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. Most of the soybeans we grow in Oklahoma are used to feed livestock, like cattle, pigs and chickens. 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 toys, and in sunscreen, lip balm, hand lotion and other makeup products.

Science

1. Provide each student with one large and one small bean, a plastic jewelry bag, yarn and a cotton ball.
   —Students will place the cotton balls and beans inside the bags and moisten the cotton ball with a few drops of water.
   —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.
   —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.
   —Students will hang the bags around their necks and tuck them inside their clothes.
   —Tell students they are responsible for providing their bean babies with the best possible care until they have sprouted.
   —Students will name their "babies" and tell the names to their classmates.
   —Send a note home to parents explaining the needs of the bean baby.
   —Students will record the progress of their seeds. Which ones grow faster?
   —Each day students will discuss the changes taking place in their seeds.

Oklahoma Academic Standards

KINDERGARTEN
Life Science: 1.1

GRADE 1
Physical Science: 4.1. Life Science: 1.1

GRADE 2
Life Science: 2.1

GRADE 3
Physical Science: 2.2. Life Science: 1.1; 4.3

GRADE 4
Physical Science: 3.1,3. Life Science:1.1

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

—At the end of three days, make a chart as a class showing how many of the seeds have sprouted.
—Students will predict what their bean babies will look like two weeks later.
—After students have cared for their bean babies for a couple of days, discuss how the needs of the bean babies are different than or the same as that of an animal or a human child.

2. Students will use the worksheet 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.
3. Lead a discussion about the best kind of weather for growing seeds. Students will test their hypotheses with the following seed sprouting experiment:
—Place wet paper towels in four different styrofoam plates and put the same number of beans on each plate. (Make sure you use all the same kind of bean.)
—Cover each plate with another wet paper towel.
—Place the plates in different locations (in a freezer, in a refrigerator, near a heating vent or radiator, outside a window).
—Observe the plates over a few days, and keep records of your observations.
—Which seed sprouted quickest? How many seeds sprouted?
4. Provide each student with a measured container of water and one or two beans.
—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.
—Now students will look at the seeds. Are they larger? How do they feel?
—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.)
5. Working in groups or individually, students will place three or four beans in an 11-inch clear balloon (found in party stores).
—Inflate the balloons 2/3 full and knot them.
—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 suppled 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.

6. Cut 2-liter drink bottles in half to make planters.
   —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.
   —Fill the planter with about one inch of planting medium.
   —Plant about five soybean or other beans along the sides of the planter.
   —Add another inch of planting medium.
   —Plant an additional five seeds at each inch mark all the way to the top.
   —Water and cover the planter with clear plastic wrap. Secure with a rubber band.
   —Students will predict and record which seeds will make it to the top, or germinate, first.

Maker Space: Bean Seed Life Cycle Bracelet

Provide beads for students to string to represent the life cycle of a bean.

- Brown Bead: Bean seed is planted.
- Tan Bead: Seed germinates underground.
- Blue Bead: Water is added throughout the cycle.
- Green Bead: Leaves develop and seed emerges.
- Yellow Bead: Plant grows toward sunlight
- White Bead: Flowers form.
- Red Bead: Bean Pods develop.
- Orange Bead: Pods dry out waiting to be harvested.
- Purple Bead: Seeds are collected and consumed!

Extra Reading

Bial, Raymond, *The Super Soybean*, Albert, Whitman and Company, 2007.

Braun, Eric Mark, and Cristian Bernadini, *Trust Me, Jack's Beanstalk Stinks! The Story of Jack and the Beanstalk as Told by the Giant,* Picture Window, 2011

Carle, Eric, *The Tiny Seed,* Little Simon, 2009.

Edom, Helen, *Science With Plants*, Usborne, 2007.

Mlawer, Teresa, and Olga Cuellar, Jack and the Beanstalk, Adirondack, 2014.

Robbins, Ken, Seeds, Atheneum, 2005.

Shurtliff, Liesl, *Jack: The True Story of Jack and the Beanstalk,* Knopf for Young Readers, 2015.

Tagliaferro, Linda, *The Life Cycle of a Bean*, Capstone, 2007.

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

Name_____

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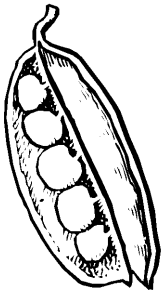
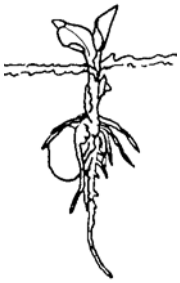
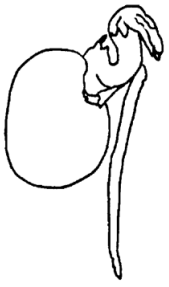
Cut out these pictures and put them in the correct order. Number them from one to six.







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