

Elementary Science: Germination



A collection of unique seed germination activities for the elementary classroom focusing on plant needs for germination.



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Desktop Garden

Standards of Learning

Science: K.7, K.9, 2.4, 2.8, 3.4, 3.8, 4.4

Objective

Students will:

- Investigate seed needs for germination

Materials

- Medium to large-sized clean plastic lids (size from peanut butter or mayonnaise jars)
- Seeds
- Paper towels
- Water
- Aluminum foil

Background Knowledge

Germination is when the seed sprouts and begins to grow. It is important for your students to know that it starts right when there is a bud present from the seed. Explain to your students that their sprout will need a while to grow and that every plant is different in the amount it takes for them to get to maturity. Ask them what their plant will need to grow. All plants need water, light, temperature, time, soil (nutrients), oxygen, and space to grow to full maturity, which is something you can show your students as they are creating their own dirt baby. The process that their plant is going to go through is also something that should be talked about and monitored for a few weeks. All plants go through about the same cycle of sprout, growth, flower, and fruit. However, it is important to also point out to your students what their plant parts are since they will not have flowers or fruits. The basic parts of the plant to point out are roots, leaves, stem, flower, seeds, and fruit. Make sure to point out that not all plants have every part.

Procedure

1. Discuss seed germination with students and identify the conditions necessary for seeds to sprout.
2. Give every student a clean lid. Lay a couple of damp paper towels within the lid, you can fold or cut them to fit.
3. Sprinkle seeds onto the paper towels.
4. Cover the lid with aluminum foil.
5. Check the garden each day and record the seeds' progress. Be sure to keep the paper towel damp.
6. Once the seeds have sprouted, you can remove the aluminum foil and let them grow by continuing to water them.

Extension

Once seeds have sprouted students can decorate their "gardens" with rocks or small toys.

After germination, seeds can be potted in a container of soil to grow to maturity.

Credit

California Agriculture in the Classroom



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Dirt Baby

Standards of Learning

Science K.1, K.2, K.7, K.9, 1.1, 1.4, 2.1, 2.4, 2.8, 3.1, 3.7, 3.8, 4.1, 4.4

Math 1.5, 1.14, 1.15, 1.17, 2.5, 2.11, 2.17, 2.18, 2.19, 2.20, 3.9, 3.17, 3.19, 4.4, 4.7, 4.14

Objective

Students will:

- Investigate germination, the lifecycle of plants and change over time
- Investigate plant parts and life needs
- Identify plants as natural resources
- Record and graph observations

Materials

- Non support knee-high hose (one per student)
- Grass seed - annual ryegrass (approximately one teaspoon per student)
- Potting soil (approximately one cup per student)
- Junior baby food jars/plastic cups (one per student)
- Google eyes (two - or more! - per student)
- Felt, pipe cleaners, pom-pom balls, craft foam, and other assorted craft items
- Glue gun
- Water

Background Knowledge

Seeds vary greatly in germination rate, amount of time needed for maturity, and growing conditions. Some seeds, such as beets, germinate and grow to maturity in as little as a month, while corn or soybeans take 3-4 months. Germination is when the seed sprouts and begins to grow. It is important for your students to know that it starts right when there is a bud present from the seed. Explain to your students that their sprout will need a while to grow and that every plant is different in the amount it takes for them to get to maturity. Ask them what their plant will need to grow. All plants need water, light, temperature, time, soil (nutrients), oxygen, and space to grow to full maturity, which is something you can show your students as they are creating their own dirt baby. The process that their plant is going to go through is also something that should be talked about and monitored for a few weeks. All plants go through about the same cycle of sprout, growth, flower, and fruit. However, it is important to also point out to your students what their plant parts are since they will not have flowers or fruits. The basic parts of the plant to point out are roots, leaves, stem, flower, seeds, and fruit. Make sure to point out that not all plants have every part.

Procedure

1. You may want to introduce this lesson using a picture book outlining the needs of seeds as they grow and mature (EX: *How a Seed Grows* by Helene J. Jordan)
2. Review the process of germination and what plants need to grow.
3. Provide each student with a knee-high hose and a baby food jar.
4. Place grass seed into the tip of the stocking.
5. Cover grass seed with potting soil.
6. Tie a knot in the stocking just above the ball of soil and trim away excess stocking (be sure to leave some of the stocking to hang down into the baby food jar)



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7. Flip stocking and place excess stocking downward into baby food jar allowing the ball of soil to rest at the top of the jar.
8. Allow students to decorate the ball of soil (or head of the Dirt Baby) with a variety of craft items **(NOTE: Do not place decorations over grass seed or it will not be able to grow out of stocking!)**
9. Place water in the baby food jar. The stocking will absorb the water and saturate the head of the Dirt Baby. In 10 – 15 days, the seeds will germinate and begin to grow!
10. Water the Dirt Baby as needed.
11. Record and chart daily observations to determine germination rates. Change variables such as the amount of water to show the effects of flood and drought.

Extension

- Ask the students to measure and record the amount of dirt used in the activity.
- Ask the students to name their Dirt Baby and create a life story about its journey from England to Jamestown. They could describe life in the settlement and present this information to the class.
- Ask students to keep a journal of the day-to-day changes they observe in the Dirt Baby.
- Discuss the life cycle of plants from seed to maturity and ask students to research types of grass. What are the best growing conditions?
- Discuss the nutrients necessary for plants to grow. When and why do you fertilize your lawn?
- Keep records of the classroom and outdoor temperatures. Is there an optimum temperature for the best growth of grass?
- Ask the students to gather information from the seed bag. What is the percent germination? Are there weed seeds present in the grass seeds? How do weeds affect the growing of the grass?
- Review the parts of the grass plant.
- Describe how ruminates, such as cows, can utilize the energy in grass. Why can't people eat grass?
- Have your students decorate their Dirt Babies to represent an important historical figure they have studied. Then ask them to write a brief biography of that person's life.



Garden in a Glove

Standards of Learning

Science K.1, K.7, K.9, 1.1, 1.4, 2.1, 2.4, 2.7, 2.8, 3.1, 3.8, 4.1, 4.4

Objective

Students will:

- Investigate the germination of seeds
- Investigate plant needs

Materials

- *Oh Say Can You Seed: All About Flowering Plants* by Bonnie Worth
- Clear plastic gloves
- Cotton balls
- Five different flowering plant seeds
- Water

Background Knowledge

Seeds vary greatly in germination rate, amount of time needed for plant maturity, and growing conditions. Some seeds, like radishes, only need 4-6 weeks to grow to maturity, while corn and soybeans require several months. The purpose of this activity is to provide students with an opportunity to observe the germination process. What does it look like when the sprout breaks through the seed coat? Is there a difference between dicot and monocot seed germination? How long will the seed take to grow? All of these questions are exciting to explore with students.

Germination is when the seed sprouts and begins to grow. It is important for your students to know that it starts right when there is a bud present from the seed. Explain to your students that their sprout will need a while to grow and that every plant is different in the amount it takes for them to get to maturity. Ask them what their plant will need to grow. All plants need water, light, temperature, time, soil (nutrients), oxygen, and space to grow to full maturity. The process that their plant is going to go through is also something that should be talked about and monitored for a few weeks. All plants go through about the same cycle of sprout, growth, flower, and fruit. However, it is important to also point out to your students what their plant parts are since they will not have flowers or fruits. The basic parts of the plant to point out are roots, leaves, stem, flower, seeds, and fruit. Make sure to point out that not all plants have every part.

Procedure

1. As a class, generate a list of how plants are important to us.
*** They provide oxygen, serve as a source of food, provide useful products, help reduce soil erosion, provide shelter for animals, etc.*
2. Discuss that just like people; plants go through stages as they grow.
3. Read the book *Oh Say Can You Seed: All About Flowering Plants* by Bonnie Worth and review the stages of growth for flowering plants.
**seed germinates, roots and stem develop, leaves grow from the stem, flower develops, fruit forms and contains seeds for the next cycle of plant life*
4. Inform students that they will be given the opportunity to watch some plants progress through an entire growth cycle starting with the germination of the seeds.
5. Provide each student with a clear plastic glove and have them label the palm of the glove with their name and the fingers of the glove with the names of the seeds.



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6. Students should then wet five cotton balls (wring out excess water) and place one in each finger of the glove.
7. Next, place 3 to 4 seeds on each cotton ball in the glove.
**You may have students dip the damp cotton ball in the seeds then place the cotton ball in the glove to reduce the mixing of seeds in the fingertips of the glove as the students place the seeds in by hand.*
8. Finally, have students puff some air into the glove then tape their completed gloves to a window (for warmth from the sun) or place in a warm area of the room.
9. Observe seeds for several days until germination is complete
**Always check seed packets for germination period*
10. Once seeds have germinated, transplant them into soil and provide them with the things they need to grow into strong plants! Make observations as the plant progresses through its various life cycle phases.

Extension

- Have students keep a journal of the changes day to day. Experiment with different gloves. Do they germinate at the same rate in the dark as they do in the light?
- Have students research the plants used in Jamestown. What crops did the Indians help the settlers grow?
- Have students review information on the seed packet for growing habits of plants. What zone does Virginia fall in?
- Have students discuss the crops grown in Virginia today. How has transportation changed the variety of foods available to consumers?
- Discuss the life cycle of plants from seed to mature plant.
- Use seeds for sorting and pattern activities.
- Keep records of the classroom and outdoor temperatures. Is there an optimum temperature for germination?
- Discuss nutrients necessary for plants to grow and the components of soil.
- Collect measurements data from seed germination and growth.
- Count number of seeds on each cotton ball.



Germination Journal

Standards of Learning

Science: 1.4, 4.4

Language Arts: 2.11, 3.9, 4.7

Objective

The student will be able to:

- Describe the growth of a plant from a seed
- Observe and record data from a germination experiment

Materials

- Seed packets
- Paper
- Scissors
- Stapler
- Markers

Background Knowledge

Seed packets are readily available and inexpensive. Planting seeds with students has long been a favorite activity for teachers and students the paper packets are often left out of the equation. With a little effort these packets can be transformed into booklets useful for a number of activities. Seed journals can serve as poetry books, a place for a new story, a log book, or event place to create word problems.

Procedure

1. Provide each student with a packet of seeds. This activity works best when seed packets are paper rather than see through plastic.
2. Cut open the top of packet. Remove seeds.
3. Cut open the bottom and right side of packet. The open packet will form a book cover.
4. Provide each student with a 8 ½ by 11 piece of paper.
5. Fold paper in half horizontally. Fold in half vertically. Open the paper and cut on the folds.
6. Stack the four pieces of paper and fold in half to form a book.
7. Insert book pages into seed packet book cover. Staple in the center.
8. Use book to record the steps of the germination process.

Extension

Use the journal to write a garden story.

Journals can be used to write a lab from the garden.



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Germination Foldable

Standards of Learning

Science: K.7, K.9, 1.4, 2.4, 2.8, 3.8, 4.4

Objective

The student will be able to:

- identify and illustrate the stage in a plant's life cycle
- identify the conditions necessary for seed germination

Materials

- square pieces of construction paper
- scissors
- tape
- markers/crayons
- snack sized plastic baggies
- cotton balls
- water
- various seeds

Background Knowledge

Plants undergo a series of changes from the time the seed is planted to the time that the plant reaches full maturity. First, the seed must germinate, or sprout. To do this, the seed requires moisture, warmth, air, and space. While the seed does not need soil to sprout, it does need the soil's nutrients in order to grow to maturity. After germination, the seed will grow roots down into the ground and shoots will begin to poke out of the ground. Next, leaves and blossoms will appear on the young plant. After the blossom is pollinated, the plant will bear fruit. This process is the same whether the plant is growing in the wild, in a backyard, or on the farm. On the farm, after the plant bears its fruit, it is time to be harvested. Common plants which are planted and harvested yearly on Virginia farms include corn, soybeans, cotton, tomatoes, and wheat.

Procedure

1. Ask students if they look the same today as when they were born. No, they've changed and gotten bigger. Note that plants and other animals undergo an orderly set of changes throughout their lives as well. Review with your students the steps in plant's life cycle.
2. Give each student a square piece of construction paper. You may cut them beforehand or have students place the standard rectangular construction paper on their desks lengthwise and fold one corner across to form a triangle. Next cut off the 3 inch strip remaining. Open the triangle to reveal a square.
3. With the square piece in front of them, have students fold each corner to the middle, so that the ends touch and a smaller square is formed. Crease and re-open the flaps.
4. Take the bottom flap and on the outside have students write the first stage in a plant's life cycle: "A seed is planted." Next, on the inside of the flap, have them illustrate this.
5. Moving clockwise to the next flap, write the next stage on the outside: "Roots grow into the ground and leaves grow above ground." Illustrate the inside flap.
6. Continue to the next flap and write and illustrate: "Blossoms appear and are pollinated." Finish with: "Mature plant grows and bears fruit."
7. Tell students that you will now be observing the first stages in a plant's life cycle.



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8. Pass out a snack sized plastic baggie to each student as well as 3-4 cotton balls and seeds.
9. Have students wet their cotton balls by either dipping them in a cup of water or spritzing them with a spray bottle. Cotton balls should be wet but not dripping.
10. Open the baggies and place the cotton balls inside. Place 2-3 seeds on top of each cotton ball and zip up the baggie.
11. Measure and cut a window in the middle of the construction paper which is about 4.5 inches across and 3 inches tall.
12. Tape the plastic baggie behind the window so that the seeds are visible.
13. Have students observe and record their seeds' growth over the course of the next several days.

Extension

Have students create a graph depicting their seeds' daily growth. Determine the class' average growth rate.

After germinating, you can repot the seeds used in this activity and have students observe the next steps in the plants' life cycles. Simply remove the germinated seeds from the baggie (cotton ball and all) and plant in a small container with soil. You may choose to have students decorate their containers as a gift for Mother's Day.



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Grow Cards

Standards of Learning

Science K.1, K.7, K.9, K.11, 1.1,1.4, 1.8, 2.1, 2.4, 2.8

Objective

Students will:

- Make recycled paper containing seeds to plant
- Investigate how materials can be reused and recycled

Materials

- Newspaper
- Screen
- Bin
- Water
- Cookie cutters
- Blender
- Seeds
- Paper towels

Background Knowledge

Recycling involved processing used materials into new products to prevent waste of useful materials. Recycling helps to reduce energy usage, reduces air pollution and water pollution by reducing the need for waste disposal, and lowers greenhouse gas emissions. Materials that can be recycled include glass, paper, metal, plastic, textiles, and electronics. In order to recycle materials they need to be sorted, cleaned, and processed into new materials that will be manufactured. These are also considered items that are reusable because they can be used over and over again once they are made into something else. Almost 40% of our total waste comes from paper and paperboard so it is important to explain to your students the need to recycle. This would be a great time to discuss materials that can be recycled and the materials in our world that can be reused. In this activity, students learn about recycling paper to make very special greeting cards. These cards contain seeds and can be planted to enjoy all summer!

This activity also provides a great opportunity for you to talk about germination and plant growth with your students so that they know what their seeds need to grow and how they grow. Germination is when the seed sprouts and begins to grow. It is important for your students to know that it starts right when there is a bud present from the seed. Explain to your students that their sprout will need a while to grow and that every plant is different in the amount it takes for them to get to maturity. Ask them what their plant will need to grow. All plants need water, light, temperature, time, soil (nutrients), oxygen, and space to grow to full maturity. The process that their plant is going to go through is also something that should be talked about and monitored for a few weeks. All plants go through about the same cycle of sprout, growth, flower, and fruit. However, it is important to also point out to your students what their plant parts are since they will not have flowers or fruits. The basic parts of the plant to point out are roots, leaves, stem, flower, seeds, and fruit. Make sure to point out that not all plants have every part.

Procedure

1. Ask students if they have ever received a card for their birthday, Christmas, or other special occasion. Then ask if they have ever planted one of those cards in the garden.



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2. Tell them that today they are going to make a greeting card that can be planted and will grow.
3. Have students tear newspaper into small pieces (about the size of a postage stamp).
4. Fill the blender half full with newspaper scraps and $\frac{3}{4}$ full with water. Make sure the students recognize that they are reusing and recycling the newspaper so that it does not just get thrown away. Explain how recycling is good for the Earth.
5. Blend at a high speed until mixture has an oatmeal-like consistency.
6. Place the screen over the bin and select a cookie cutter.
7. Place the cookie cutter on the screen and pour a thin layer of the mixture into the cutter.
8. Place several seeds into the mixture.
9. Remove the screen from the bin and place on a paper towel.
10. Remove the cookie cutter and take another paper towel and lay over shaped mixture.
11. Press the towel on the shaped mixture to remove excess water and move to a dry safe place.
12. Let stand for one to two days to completely dry out.
13. Decorate and share with someone you love!

Extension

- Have students write an explanation paragraph on how they created their Grow Card.
- Use the Grow Cards to start a school garden. Note the life cycle of each plant.
- Discuss how the newspaper was recycled and what other items can be recycled.

Credit

Lesson adapted from Junior Master Gardeners



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Living Magnets

Standards of Learning

Science K.1, K.7, K.9, 1.1, 1.4, 2.1, 2.4, 3.1, 3.8, 4.1, 4.4

Objective

The student will be able to:

- investigate plant needs
- identify conditions necessary for seed germination

Materials

- clear test tubes or pill bottles (using test tubes will allow you to use the lines for measurement of growth) with tops
- adhesive magnets
- cotton balls
- water
- various seeds
- permanent markers

Background Knowledge

Seeds vary greatly in germination rate, amount of time needed for plant maturity, and growing conditions. Some seeds, like radishes, only need 4-6 weeks to grow to maturity, while corn and soybeans require several months. The purpose of this activity is to provide students with an opportunity to observe the germination process. What does it look like when the sprout breaks through the seed coat? Is there a difference between dicot and monocot seed germination? How long will the seed take to grow?

Procedure

1. Write the word "germination" on the board. Review that germination refers to a seed beginning to sprout. Have the class brainstorm words that go with germination (ex: plants, seeds, water, growth, soil). Sort the brainstormed list to create a concept web, with germination in the middle.
2. Tell students that you will be germinating your own seeds. Review the conditions necessary for germination.
3. Pass out test tubes, cotton balls, seeds, and water (you may use spray bottles or small cups with water). Have students identify the purpose for each of these materials.
4. Have students first write their names or initials on test tubes with the permanent markers.
5. Wet 1-2 cotton balls, they should be wet but not dripping. Place down into test tube. Insert 2-3 seeds on top of the cotton balls. Place the cap on the tube (this will keep your seeds from drying out).
6. Now pass out adhesive magnets (you may also use craft glue if you cannot find the magnets with adhesive backing). Attach to the side of the test tube.
7. Stick the magnets to the board so that students may observe their seeds' growth each day. You may choose to use the lines on the test tubes to have students track and graph the growth.

Extension

- Use a variety of seeds and observe and graph their growth to determine which ones germinated fastest.
- Once seeds have sprouted you may remove them from the test tubes/pill bottles and replant them either outside or in a container. You do not have to separate them from the cotton balls.



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My Little Greenhouse

Standards of Learning

Science: K.7, K.9, 2.4, 2.8, 3.4, 3.8, 4.4

Objective

The student will be able to:

- identify plant needs for germination

Materials

- template, attached
- cotton balls
- spray bottle with water
- seeds
- crayons, markers
- tape
- sandwich-size plastic baggie

Background Knowledge

Greenhouses are able grow plants, such as ornamentals (plants grown and used for decoration) and vegetables, all year long because they stay warm inside. Some greenhouses use electric heat, while others harness the sun's warmth. Greenhouses have many windows, which allow the sunlight in and then trap it, so that it stays warm. In Virginia, bedding plants are the most commonly produced greenhouse item. In addition to bedding plants and perennials, growers may plant vegetables to be used as transplants or for consumption. Many growers will start their seeds in greenhouses and then move them to the fields when the weather is warm enough. The most common vegetable grown for consumption in a greenhouse is the tomato.

Procedure

1. Review with students the necessary conditions for seed germination – air, water, warmth.
2. Tell students that many plants need warm weather to grow and mature – such as tomatoes. How do we get these vegetables in the winter, when it's too cold to grow them outside? They are either grown in warmer locations and then shipped to us, or they can be grown in greenhouses, which are able to keep a warm, controlled climate. Use the background knowledge above to discuss how this works.
3. Students will now make their own mini-greenhouses.
4. Pass out supplies.
5. Have students color and cut out their greenhouses. Cut along the dotted lines of the greenhouse to make a window.
6. Take about 5 cotton balls and lightly spray with water.
7. Place cotton balls along the bottom of the baggie.
8. Place a seed in the middle of each cotton ball. You may choose to use different seeds if you would like to compare/contrast plant growth.
9. Seal the baggie and tape behind the greenhouse.
10. Place greenhouses in a location where seed growth can be observed – such as in a window or on a bulletin board.



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11. Have students observe and report seed growth each day.

Extension

Recommended reading: Out and About at the Greenhouse by Bitsy Kemper

After germination, seeds can be transplanted to containers to continue growing.

Have students choose different variables to measure – such as type of seed, growing medium, or location. Chart the results.

References

Original lesson adapted from Utah Agriculture in the Classroom.



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My Little Greenhouse

Name: _____ Date Planted: _____



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Nitrogen Needs

Standards of Learning

Science: 2.4, 4.4

Objective

Students will:

- Identify the conditions necessary for seeds to germinate
- Investigate the importance of nitrogen to plant growth

Materials

- Clear plastic cups
- Bean seeds
- Soil
- Paper napkins (bright colors other than white allow you to better observe seed growth)
- water

Background Knowledge

George Washington Carver is known as the “Peanut Wizard” because of his extensive work with peanuts. In fact, he developed over 300 different uses for peanuts. He did this work as a way of encouraging southern farmers to grow peanuts as a rotation crop. At this time in the south, cotton was “king.” However, cotton uses a lot of nitrogen from the soil in order to grow. When planted in the same field year after year, the soil will become depleted making the soil unproductive and the crop poor.

Peanuts are a legume and help replenish the nitrogen in soil when planted. Nitrogen is in all living cells – plant, animal, and human. It is an essential nutrient for plant growth. Like phosphorus and potassium, nitrogen is a primary macronutrient because plants absorb large amounts of them in order to grow. Plants need nitrogen because it makes proteins, fruits, seeds, and chlorophyll to carry out photosynthesis. If a plant is lacking nitrogen you might observe it lacking flowers and root growth. Furthermore, a plant that has adequate nitrogen will be better able to utilize water from rainfall and soil moisture. Farmers take soil samples that are studied at a laboratory to determine the amount of usable nitrogen already in the soil. This helps the farmer determine whether or not he needs to apply additional nitrogen, in the form of fertilizer, to the soil.

Procedure

1. Review with students the conditions necessary for plant growth and germination.
2. Discuss how George Washington Carver encouraged farmers to rotate their cotton crops with crops such as peanuts, soybeans, or sweet potatoes that would replenish the nitrogen in the soil, thus keeping the soil healthy.
3. In partners or groups students will plant 6 bean seeds two different ways. The first way they will plant their seeds is to fill a clear plastic cup with soil. Then place three bean seeds about an inch down in the soil and up against the side of the cup (the seed should be visible when looking at the side of the cup).
4. Next take another clear plastic cup and open up a paper napkin. Push the paper napkin down into the cup so that it covers the bottom and comes up the sides. Use a spray bottle to wet the napkin at the bottom of the cup (the water will wick up the sides).
5. Place the remaining 3 seeds in between the napkin and cup so that the seeds are visible when looking at the side of the cup.



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6. Have students record observations about the different growing environments as well as make predictions about seed germination and plant growth.
7. Over the next 2-4 weeks (until the plants have developed leaves) have students record the amount of water that they give each cup and continue to observe and record plant growth and appearance.
8. Point out that the leaves on the plants grown in soil are darker green than the leaves on the plant grown without soil because they received nitrogen.



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Potato People

Standards of Learning

Science: K.7, K.9, 2.4, 2.8, 3.4, 3.8, 4.4

Objective

Students will:

- Investigate plant needs for germination

Materials

- One large potato per student
- Small sponges or cotton balls
- Spray bottles with water
- Grass seed
- Raisins, cloves, carrots, peas, corn, and/or other vegetables
- Construction paper or fabric scraps

Background Knowledge

Seeds vary greatly in germination rate, amount of time needed for maturity, and growing conditions. Some seeds, such as beets, germinate and grow to maturity in as little as a month, while corn or soybeans take 3-4 months. Germination is when the seed sprouts and begins to grow. It is important for your students to know that it starts right when there is a bud present from the seed. Explain to your students that their sprout will need a while to grow and that every plant is different in the amount it takes for them to get to maturity. Ask them what their plant will need to grow. All plants need water, light, temperature, time, soil (nutrients), oxygen, and space to grow to full maturity, which is something you can show your students as they are creating their own potato person.

Students will be germinating grass seeds in their potato people. Grass plants, such as corn, wheat, oats, rye, barley, rice, and sugarcane are very important to the diets of both people and animals. The type of grass that students might be most familiar with is turfgrass, which is what they probably have in their yards. Turfgrass is part of the horticulture industry, which is the fastest growing segment of Virginia's agriculture industry. It is grown on a farm and then cut in strips and rolled for transporting.

Prior to the lesson slice a short piece off of the end of each potato so it will stand upright. Also, Slice a short piece off the top and scoop out a small amount of potato so that you create a small crater in the top.

Procedure

1. Ask students if they've ever eaten grass. Then point out that if they've ever eaten corn, wheat, oats, barley, rice, or sugarcane then they have eaten grass! Ask them if they can think of any other animals that eat grass (such as cows or goats).
2. Tell them that you will be germinating grass seed today and review what a seed needs in order to germinate (water, air, space, and warmth).
3. Pass out a potato to each student (see note above about prepping the potatoes prior to the lesson) as well as cotton balls (you may also use small sponges) and grass seeds.
4. Wet the cotton ball by spraying with the water bottle. Place inside the crater of the potato and then sprinkle with grass seed.
5. Use the other food items (such as raisins, cloves, peas, etc) to create eyes, nose,



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mouth, and ears. You may also use construction paper or fabric scraps to create clothes.

6. Display along a window sill. Check the cotton balls daily and spritz with more water as needed to keep them moist.
7. Observe and track the rate of “hair” growth for each potato person.

Extension

Potatoes grow differently than most other plants. They sprout from eyes. Demonstrate this to the class by using toothpicks to suspend a potato in a jar of water. When the shoots are 2-3” long, cut the potato so each piece has a shoot and plant in a pot of soil or outdoors.

References

Lesson adapted from Louisiana Agriculture in the Classroom



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Sowing Seeds

Standards of Learning

Science: K.1, K.7, K.9, 1.1, 1.4, 2.1, 2.8, 3.1, 3.8, 4.1, 4.4, 5.1

Mathematics: K.10, K.13, K.14, 1.14, 1.15, 2.11, 2.17, 2.18, 2.19, 3.9, 3.17, 4.7, 4.14, 5.14, 5.15, 5.16

Objective

The student will

- conduct an experiment to investigate the growth rate of different grass seeds.

Materials

- 2 types of grass seed (lawn and feed); available from Southern States, feed/seed stores
- plastic paint trays, 2 per group
- topsoil
- spray bottle with water
- rulers
- index cards
- handout, attached

Background Knowledge

This book introduces students to 3 Montana ranches, which have been recognized for their conservation and preservation efforts. In particular, the book discusses grass as a natural resource, which the animals depend on for food. In this lesson students will conduct an experiment to discover the difference(s) between grass that is grown for lawns versus grass that is grown to feed cattle.

Procedure

1. Read Amazing Grazing to the class. Discuss the book's reference to grass as a natural resource. Ask students if they think there is a difference between the grass in their backyards and the grass that cattle eat. Tell them that they will be conducting an experience to see if there are, in fact, differences between the two.
2. Divide students into groups of 3-4. Pass out 2 trays and 2 index cards, along with 2 types of seeds, to each group. The index card is used to label the type of grass that will be grown in each tray.
3. Give each group of students enough topsoil to fill their trays.
4. Plant the grass seed in each tray.
5. Use the spray bottle to spray the soil until moist.
6. Pass out the handout to each student.
7. Have students write their predictions at the top of the handout.
8. Over the next several days students will record their observations and take measurements of the growth. Be sure to keep the soil moist.
9. Concluding questions: Which seed type grew the fastest? Feel the blades of grass, how are they similar and different? Encourage students to share any other observations and then determine if their initial predictions were correct.

Extension

After growing the grass, students can conduct erosion experiments. Using a 16-oz cup with small holes in the bottom, students can simulate rain on the grassy "plain." Record observations. Next, place model trees, grasses, or small rocks in the pan and create another "rainfall." Record observations. Did the items prevent erosion or increase it? Explain.



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Grass Lab – Scientific Journal

Over the next several days, you will observe and record the growth of different types of grass seeds. Do you think there will be any differences? Write your predictions below.

Date & time	Tray 1		Tray 2	
	Observations	Growth	Observations	Growth
1				
2				
3				
4				
5				



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Date & time	Tray 1		Tray 2	
	Observations	Growth	Observations	Growth
6				
7				
8				
9				
10				
11				
12				



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Super Seed Racers

Standards of Learning

Science K.1, K.7, K.9, 1.1, 1.4, 2.1, 2.4, 2.8, 3.1, 3.8, 4.1, 4.4

Objective

Students will:

- Investigate the germination of seeds
- Investigate plant needs

Materials

- At least 2 different types of seeds, any type will work
- Sandwich size plastic bag
- Cotton balls (2 per student)
- Template, attached
- Tape
- Scissors
- Markers/crayons
- Water

Background Knowledge

Seeds vary greatly in germination rate, amount of time needed for plant maturity, and growing conditions. Some seeds, like radishes, only need 4-6 weeks to grow to maturity, while corn and soybeans require several months. The purpose of this activity is to provide students with an opportunity to observe the germination process. What does it look like when the sprout breaks through the seed coat? Is there a difference between dicot and monocot seed germination? How long will the seed take to grow? All of these questions are exciting to explore with students.

Germination is when the seed sprouts and begins to grow. It is important for your students to know that it starts right when there is a bud present from the seed. Explain to your students that their sprout will need a while to grow and that every plant is different in the amount it takes for them to get to maturity. Ask them what their plant will need to grow. All plants need water, light, time, soil (nutrients), oxygen, and space to grow to full maturity. However, it is important to note that the seeds do not need all of these things to sprout but they will need them to grow to maturity. The process that their plant is going to go through is also something that should be talked about and monitored for a few weeks. All plants go through about the same cycle of sprout, growth, flower, and fruit.

In this activity students will “race” their seeds to see which germinates first and grows the tallest. Seeds play an important role with real race cars as well. Both Nascar and Indy racing leagues use an ethanol blend fuel to for their cars. The Nascar blend is made from 15% ethanol, a biofuel made from corn. In fact, ethanol produced in Hopewell, Virginia at the Vireol Biofuel plant is used in Nascar races. Ethanol biofuel is created in an efficient process that produces zero waste as the corn is turned into fuel.

Procedure

1. Define the term germination. “To sprout or begin to grow”
2. Show the class a variety of seeds and brainstorm what a seed needs to germinate. *This list should be comprised of the children’s perceptions of what a seed needs to germinate, but guide them to include the following if they do not think of them on their*



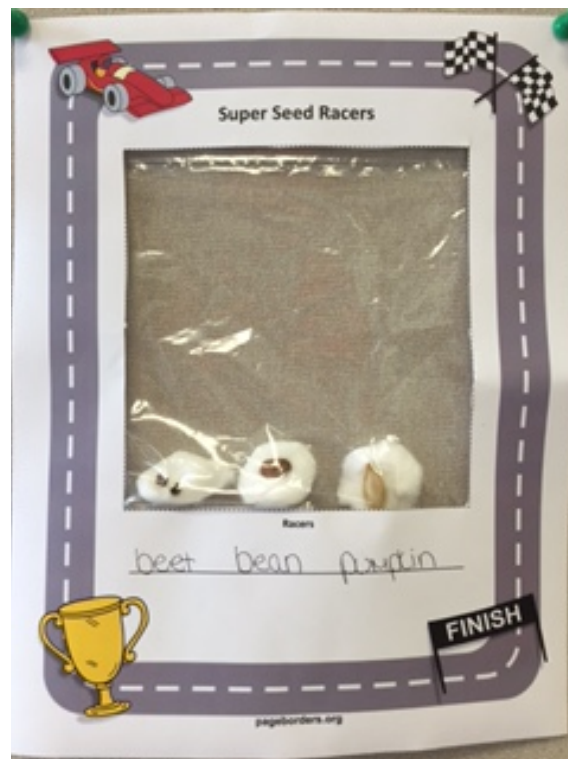
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own: water, air, warm temperature.

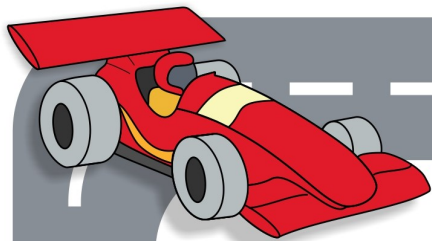
3. Instruct the children that they will be conducting a seed germination “race.”
4. Provide each student with a sandwich sized baggie.
5. Wet a cotton ball and squeeze out the excess.
6. Place the cotton ball inside the baggie.
7. Place two seeds of the same type on the dampened cotton ball.
8. Repeat using a different type of seed so that there are at least 2 different types of seeds in the baggie. Each type on their own cotton ball.
9. Zip the top of the plastic baggie.
10. Cut along the dotted lines on the template. Tape the baggie behind the window so that the seeds are visible.
11. Students may also color their templates.
12. Place in a safe place (preferably on a window to demonstrate how seeds need warmth to germinate) and have students observe, measure, and record the growth of their seeds.

Extension

Once seeds have germinated, plant in plastic cups, planters, or outside for further observation.



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Super Seed Racers

A large rectangular area with a dashed border, intended for drawing or writing.

Racers



What's Growing in *Your* Window?

Standards of Learning

Science: K.7, 1.4, 2.4, 3.8, 4.4

Math: K.10, K.13, K.14, 1.14, 1.15, 2.11, 2.17, 2.19, 3.9, 3.17, 4.7, 4.14

Objective

The student will be able to:

- identify plant needs for germination
- estimate, measure, and record plant growth to the nearest centimeter
- use data to construct a bar graph

Materials

- seed packets, one per student
- cotton balls
- jewelry bags (found in the craft/bead aisle)
- water
- scissors
- tape
- rulers
- pens

Background Knowledge

Germination is when the seed sprouts and begins to grow. It is important for your students to know that it starts right when there is a bud present from the seed. Explain to your students that their sprout will need a while to grow and that every plant is different in the amount it takes for them to get to maturity. Ask them what their plant will need to grow. All plants need water, sunlight (warm temperature), time, soil (nutrients), oxygen, and space to grow to full maturity.

Procedure

1. Write the word “germination” on the board. Have students brainstorm what is needed for a plant to germinate (water, warmth, air). From this brainstorm, have students define germination. Have students write this definition at the top of a piece of paper. Below the definition, have students illustrate plant needs.
2. Pass out a seed packet to each student. Snip the top of the bag off and empty seeds into a container (you may want to do this before passing packets out to students). Save a few seeds to use.
3. Now snip off the right side and bottom of the seed pack so that it will open like a book.
4. On the inside right, use a ruler to draw lines at every centimeter or half centimeter.
5. Pass out one jewelry bag per student.
6. On the inside left, place the bag in the middle and trace around. Cut out the resulting rectangle to create a “window” in the front of the pack.
7. Pass out cotton balls to students. Have them wet their cotton ball (by dunking into a water cup or spritzing with a spray bottle) and place into the bag. Then have them place their seeds onto the cotton ball and seal the bag.
8. Tape the bag to the back of the window. Close the seed pack and tape the edged back together.
9. Have students monitor their seeds growth and use the lines drawn inside the packet to measure its progress. Record measurements on the back of the notebook paper used for the germination definition.



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10. After one week of data collection have students graph their seed's growth and share with the class. Which seeds had the most/least growth? Which was the quickest?

Extension

After seeds have germinated, remove them from the baggies (cotton ball and all) and re-pot in small containers. Students may decorate their containers and give them as Mother's Day gifts.

Collect left-over seeds and have students use them to make seed collages.



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