

A Bean is a Seed

Objective

Students will learn about and sequence the life cycle of a plant. Students will use beans for simple science experiments. Students will write descriptive words about beans.

Background

When a seed gets warmth, air and water, it starts to change. The stem and the root emerge from the seed. This is called germination. Germination occurs if the seed is in a warm place. We plant seeds in the spring, when the ground is warming up. The seed is the food for the baby plant until it can grow its own root system. A seed is germinated when it can grow without the food stored in the seed.

A bean is the seed of the bean plant. In Oklahoma we grow many different kinds of beans. We grow lima beans and green beans in our gardens. Some growers sell their beans at the farmer's market. A soybean is a kind of bean that is grown in fields as a crop. Soybeans are used in many common foods, like soy sauce, vegetable oil, salad dressing and snack foods. They are also used in building materials, ink for newspapers, crayons, on CDs and DVDs, and in sunscreen, lip balm, hand lotion and other makeup products.

Science

ACTIVITY ONE: BEAN BABIES

1. Provide each student with one large and one small bean, a plastic jewelry bag, yarn and a cotton ball.
2. Students will place the cotton balls and beans inside the bags and moisten the cotton ball with a few drops of water.
3. Help students punch holes in their bags with a hole punch. String the yarn through the hole, and tie the ends to make a necklace.
4. Ask what conditions are necessary for a seed to germinate (moisture, warmth, sometimes darkness). Ask students where they might place the bags to provide the best conditions for germination.
5. Students will hang the bags around their necks and tuck them inside their clothes.
6. Tell students they are responsible for providing their bean babies with the best possible care until they have sprouted.
7. Students will name their "babies" and tell the names to their classmates.
8. Send a note home to parents explaining the needs of the bean baby.
9. Students will record the progress of their seeds. Which ones grow faster? Each day students will discuss the changes taking place in their seeds.
10. At the end of three days, make a chart as a class showing how many of the seeds have sprouted.

Oklahoma C3 Standards

KINDERGARTEN

Science Process—1.2,3,5

Physical Science—1.3

Life Science—2.1,2

COMMON CORE

Language Arts—K.RL.7;

K.RFS.1; K.W.2

GRADE 1

Science Process—1.1,2;

3.1,2,3; 4.3

Physical Science—1.1

Life Science—2.1,2

COMMON CORE

Language Arts—1.RIT.2;

1.RFS.4a, 1.W.3

GRADE 2

Science Process—1.1,2;

2.1; 3.1,2,3; 4.3

Physical Science—1.2

Life Science—2.1,2

COMMON CORE

Language Arts—2.W.3

GRADE 3

Science Process—1.1;

3.1,2,3; 4.3

Physical Science—1.2,3

Life Science—2.1,2

Materials

an assortment of dried beans—soybeans, lima beans, navy beans, kidney beans, black beans, etc.

small plastic jewelry bags

cotton balls

yarn cut into 18-inch lengths

hole punch

paper towels

styrofoam plates

11-inch clear balloons (found in party stores)

2-liter drink bottles

planting medium

11. Students will predict what their bean babies will look like two weeks later.
12. After students have cared for their bean babies for a couple of days, discuss how the needs of the bean babies are different or the same as that of an animal or a human child.

ACTIVITY TWO: SEQUENCING BEAN SEED SPROUTING

1. Students will use the worksheets included in this lesson to show the sequence of a bean seed sprouting.
 - Students will write a sentence on each page of the book to explain what is happening to the seed.

ACTIVITY THREE: EFFECT OF TEMPERATURE ON BEAN SEED SPROUTING (GERMINATION)

1. Ask students: “Seeds grow best in what kind of weather?”
2. Students will put wet paper towels in four different styrofoam plates.
3. Put the same number of beans on each plate. (Make sure you use all the same kind of bean.)
4. Cover each plate with another wet paper towel.
5. Students will place the plates in different locations (in a freezer, in a refrigerator, near a heating vent or radiator, outside a window) and keep records of their observations.
6. Which seed sprouted quickest? How many seeds sprouted?

ACTIVITY FOUR: MEASURING BEANS BEFORE AND AFTER SOAKING / ABSORPTION OF LIQUID / PARTS OF A BEAN

1. Give each student a measured container of water and one or two beans.
2. Students will place the beans in the water and soak them overnight. The next day students will drain off the water and measure it to see how much is left, compared with how much they measured the day before.
3. Now students will look at the seeds. Are they larger? How do they feel?
4. Students will slip the seed coats off and examine the insides of the seeds or plant them for further observation. (Bean seeds work better than store-bought beans for planting.)

ACTIVITY FIVE: BUZZING BEANS

1. Working in groups or individually, students will place three or four beans in an 11-inch clear balloon (found in party stores).
2. Inflate the balloons $\frac{2}{3}$ full and knot them.
3. Students will hold the balloons by the knot, and twirl them to get the beans moving inside the balloon. Ask students what they see, hear and feel? What creates the noises they hear?
 - FRictional Forces** slow the movement of the beans. The force of gravity slows them on their ascent to the top of the balloon and speeds them on their descent to the bottom of the balloon.
 - CENTripetal Force** is supplied by the surface of the balloon pushing the beans toward the center, and it keeps the beans moving in a circular motion around the inside of the balloon.

—The BUZZING NOISE is produced as the beans roll along the inside surface of the balloon, causing the balloon to vibrate. The beans' speed determines the pitch. As the beans move faster, they vibrate more quickly, which our ears distinguish as a rise in pitch. The CLICKING NOISES are the beans running into each other.

ACTIVITY SIX: GERMINATION RACE

1. Cut 2-liter drink bottles in half to make planters.
2. Beginning at the bottom of the planter, use a ruler to measure inches up to five inches. Mark each inch with a light-colored paint pen.
3. Fill the planter with about one inch of planting medium.
4. Plant about five soybean or other beans along the sides of the planter.
5. Add another inch of planting medium.
6. Plant an additional five seeds at each inch mark all the way to the top.
7. Water and cover the planter with clear plastic wrap. Secure with a rubber band.
8. Students will predict and record which seeds will make it to the top, or germinate, first.

ACTIVITY SEVEN: TOFU TIMBER

1. Divide students into teams of two and provide each team with the following:
 - 4- by 4-inch piece of newspaper
 - 10-ounce clear plastic cup
 - water
 - 2 tablespoons silken tofu
 - Stirring stick or spoon
2. Students will tear the piece of newspaper into small pieces.
3. Students will place the pieces in the plastic and add 1/4 cup water.
4. Students will mix until a thick slurry forms.
5. Students will add 2 tablespoons silken tofu and mix until consistent mass is formed. Add additional tofu if needed for consistency.
6. Students will remove mass from the cup and squeeze out remaining water.
7. Students will shape the mass into a ball.
8. Students will place the ball in a microwave on high for 10-20 minutes.
9. Remove the ball and cool.
10. Students will examine the soy product and record their observations.
11. Students will suggest possible uses for the product.

Extra Reading

Bial, Raymond, *The Super Soybean*, Albert, Whitman and Company, 2007.
Carle, Eric, *The Tiny Seed*, Little Simon, 2009.
Edom, Helen, *Science With Plants*, Usborne, 2007.
Robbins, Ken, *Seeds*, Atheneum, 2005.

Vocabulary

air—the invisible mixture of odorless tasteless gases (as nitrogen and oxygen) that surrounds the earth.

germinate—to begin to grow

light—electromagnetic radiation of any wavelength (as infrared, visible, ultraviolet, and X-rays) and traveling in a vacuum with a speed of about 186,000 miles (300,000 kilometers) per second; especially : such radiation that is visible to the human eye.

root—the leafless usually underground part of a plant that absorbs water and minerals, stores food, and holds the plant in place.

seed—a fertilized and ripened plant ovule containing an embryo capable of germinating to produce a new plant.


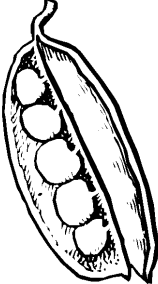
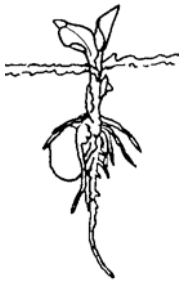


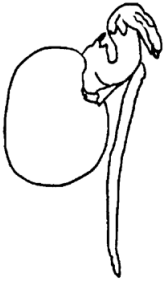
stem—the main stalk of a plant that develops buds and shoots and usually grows above the ground.

water—the liquid that descends from the clouds as rain, forms streams, lakes, and seas, and is a major part of all living material and that is an odorless and tasteless compound having two atoms of hydrogen and one atom of oxygen per molecule.

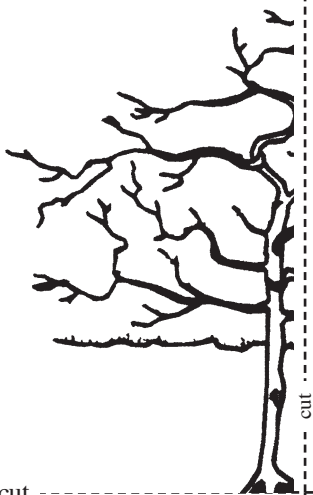
Name _____

A Bean is a Seed

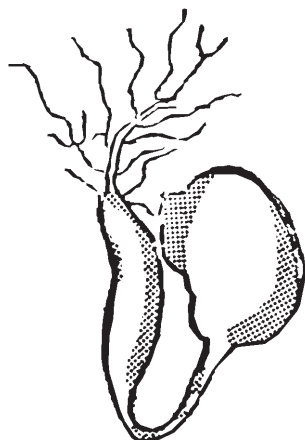
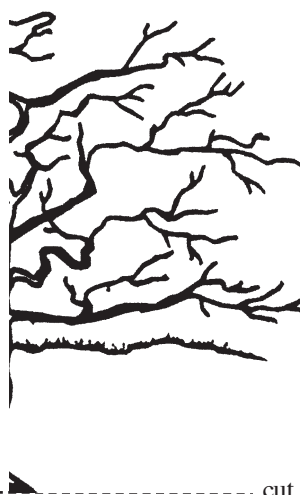
Cut out these pictures and put them in the correct order. Number them from one to six.

 <input type="checkbox"/>	 <input type="checkbox"/>
 <input type="checkbox"/>	 <input type="checkbox"/>
 <input type="checkbox"/>	 <input type="checkbox"/>

Glue or staple the pictures in order to make a book.



Bean plants grow from seeds.

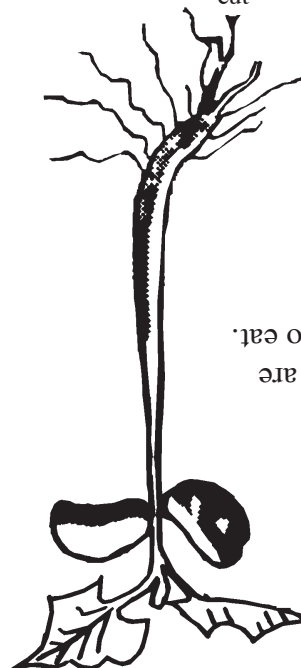


Write three words that describe a bean plant.

1. _____

2. _____

3. _____



Beans are good to eat.

Seeds need sun, soil, water and air.



Beans can be green, red, yellow, purple, brown or black.

