



4-H Earth Is Our Home Activity



Topic: Germination and plant growth • **Estimated time:** 12 hours to soak seeds, then about 40 minutes • **For individuals and groups**

Easy Bean Babies

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Let's explore how lima beans grow from seed to plant. With sunlight, heat, and moisture, a seed **germinates** and grows. All the parts that eventually become the plant are contained in the seed.

Supplies

- lima bean seeds, pre-soaked for 12 hours before activity
- cotton balls
- toothpick
- Bean Baby house with window cut out
- reclosable, zipper sandwich bag
- tape

Learning Outcomes

Project skill: Identifying seed parts and germinating lima bean seeds • **Life skill:** Understanding systems

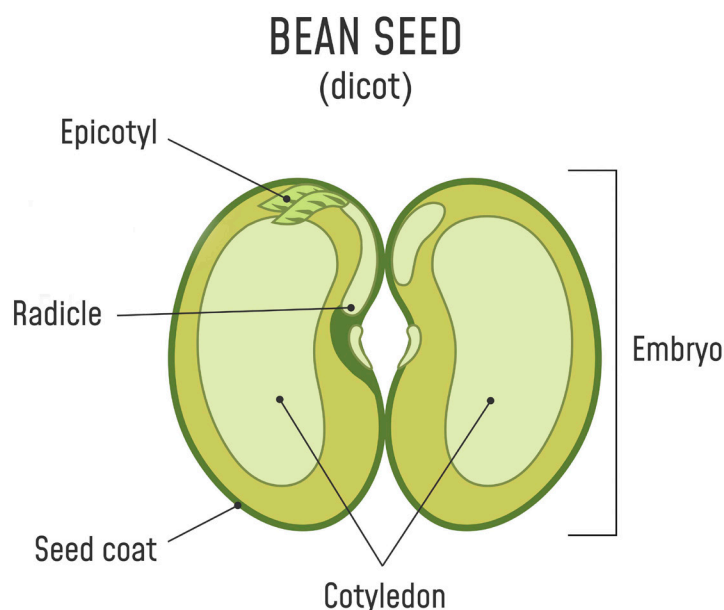
Educational standard: NGSS MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. • **Success indicator:** Identifies seed parts and germinates lima bean seeds



What to Do

Part A

1. Soak the lima bean seeds overnight or for about 12 hours. Use one bean seed to dissect. Use the toothpick to gently remove the seed coat from around the bean.
2. After you have removed the seed coat, carefully separate the two pieces of the bean. Those two important pieces are the **cotyledons**. They are the food for the plant as it sprouts and grows. A seed with two cotyledons is called a **dicot**. After the cotyledons are pulled apart, notice the two tiny leaves. Those are the **epicotyl**. The baby root is the **radicle**.
3. Compare your bean to the drawing here. Can you identify all the parts in the bean you split apart?



Part B

4. Soak three cotton balls in water and squeeze out any excess, leaving them wet but not dripping. These wet cotton balls will be like soil.
5. Place the cotton balls in the sandwich bag and put 2 or 3 of the beans (not the dissected one) in with them. Close the bag.
6. Tape the bag to the backside of the Bean Baby house, and then tape the Bean Baby house to the inside of a sunny window. The bag acts as a **greenhouse**—providing sunlight and keeping in warmth and moisture.

Observe the seeds each day for evidence of green shoots sprouting from the seed. If possible, take a picture of your window greenhouse and attach it to this page.

Talking It Over

Write your answers to these questions on a separate piece of paper and talk about them with your project helper or another caring adult.

SHARE What do plants need to germinate and grow?

REFLECT What specific parts of the lima bean seed help it to grow into a plant?

GENERALIZE Why are plants important to us?

APPLY When would it be good to have a greenhouse?



More Challenges

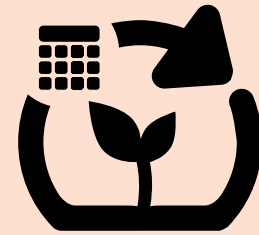
When the beans have sprouted and grown to 3 or 4 inches tall, transplant them into a small pot with soil so they can continue growing. Place it in a sunny window and keep it moist. Try using a biodegradable peat or paper pot, so that when it is eventually planted the ground, you do not have to disturb the roots.

Background

It's amazing what you can see in the world around you by taking a close look. When you dissected the lima bean seed, you could see all the parts that grow into the plant. Every plant that grows from a seed works the same way. Imagine how many seeds grow into plants that provide food. Billions!

Beans are dicots, meaning they have two sides, or cotyledons. Some seeds, like corn, are **monocots** and have only one cotyledon.

Seeds need sunlight, moisture, and heat to germinate. We can give plants a head start by starting them in a greenhouse. Greenhouses are made of clear materials, like glass or plastic, that allow sunlight to enter. Light energy entering the greenhouse is converted to heat energy, providing the warmth needed. When moisture is also present, conditions are just right for germination.



Did you know?

Lima bean is a **perennial** plant, meaning it lasts for several years, but is often grown as an **annual** plant, one that lasts only one growing season.

Vocabulary Words

annual. A plant that completes its life cycle in one growing season or year.

cotyledon. The food source inside the seed.

dicot. A seed that has two cotyledons, like a lima bean.

epicotyl. The two small leaves in a seed that will grow into the plant.

germinate. To begin to grow, to sprout.

greenhouse. A structure with transparent walls/roof that allows sunlight in; used to grow plants.

monocot. A seed with only one cotyledon, like corn.

perennial. A plant that comes back every year.

radicle. The lower part of a plant embryo or seedling.



Easy Bean Baby House

