- \* Germination: When a seed starts to grow into a new plant
- \* Root: The part of a plant that grows down to get water and hold the plant in place
- \* Shoot: The part of a plant that grows up and will have leaves and stems
- \* Embryo: The tiny baby plant inside a seed
- \* Seedling: A young plant that just started growing from a seed

### External Resources

Children's Books:

- From Seed to Plant by Gail Gibbons
- A Seed Is Sleepy by Dianna Hutts Aston
- The Tiny Seed by Eric Carle

YouTube Videos:

- "Seed Germination Time Lapse" - Shows bean seeds growing over several days in fast motion: <https://www.youtube.com/watch?v=w77zPAAtVTul>
- "Parts of a Seed Song" - Educational song about seed parts and germination for kids: <https://www.youtube.com/watch?v=QJPQ0cYBZSY>