

# Seeds



**SEED FUNCTIONS:** hold embryo; store food for baby plant

Children dissect and compare bean and almond seeds. They observe the tiny plant embryos surrounded by food for the baby plant, and test the seeds for the presence of natural oil. They learn to use a Venn diagram to organize their seed observations.

## What You Need

**Plant Snack Items** (at least 4 cut pieces of each item per child)

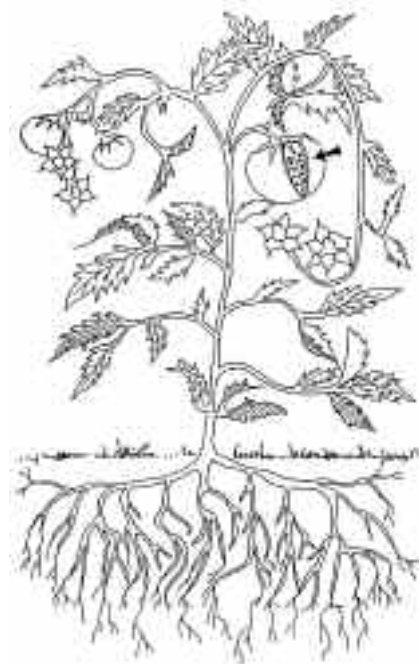
- \* almonds or sunflower seeds
- \* hummus and/or chickpeas (garbanzo beans)
- \* whole grain bread with visible grains and seeds

## Dissection Materials for Student Pairs

- \* 2 raw almonds
- \* 2 green fava or lima beans
- \* magnifier
- \* paper plates or cutting board
- \* sturdy metal spoon
- \* brown paper bag cut into 2" x 4" pieces
- \* journals
- \* pencils and crayons
- \* Seed Nutrition Labels (chickpea and sunflower, p. 75)

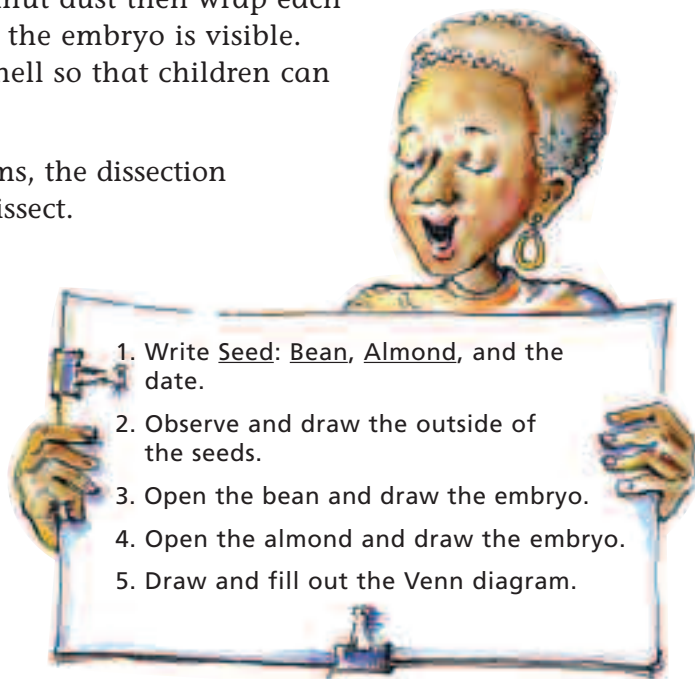
## For the Group

- \* unprocessed examples of each snack item
- \* several whole bean pods
- \* raw peanuts in the shell
- \* clear plastic tape
- \* Inside a Fava Bean and Inside an Almond Seed diagrams (p. 68)
- \* Venn diagram on classroom board or chart paper
- \* Structures of a Tomato Plant diagram (from Lesson 2)
- \* marking pens
- \* snack supplies: cutting board, knife, containers, spoons, plates, and napkins
- \* additional seeds: include fresh seeds such as snap peas or soy beans (edamame) in pods and dry seeds such as grains (see Plant Products Kit, p. 12, and Produce Shopping List by Lesson, p. 13)



## Getting Ready

1. Purchase the produce and plant snack items. If possible obtain fresh fava or lima beans, otherwise soak large white, dry lima beans overnight. The larger the beans, the easier it is for children to observe the plant embryo.
2. Cut slices of bread into halves or quarters. Hummus is a nutritious dip that originated in the Middle East and is traditionally made from chickpeas (also called garbanzo beans), ground sesame seeds (tahini), lemon juice, and garlic.
3. Purchase a few dozen unsalted peanuts in the shell for students to observe but not eat.  
**Note:** While peanuts are ideal for viewing the embryo, they cause serious allergic reactions in many people. To eliminate this hazard, carefully open the peanuts in an area not used by students. Wash your hands to remove peanut dust then wrap each pair of peanuts in clear packing tape so that the embryo is visible. Put clear tape around some peanuts in the shell so that children can also observe the fruit pod.
4. Just before the session, organize the snack items, the dissection materials, and the plants that students will dissect.
5. Post the Structures of a Tomato Plant diagram, and draw a large Venn diagram on the board. Have the pieces of brown paper bag on hand; students will use them for a “squash” test.
6. Draw a cross section of a seed on the board using the Inside a Fava Bean diagram and write the tasks (shown right) on the board to guide the dissection.



## Tastings and Journals

1. Have children get ready for the tastings and take out their journals. Review the Structures of a Tomato Plant diagram and have volunteers describe the plant parts and functions they have studied.
2. Display the bread and ask what part of the plant they think the food was made from. [seeds] Stimulate a discussion about the ingredients of bread. Connect the ingredients with the terms “seed,” “grain,” and “flour.” If possible, show examples of whole grains such as wheat.
3. Show the chickpeas to help students identify a seed, and have them title their journal page “Seed” and record the date.
4. Encourage students to taste and describe the seed foods to a partner, and document their findings in their journals. Invite them to share knowledge they may have about the cultural origins and nutritional values of these foods.

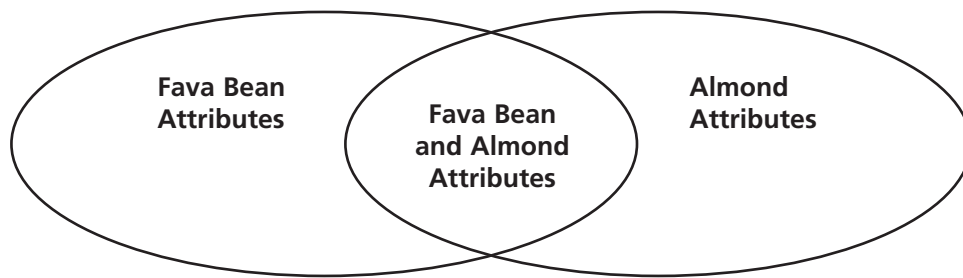


## Dissecting Seeds to Explore Structures

1. Announce that today students will be looking at two kinds of seeds, a bean and a nut. Show children the bean pod with beans inside, and prompt them to note that the pod is the fruit that contains the seeds. Explain that the hard covering around the almond seed is called the shell. When on the tree, the shell is enclosed in a fleshy pod — the fruit.
2. Draw children’s attention to the clear seed coat of the bean and the brown, papery covering of the almond. Using a fingernail, demonstrate how to break open the seeds into two equal halves. One half will have the embryo still attached.
3. Distribute the two seeds and have students begin by drawing the outside of each seed, then opening the seeds and observing their insides.
4. Encourage students to use magnifiers to look for evidence of a baby plant, called an embryo. Surrounding the embryo is stored food in the form of the cotyledon. Circulate among student pairs, asking questions about what they are observing and checking that they label their findings.
5. When everyone has documented their dissections, tell the students they will use a “squash” test to compare the composition of the two seeds. Demonstrate how to use a sturdy metal spoon to crush an almond and a bean on a piece of brown paper bag. Firmly rub the crushed seeds into the paper until you’ve created a mark. Label the marks and compare their qualities. [The almond leaves an oily stain, the bean mark is wet but not oily.] For young students, conduct this as a demonstration.

## Seed Function Ideas Based on Observations

1. As a group, ask pairs to share their findings from the dissection. Ask:
  - ⊗ *What was inside the seed?* [a baby plant]
  - ⊗ *What made you think it was an embryo or baby plant?* [it had tiny leaves and a root]
  - ⊗ *What do you think the rest of the seed surrounding the embryo is for?* [stored food for the embryo; protects the embryo]
2. Introduce the Venn diagram and have students draw it in their journals. Tell them to find three attributes or ways that the almond and fava bean are different and three ways they are similar and fill out their Venn diagram. (If your class is not familiar with Venn diagrams they can make two lists.)



3. Guide the students in sharing their findings. During the discussion, record their responses in the Venn diagram on the board.
  - ☼ *What are some differences you noticed between the almond and the bean?* [color, size, wet/dry, watery/oily, soft/hard]
  - ☼ *What are some similarities you saw?* [both have seed coats, both have embryos, both come from a fruit with a shell or pod]
4. Distribute the plastic-covered peanuts for comparison. Ask volunteers to look for similarities to the bean and almond while you list their findings on the board. *What evidence is there that the peanut is a seed?*

## Reflecting on the Investigation

1. Draw students' attention to their list of attributes shared by seeds. Provide some questions or prompts for their reflection about seeds.

- ☼ *In what ways are seeds important to plants?* [hold and feed baby plant/embryo to create new plants]
- ☼ *In what ways are seeds important to people?* [edible; create new plants for food and oxygen]



- ☼ *What might happen if, all of a sudden, tomato plants couldn't make seeds?* [tomato plants would become extinct]
- ☼ *What is something interesting you learned about seeds?*

2. Add the seed functions to the Structures of a Tomato Plant diagram and have students write in their journals about the results of their seed comparisons.
3. Direct the children to think about and share what they have learned as they examine other examples of seeds.



## Going Further

### Seed Math: Planting

- ☼ From using seed spacing guides on seed packets to figuring out how to divide the garden bed, planting activities are full of math opportunities. Help children learn how to use their own bodies as measuring tools by measuring in hand-spans and paces. Explore fractions by having children divide beds of various shapes and sizes. Solve volume equations by having them determine how much compost to add.

### Seed Nutrition and Cooking: Beans, Seeds, and Nuts

- ☼ Starting with chickpeas and sunflower seeds, have students compare the nutrients in a variety of seeds, nuts, and beans. *Which ones are highest in protein, fiber, and oil?*
- ☼ Involve the class in making a trail mix with a variety of dried fruits, nuts, and seeds to celebrate the harvest.

### Seed Science: Sprouting

- ☼ Have students conduct germination studies of various kinds of seeds. They can make their own seed-starting cups and plant herbs to take home. Select seeds from monocots and dicots and invite students to compare the seed leaves or cotyledons of the germinating plants.

### Seed Social Science: Wheat and Chickpeas

- ☼ Wheat, the primary grain in bread, was cultivated by people living in the region known as the Fertile Crescent as early as 9,000 years ago. Today much of this early farming region, which includes part of Turkey, Israel, Iraq, and Iran, has become desert. Chickpeas, or garbanzo beans, were first cultivated in the Mediterranean Basin 7,000 years ago, and spread to Ethiopia and India, eventually becoming the most widely consumed legume in the world. Have students choose a seed crop and research its origin and use by humans over time.

### Seed Language Arts: Seed Adventure Stories

- ☼ Invite students to write adventure stories of a seed's journey from the fruit on its parent plant to its new home, and its development into a new plant. Remind them that animal characters, travel, environmental features, and events of nature may contribute to an exciting tale.