

**LESSON PLAN** by: Meganmarie Pinkerton

**Adapted from:** Activities for Teaching Science as Inquiry

**Lesson:** Investigating Bean Pods and How They Grow **Length:** 10-30 minutes

Three weeks

**Age or Grade Intended:** 3rd Grade

**Academic Standard(s):**

3.1.3 Keep and report records of investigations and observations\* using tools, such as journals, charts, graphs, and computers.

3.1.4 Discuss the results of investigations and consider the explanations of others.

**Performing Objectives:** After participating in a seed lesson, students will record daily seed observations for three weeks on a chart.

After observing seed growth for three weeks students will write a paragraph including an explanation of observations and the results of the experiment.

**Advanced Preparation/Materials:** The teacher needs for each pair of students: 7 unsoaked lima beans, a magnifying glass, a ½ cup of water, paper towels, 7in. by 8 in. clear zip-lock baggie, stapler, ruler, water, and a copy of the “Investigating Beans” worksheet. The teacher needs to decide how to hand out materials and how the students will be divided, there also needs to be an open area to put all the baggies.

**Introduction/Motivation: Engage:** Give each pair/group of students the beans, baggies, cup of water paper towel, magnifying glass, and ruler. What do you think the inside of a seed looks like? Ask them to observe the lima beans, what is inside the beans and how could we use these materials to determine what is inside? Write observations and draw a picture. (Bloom’s knowledge, Gardner’s kinesthetic)

**Step-by-Step Plan:**

1. Discuss ideas for observing the insides of lima beans. Instruct students to put seeds in the cup of water to soak overnight.
2. **Explore:** Next day observe changes: How have the seeds in the water changed? How are the soaked seeds different from the unsoaked seeds? Why did this change happen? (Bloom’s comprehension)
3. Ask what they think was happening in the seed. Instruct students to carefully peel the outer coat off of one seed and examine it with a magnifying glass. Then pull the two halves apart. Have students draw a picture of what they see.
4. **Explain:** Provide names for the main parts of the bean seed: seed coat, cotyledon, and embryo. Instruct students to label their drawings.
5. **Elaborate:** How do you think the different parts of the seed change during germination? Which part grows into a plant? How could we figure this out using these materials? Discuss the parts and ideas. (Bloom’s comprehension and analysis, Gardner’s interpersonal)
6. Determine what parts of the seed they want to try and germinate. Instruct students on setting up a germination bag with one cotyledon by itself; one cotyledon with an embedded embryo plant; an embryo plant by itself and three whole lima beans.
7. Allow students to observe germination bags once a day for two to three weeks and draw observations and write size measurements.
8. **Evaluation:** After a few weeks have students analyze their data and participate in a class discussion, which parts of the seeds started to grow? Why? What does that tell us about necessary parts for seed germination? (Bloom’s comprehension and analysis)

**Closure: Evaluation cont..** Instruct students to write a paragraph answering the last question on their lab paper discussing what they saw in the whole experiment and why they think these things happened. Tell students that they will try to plant their germinated seeds the next day and continue to examine their progress. (Gardner's linguistic and intrapersonal)

**Adaptations/Enrichment:** This lesson works well for students with LD, ADHD, and MiMH because they are working with hands on manipulatives and brainstorming with a partner. If the students have difficulty completing a task then their partner can help them out. It would be helpful to have the beans separated before hand for students with MiMH and separate the different parts for the germination stage. The teacher might also want to put the germination bag together for these students. It would also be helpful for the teacher or partners to help students label their observations. Enrichments could include having the student research the different ways that plants become pollinated or they could get different types of seeds and compare the differences between the insides and outsides of the different seeds and then chart the different seed growths to see how they vary.

**Assessment:** -I will check their lab sheets to see that they recorded observations and completed the questions and illustrations.

-I will check their final paragraphs to see that they discuss their observations and reasons for their outcomes.

Name: \_\_\_\_\_

## Investigating Bean Seeds

Draw and write the observations of the dry seed.	Draw and write the observations of the seed after it soaked.

~How did the seeds change in the water?

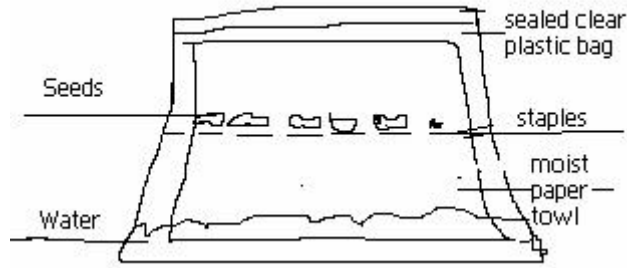
What do you think the inside looks like?	Draw the inside of the lima bean and label.

~How do you think the different parts change during germination?

~Which parts are needed to grow into a plant?

~How could we determine this?

# Lima Bean Germination



**Observation Table:** Draw a picture and record measurements.

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1					
Week 2					
Week 3					

~Discuss your observations: Which parts of the seeds started to grow and why? What is your conclusion from this investigation about the roles and necessary seed parts. What happened during this whole experiment and why?