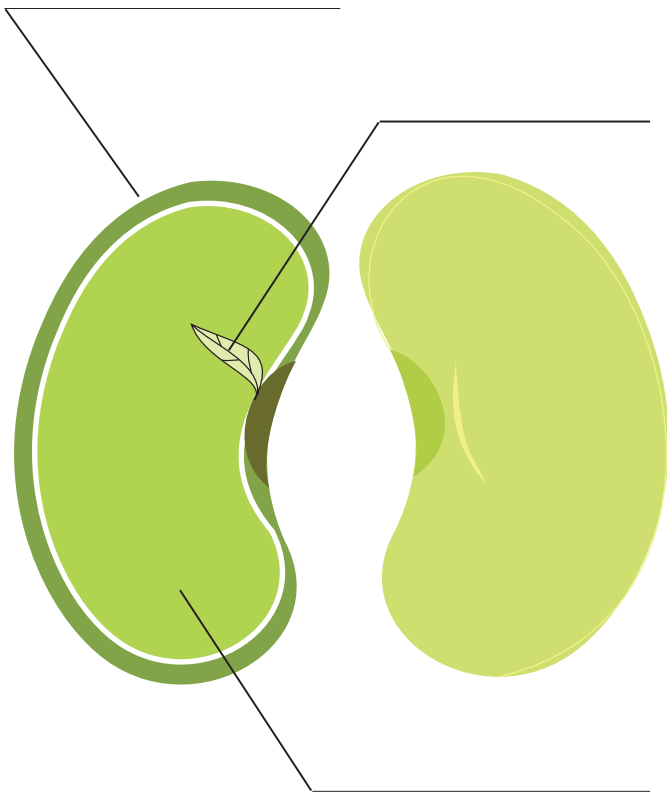


## Seeds Up Close

### Part 1: Inside a seed

**Supplies:** 11 lima or kidney beans, 1 cup water, one glass, pencil

1. Look at a kidney or lima bean seed. Guess what is inside the seed.
2. Soak the lima beans in the water overnight (24 hours).
3. Ask an adult helper or friend to help you carefully peel the outer coat from one of the seeds. Split the coatless seed in half with a fingernail. Draw what you see.
4. Label the seed diagram with these parts of the seed: *seed coat*, *cotyledon*, *embryo*. Learn more about these seed parts by looking up the words in the glossary inside the [Gardening Curriculum A - See Them Sprout](#).



### What are seeds?

What are seeds, and how do they sprout? When conditions are right—air, water, and warm temperatures—a seed sprouts or germinates.

#### This happens in steps:

1. The seed takes in water through the seed coat.
2. It enlarges.
3. A root emerges first.
4. Then the shoot appears.

What does the have to do with gardening? After doing this experiment, you can understand why it's important to treat seeds with care if you want them to sprout.

- Seeds planted too deeply use up all the temporary food before the tiny plant can reach light.
- Seeds planted in dry soil don't have enough moisture to germinate.
- Seeds planted in soaking wet soil may not get enough air or may rot.



### Try this...

#### Project skill:

Understand seed germination

#### Life skill:

Using scientific methods

## Part 2: Germinating seeds

*Supplies: several paper towels, small plastic bag, long sheet of paper, pencil, magnifying glass (optional), 10 seeds soaked overnight from part 1*

1. What question do you have about sprouting? I wonder . . .

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2. Sprout a guess. I predict . . .

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3. Get growing.

Dampen a paper towel. Fold it once, and place all the seeds on it. Fold it again, and place it in a plastic bag for a week. Keep it in a warm place. Write down the date. Moist seeds should sprout in 7 to 10 days.

4. Record what you see.

- Make a folding “book,” so it’s easy to write down what you see. Fold a long strip of paper so it looks like an accordion.
- Look at the seeds every day. Every time you observe a change in your seeds, draw on one section of your folding book.

5. Harvest your findings.

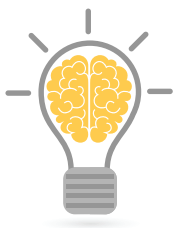
After a week or so, unfold your book and look at the pictures. What happened? You probably have a storyboard about “How a Seed Sprouts.”



## Grow What You Know

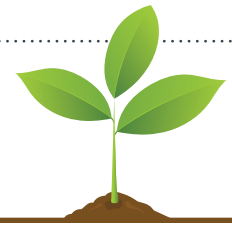
Science is a way of looking at the world. It’s like a game for understanding what’s going on around us, and like all games, it has rules. Science is played by special rules called the scientific method. The scientific method has eight basic steps:

- Ask a question.
- Gather information about the question.
- Make a guess about the answer (hypothesis).
- Test your guess, usually by doing an experiment.
- Get the answers.
- Compare your answers with your guess.
- Decide what it means (conclusion).
- Tell others what you found.



**Learn what new words mean by matching the words in the list below with their definitions.**

<b>Seed coat</b>	A tiny plant complete with leaf, stem, and root parts
<b>Cotyledon</b>	To begin to grow; sprout
<b>Embryo</b>	Contains temporary food until the plant can grow up to make food with its leaves
<b>Germinate</b>	Contains the stem and leaves
<b>Shoot</b>	Protects the embryo



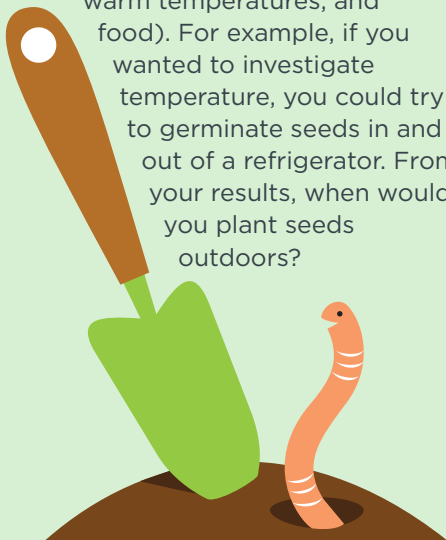
## DIG DEEPER

Go on a scavenger hunt in your kitchen to find other examples of seeds. How many different seeds did you find? Sort them by color, shape, size, texture (how it feels), and/or weight. Is the seed size an indicator of the plant size? Why or why not? Give examples.

Part 2 of this activity is also a way to test whether the seeds you save from one year to another can be used again. It's called a germination test. If four or five seeds out of 10 germinate, they're not in good shape, but you can still use them if you have to. If six or more of the 10 seeds germinate, your seeds are in good shape. If eight or more seeds germinate, they're excellent!

Some seeds can last for a long time before sprouting. Go online and research the Svalbard Global Seed Vault. How long will those seeds last?

Design a way to investigate if other factors besides moisture affect sprouting. Think about the things that plants need—light, water, air, warm temperatures, and food). For example, if you wanted to investigate temperature, you could try to germinate seeds in and out of a refrigerator. From your results, when would you plant seeds outdoors?



## What's it all About?

1. Share with your project helper what you predicted would be inside the seed, and what really was inside the seed.

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2. How did different parts of the seeds change during your week of observation?

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3. Where else, besides in school, can you use your skills of observing, questioning, predicting, investigating, making conclusions, and communicating?

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4. How might you use these skills in the future?

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To go deeper, find the full curriculum at [Shop4-H.org/Gardening](http://Shop4-H.org/Gardening)