

# Beans & Germination!

Germination is the process where a **seed** turns into a **plant**. When a seed germinated you will begin to see **roots**, then a **stem**, **leaves**, and **flowers**!

## WHAT IS A SEED?

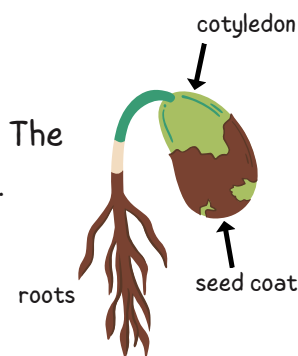
Beans are seeds! A seed contains an **embryo** that will eventually grow into a full sized plant. An embryo is like a baby plant with the necessary parts needed to grow into an adult plant. Seeds have an important outer shell called a **seed coat** that keeps the embryo safe inside. A seed also has **nutrients** inside for the embryo. The **cotyledon** is beneath the seed coat and grows into leaves.

## STAGES OF GERMINATION

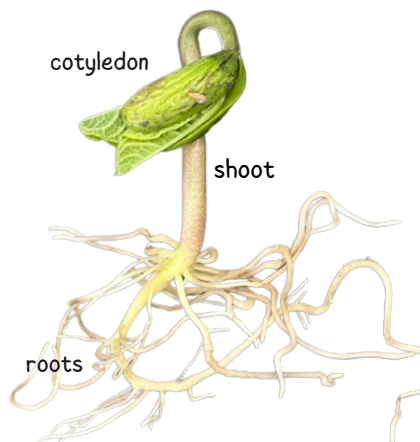
First water gets into the seed and the seed coating splits open.



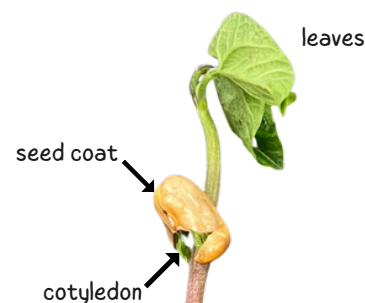
Oxygen enters through the open coating and the seed can begin to grow. The roots emerge from the seed. The roots grow downward into the soil.



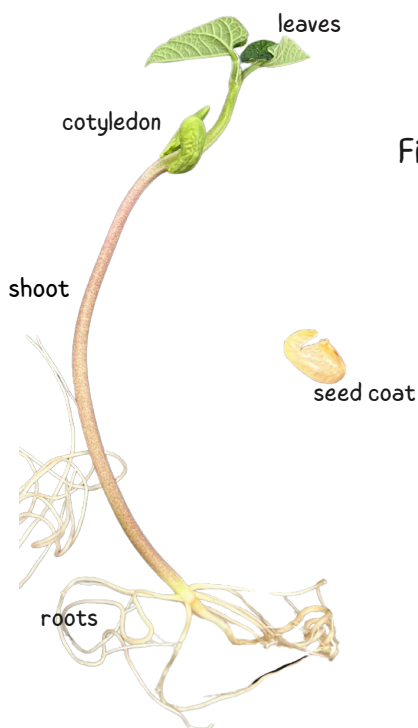
Next, the shoot develops. The shoot grows upward and will be the stem of the plant.



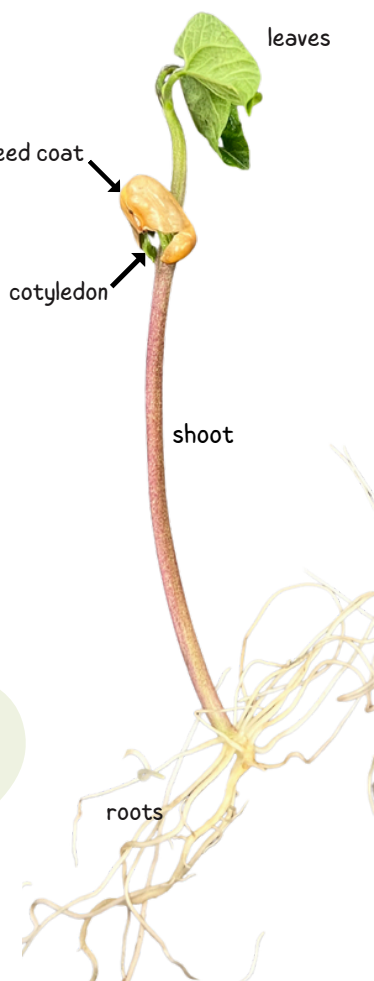
Leaves grow from the top of the cotyledon and aim to the sky.



Finally the cotyledon becomes leaves and the seed coat is dropped. Now the seed is a plant!



The seed coat can fall off at any time once the seed begins to germinate.



# Ziplock Greenhouse

## Materials

- sandwich bag
- Whispering Roots Ziplock Greenhouse .....→  
print out or construction paper
- scissors
- tape
- paper towels
- water
- beans



## Instructions

1. Cut out your greenhouse. Use either a piece of construction paper, or the greenhouse printout below. Make your greenhouse large enough to frame your beans and still allow a large window for viewing.
2. Wet a paper towel with water (get it very damp) and push it into the ziplock. The paper towel should take up about half the bag.
3. Add your beans to the ziplock with the paper towel. Some good beans to use are kidney beans, pinto beans, lima beans, and Cannellini beans. The beans should be pressed between the paper towel and the side of the bag.
4. Seal the plastic bag tightly to trap moisture.
5. Tape your plastic bag to the greenhouse cut out. Make sure you tape it together so that the beans are visible and the paper towel side is on the back so you can see them grow!
6. Tape your Ziplock greenhouse to a sunny window.
7. Watch your beans grow! Track the growth progress on the observation sheet. Beans will take a few weeks to fully grow (but this can vary).
8. Once beans have roots, stems, and leaves, you can transport them into soil and continue growing!

Try growing different kinds of beans and discover which grows faster. Try making two greenhouses and place one in a sunnier window to see what happens.



**Write your name on  
the line!**



WHISPERING ROOTS

**GREENHOUSE**

**Cut this part out!**



# GERMINATION OBSERVATIONS



Germination is the process of a seed growing into a plant! Start your observations on the day you first add your bean to your greenhouse. Draw and write your observations below.

	WRITE WHAT YOU SEE! CHECK THE BOTTOM OF THE PAGE FOR IDEAS	DRAW YOUR BEAN
WEEK 1		
WEEK 2		
WEEK 3		
WEEK 4		
DAY 5		

What do you see? How does your bean look different today? Does it have new parts? Is it taller? Is it wider? Is there new color? Can you label any of the new parts? Is your bean growing faster or slower than your classmates?