What Does A Corn Seed Need?

Grade Level: Third Grade

qrco.de/ncscornseed

Scan to Access Lab and Materials Online

Created 2025

This lab is made possible with the support and content contribution of Kansas Corn STEM and the National Corn Growers Association.

What Does a Corn Seed Need?
Grade Level: Third Grade

Unit Overview
Students will learn the different parts of the corn seed. Students will work like scientists to test to see if the seed can still survive and thrive by changing one element to the germination process; either the soil, water or temperature source the seed receives. Students will compare their germinating seed against the teacher's controlled seed to then make observations and draw conclusions about what helped or hindered the germination process. Students will end the unit with creating a new product using some part of the corn seed.

Learning Objectives
- Students will label and explain the functions of a corn seed's three main parts: seed coat, endosperm, and embryo.
- Students will identify the essential conditions (temperature, water, soil) required for seed germination.
- Students will plan and conduct an investigation to test environmental factors on corn seed germination (e.g., water availability, soil availability, etc.).
- Students will identify the essential conditions (temperature, water, and soil) required for germination.
- Students will make observations and record their findings to construct an evidence-based account that corn seed germination needs water and warm temperature to grow.
- Students will identify patterns in germination based on variable conditions (temperature, water, soil).
- Students will conclude from data that the seed needs water, soil and warm temperature in order to germinate.
- Students will understand the usefulness of different parts of a corn kernel.
- Students will use creativity and problem-solving skills to invent and model a new corn-based product.

Standards Aligned
- **3-LS1-1:** Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
- **3-5-ETS1-1:** Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- **3-LS3-2:** Use evidence to support the explanation that traits can be influenced by the environment.

Materials
- "We Grow Corn: Raising Corn on a Kansas Family Farm" by Sharon Thielen, Ph.D
- Google slides
- Science journals
- Observation and Recording sheet
- Pencil
- Colored pencils
- Corn Kernel Diagram handout

What Does a Corn Seed Need?
Grade Level: Third Grade

- Signs (seed needs/don't needs)
- Dot stickers (or something to create tally marks)
- Corn seeds
- Soil, sand, rocks
- Measuring spoon (for watering)
- Planting cups
- Labels or markers
- Blank paper
- Index cards
- Markers
- Play Doh
- Pipe cleaners

Lesson 1

Overview
In this interactive lesson students will investigate the structure and function of a corn seed while learning the essential requirements for germination. Through hands-on activities, guided observations, and multimedia, students identify the seed coat, endosperm, and embryo, understanding their roles in plant development. The lesson connects seed anatomy to agricultural practices and prepares students for experiments on seed needs, fostering curiosity about food production.

Learning Objectives
- Students will label and explain the functions of a corn seed's three main parts: seed coat, endosperm, and embryo.
- Students will identify the essential conditions (temperature, water, soil) required for seed germination.

Standards Aligned
- **3-LS1-1:** Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
- **3-5-ETS1-1:** Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

Materials
- "We Grow Corn: Raising Corn on a Kansas Family Farm" by Sharon Thielen, Ph.D
- Google slides

What Does a Corn Seed Need?
Grade Level: Third Grade

- Pencil
- Colored pencils
- Corn Kernel Diagram handout
- Signs (seeds need/don't need)
- Dot stickers (or something to create tally marks)

Assessments

- Student Drawings:
  - Initial "What's Inside a Seed?" sketch to activate prior knowledge.
  - Final diagram of corn seed labeled with parts: seed coat, endosperm, embryo.
- Class Discussion Participation: Justifying ideas about what a seed is and what it needs to germinate.

Key Points

- Seeds have different parts with special jobs:
  - Seed coat protects the seed.
  - Endosperm stores food for the growing plant (and is the part we eat).
  - Embryo is the baby plant that will grow.
- Seeds need warm temperature and water to germinate.
- Understanding that the corn kernel on a corn plant can be used as a seed or for products we use every day.

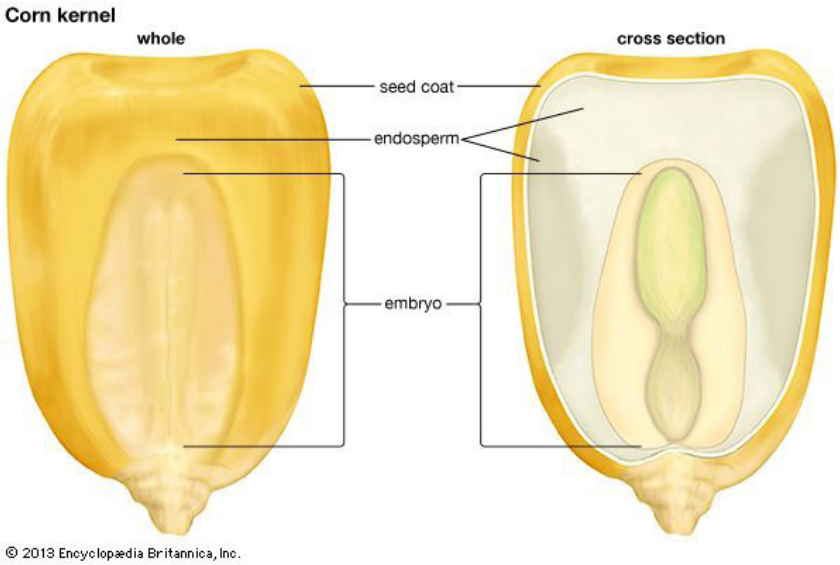
Teacher Guide

Opening

- Slide 1: Picture of corn kernel.
  - Teacher: Begin by holding up a corn kernel and/or placing it under a document camera to project, and ask students:
    - Teacher: "What is this?"
    - Listen to students' responses and ask them to justify all responses, but do not indicate any judgement.
    - A corn kernel has several purposes but did anyone say it is a seed? "Ever wonder what is inside a seed?" (Pass out the Corn Kernel Diagram handout). Have students draw what they think is inside of a corn seed. Give them 5 minutes.
    - Discuss some of their ideas.
- Slide 2: Inside seed diagram.
  - Play the first 1 minute 30 seconds of "Farm to Plate" video.

What Does a Corn Seed Need?
Grade Level: Third Grade

- Show corn kernel diagram from slide. As you discuss each part of the kernel, have students refer to their Corn Kernel Diagram handout and draw the correct diagram of the parts of a kernel. Discuss whether their original diagram was accurate or not. What was similar/different?
- "Earlier when you all were guessing what this corn kernel was, did you realize that this corn kernel is used either as a seed to grow new corn plants or used to make many products we use every day.



Let's explore the parts of a corn kernel.

- "The outer layer of the kernel is called the seed coat or hull. This is very thin but hard and protects the seed from damage such as insects, water loss and physical damage. It's what makes popcorn POP!"
- "The big, white, middle part of the seed is called the endosperm. It stores the food for the baby corn plant when it begins to grow. When a corn kernel is not used as a seed to grow plants, we use this part of the kernel for food products like cereal, tortillas, ethanol (which is gas we use for our car) and animal feed."
- "The embryo is the tiny part inside the kernel that grows into a new plant. It has all the parts needed to grow into a full corn plant. The embryo has healthy oils and vitamins. It's used in corn oil."

- "Wow, this corn kernel is very important. Do any of you know what it takes for this corn kernel to grow into a plant and then produce more corn kernels?"

- Next Slide: What does a seed need in order to germinate?
  - "What is germination? Germination is the process where a plant embryo inside the seed begins to grow and develop into a plant."

What Does a Corn Seed Need?
Grade Level: Third Grade

- "We know this corn kernel is a seed that will grow into a plant. Look at the signs around the room. Which one of these seeds do you think needs to germinate? Don't tell me out loud! You have a sheet of dot stickers. Walk around the room and place a dot in the need column if you think the seed needs the item to germinate or place it in the don't need if you don't think it needs it.
- Give students 5 minutes to place dots around the room.
- Discuss tabulations. Were students correct in the items that a seed needs to germinate?
- You've made some great choices, but how can we PROVE seeds need these materials/conditions?
- That's right! We'll have to do an experiment!

Closing

- "Today, you all became seed scientists! You learned that even though corn kernels look small and simple, they're full of important parts with big jobs. The seed coat protects the seed like armor. The endosperm stores food, just like a lunchbox. And the embryo is the tiny plant waiting to grow!"
- "Next lesson, we'll take what we learned and do a real experiment. We'll test what you think seeds need to germinate. We will test temperature, soil and water. Think about this tonight: If you were a seed, what would YOU need to germinate?"

Extension

Understanding the different parts of the corn kernel, students can create a 3-D model of the kernel. This can be an activity students work on throughout lesson 2, as well. The model can be created with materials students either bring in or materials already in the classroom. The 3-D model should have the different parts labeled.

Check out this video Growth Stages of Corn: Corn Seed Dissection and Growth Stages of Corn: Reproductive Stages

What Does a Corn Seed Need?
Grade Level: Third Grade

Lesson 2

Overview
In this engaging, hands-on investigation, students will take on the role of agricultural scientists to test how different environmental factors affect the germination process of a corn seed. Students will plan and conduct an experiment focused on one variable—temperature, water, or soil—while controlling the others. They will work in groups to plant corn seeds and observe the germination process under varied conditions, using a control seed as a comparison. This lesson emphasizes critical thinking, collaboration, data collection, and evidence-based reasoning.

Learning Objectives
- Students will plan and conduct an investigation to test environmental factors on corn seed germination (e.g., water availability, soil availability, etc.).
- Students will identify the essential conditions (temperature, water, and soil) required for germination.
- Students will make observations and record their findings to construct an evidence-based account that corn seed germination needs water and warm temperature to grow.

Standards Aligned
- **3-LS3-2:** Use evidence to support the explanation that traits can be influenced by the environment.

Materials
- Google slides
- Science journals
- Observation and Recording sheet
- Corn kernels
- Soil
- Water
- Measuring spoon (for watering)
- Planting cups
- Labels or markers

Assessments
- Science Journal:
  - Assess students' ability to design an investigation, identify variables, and prepare materials.
  - Capture ongoing reflections, questions, and observations throughout the experiment.

What Does a Corn Seed Need?
Grade Level: Third Grade

- Data Analysis:
  - Students analyze their findings, draw conclusions, and compare germination outcomes with the control seed.

Key Points

- Students will conduct a controlled experiment testing how one environmental factor (temperature, water, or soil) affects the germination process while keeping other variables constant.
- The lesson emphasizes scientific thinking by having students plan, observe, and record data like real agricultural scientists.
- A control seed will be used for comparison, helping students understand standard growing conditions and evaluate the effects of their variables.

Teacher Guide

Review Lesson 1

- Teacher: "You all did great yesterday when deciding what conditions seeds need to germinate. But technically those were just guesses. How can we PROVE seeds need a certain temperature, water and soil to germinate?
- Students: "We can do an experiment!"
- Teacher: "Correct! Why should we do this experiment? Who can tell me why corn is so important?" (food for humans, animals, ethanol, etc) Show graphic on slide deck.
- "Before we begin our experiment we need to create a plan. Using your science journals, let's work together to develop the steps needed just like agricultural scientists do. Be sure to number them in order."
- "What conditions will we be testing?" (germinating seeds in cool vs.warm; with water vs no water; in soil vs a damp paper towel; etc.) Note:The warmer the seed gets the quicker it will germinate. Suggest having one group put their seed in the refrigerator, in a window and warm location in the school.
- "What materials do we need to conduct this investigation?" (have students record this in their journals.)
- Show them the materials they have to plan an investigation (planting pots, soil, measuring spoons for water, refrigerator, etc.). Showing the students will help them if they do not have any background knowledge.
- Tell students how much time they will have (consider 2 full weeks for the investigation).
- Teacher: "Now that we have our plan, it's time to put you in groups. Each group will only test one variable. What are those again?" (temperature, water, soil).
- Have students record their observations in their journal. As you describe what each group is testing, refer to how students will be recording their data. Optional: Pass out the Observation and Recording sheet for recording data.

What Does a Corn Seed Need?
Grade Level: Third Grade

- Optional: Check out the Noun Project. Students can browse the icons for ideas on what to draw as a way to describe variables and conditions. This offers success to all students regardless of reading/writing abilities. The link to the Noun Project can be pushed out on Google Classroom for students to look at independently.

Control Seed

- Before students are placed in a team, the teacher will set up the controlled seed in front of the class. This allows the teacher to model what variables will stay the same and will model how students will plant their seed. The teacher will plant three dent corn seeds using soil and a specific amount of water (2 TBSP of water) daily to water their plant. The plant will be placed in the classroom or area of the school that gets the most sunlight, average temperature.
- Also plant three seeds in a clear bag with we paper towel allowing for the seed to be seen. This will allow students to observe what is happening underground. Tape to a window with access to sunlight.
- The teacher can put up an anchor chart or write on the board how much soil was used, how much water will be given daily and the temperature the seed will be exposed to during the entire experiment.
- Explain that the control seed is as close to what a corn seed would receive in a farm field with ideal conditions. When students are placed in their team; team temperature, team water or team soil, have students refer back to the control seed to make sure that only the variable they are testing is changed. Remind them that they will compare the number of days it takes for their seed to germinate compared to the control seed during the growing process.
- Slides provided will help with the explanation of all of these steps as well.

Team Temperature

- Teacher: "If you are **Team Temperature**, you will be investigating whether the temperature the seed is exposed to will affect the germination process. In order for this experiment to be a TRUE experiment that a scientist would run, your group will use the same amount of soil and the same amount of water as our control seed."
- Engage students in a discussion as to what type of experiments could be observed.
- Examples of where to place your seed:
  - By a window with lots of sunlight
  - In a warm room at your school (example boiler room)
  - In refrigerator
  - Refer to the slide with examples of how to complete the Observation and Recording Sheet or write data in the science journal.
- Refer to slides with steps to plant and water.

What Does a Corn Seed Need?
Grade Level: Third Grade

Team Water

- Teacher: "If you are **Team Water**, you will be investigating whether the amount of water given to the seed will impact germination. In order for this experiment to be a TRUE experiment that a scientist would run, your group will use the same amount of soil and the same temperature."
- Engage students in a discussion as to what type of experiments could be observed.
- Examples:
  - Seeds fully submerged
  - No water
  - Three times the amount of water
- To be a TRUE experiment, each seed needs to receive the same conditions as the control seed with the exception of the amount of water given.
- Refer to the slide with examples of how to complete the Observation and Recording sheet or write data in the science journal.
- Refer to slides with steps to plant and water.

Team Soil

- Teacher: "If you are Team Soil, you will be investigating whether a seed needs soil to germinate. In order for this experiment to be a TRUE experiment that a scientist would run, your group will use the same amount of water and same temperature."
- Engage students in a discussion as to what type of experiments could be observed.
- Refer to the slide with examples of how to complete the Observation and Recording sheet or write data in the science journal.
- Examples:
  - Place seed on paper towel only
  - Rocks
  - Torn newspaper

Students will take care of their seeds for the next 14 days. Students will record how long it will take for their seed to germinate (shows the first sign of green or when it first emerges from the soil (control seed). Once their seed has emerged students will make observations by drawing roots and coloring in their seed (like the page from lesson 1) to show what the seed looks like.

After the 14 days and students have made their observations, students will carefully cut the seed in half with a plastic knife or break up the seed so they can see what is going on, on the inside. Again, students will draw or color what they notice (page from lesson 1). Note: You need to set an end date as the seeds will all germinate at different times or not at all. On the last day all groups can find their seed to cut it in half. Students will take their observation page and seed and compare it to the controlled seed.

What Does a Corn Seed Need?
Grade Level: Third Grade

Closing

- "Over the next couple weeks we will refer back to our plants and take data in our science journals."
- "Remember, scientists don't just make guesses—they test ideas and gather evidence. That's exactly what we're doing in this experiment! You're working as real agricultural scientists by designing an investigation, observing changes, and using data to draw conclusions. Think about what surprised you, what confirmed your ideas, and what didn't go as expected. Our control seed will help us understand what seeds need in order to germinate like on a farm. Great job being critical thinkers and problem-solvers. Just imagine how you could use these skills to grow better food, help the planet, or even invent new farming tools one day. I'm proud of how scientific you've all become!"
- Remember to always bring your control seed out and have students compare.

Extension

Over the next couple of weeks have students make daily observations of their corn seed. Add in time for discussion and time for students to be able to look at and talk to other classmates about their experiment.

- While the students wait for results, use the "We Grown Corn! Raising Corn on a Kansas Family Farm" book. The suggested pages allow for discussion in small chunks throughout the 2-4 weeks of growing.
  - Pages 2-3: What does a family farm look like?
  - Pages 4-5: What type of machinery does a farmer use?
  - Pages 6-11: Planting corn and how the farmer helps it grow.
  - Pages 12-15: Harvesting corn. How does that happen and why is it a family event?
- Have students learn more about ethanol by playing the Ethanol in the Classroom online game.

What Does a Corn Seed Need?
Grade Level: Third Grade

Lesson 3

Overview
In this lesson, students act as agricultural scientists and inventors. First, they analyze results from their germination experiments conducted under different conditions: temperature, water, and soil. Using their observations, they identify optimal conditions for corn germination. Then, applying their understanding of corn kernel parts, students take on an engineering design challenge: invent a new product using any part(s) of the corn kernel. They will sketch, build a model, and explain their innovation in a classroom gallery.

Learning Objective
- Students will identify patterns in germination based on variable conditions (temperature, water, soil).
- Students will conclude from data that the seed needs water, soil and warm temperature in order to germinate.
- Students will understand the usefulness of different parts of a corn kernel.
- Students will use creativity and problem-solving skills to invent and model a new corn-based product.

Standards Aligned
- **3-LS3-2:** Use evidence to support the explanation that traits can be influenced by the environment.
- **3-5-ETS1-1:** Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

Materials
- Existing plants/seeds
- Science journals
- Google slides
- Blank paper
- Index cards
- Markers
- Play Doh
- Pipe cleaners

Assessments
- Informal group discussion around plant observations.
- Individual participation in invention planning and modeling.
- Final model presentation with written product description.

What Does a Corn Seed Need?
Grade Level: Third Grade

Key Points

- Observation and data analysis help scientists (and students) draw conclusions about germination needs.
- Corn is used in a wide variety of products—from food to fuel to packaging.
- Each part of a corn seed has potential for innovative use.
- Students practice STEM and engineering design by brainstorming, modeling, and presenting new inventions.

Teacher Guide

Review Lesson 2

- Teacher: "What were the 3 conditions we tested on our seeds?" (water, temperature, soil)
- Teacher: "What variables had to stay constant in order for it to be a true experiment?" (depending on condition tested, the amount and type)
- Teacher: "A big part of being a scientist is analyzing the data. Get with your groups based on the condition you tested (water group, soil group, temperature group.) Take a couple minutes to analyze observation data. Then discuss what conclusion you could make based on not your opinion, but your scientific data."
- Student responses should all revolve around temperature, water, soil being the best conditions.
- Teacher: "Now that we know the ideal conditions for corn germination, who remembers from lesson 2 why corn is important? (refer to graphic on slide) Student responses should vary: animal food, baking products, ethanol, packaging, cooking oil, etc.
- Teacher: "Even though those items don't look like corn, we learned that they are made from what?"
- Students: Answers may vary. The final response should be the corn seeds.
- Teacher: "Yes! For your challenge, you are to create a new product using corn.
- Teacher: Engage in further background knowledge:
    - Do you remember which part of the kernel is the hardest?
        - Seed coat-This part is used for animal feed. Is there another product you could create using the seed coat?
    - What was the largest part of the corn seed called?
        - Endosperm- used the most for food products, ethanol and animal feed.
    - The tiny part of the seed that turns into a plant is called what?
        - Embryo- This part of the seed produces oils. Corn oil is an example of something made from part of the kernel.
- Teacher: "Knowing what we know about a corn kernel, we're going to switch from being agricultural scientists to inventors. Your challenge is to create a new product. It can be made of any part of the corn kernel. You can use one or a combination of the parts. Get creative! Remember those parts can be manipulated meaning cut, smashed, folded etc into different shapes or textures."

What Does a Corn Seed Need?
Grade Level: Third Grade

- "You have 5-10 minutes to brainstorm your ideas on a piece of paper. Once you have your vision, choose your materials to create a model of your new product. You have a choice to use any of the following materials to display your model: markers, play doh, cardboard, pipe cleaners, etc. Once you complete your model write the name of your product and a description of what it does on an index card. We will do a gallery at the end of class to show off your innovative new products!"
- Give students 25ish minutes to complete their product models.
- Teacher closing: "Today, you all did something amazing—you put on the hats of both scientists and inventors! You used data to make smart conclusions about how a seed germinates, and then you used your creativity to think of new products that can be made by corn. This is exactly how real-world engineers and agricultural scientists work. They study, observe, and then use what they know to solve problems or create new products. Keep asking questions, keep inventing, and who knows—you might just create the next big thing from corn someday!"

Science and Agriculture Careers

To learn more about agriculture careers, visit agexplorer.ffa.org/.

Any educator electing to perform demonstrations is expected to follow *NSTA Minimum Safety Practices and Regulations for Demonstrations, Experiments, and Workshops*, which are available at http://static.nsta.org/pdfs/MinimumSafetyPracticesAndRegulations.pdf, as well as all school policies and rules and all state and federal laws, regulations, codes and professional standards. Educators are under a duty of care to make laboratories and demonstrations in and out of the classroom as safe as possible. If in doubt, do not perform the demonstrations.

Does a seed need cold?

NEEDS	DOESN'T NEED

Does a seed need water?

NEEDS	DOESN'T NEED

Does a seed need candy?

NEEDS	DOESN'T NEED

Does a seed need soil?

NEEDS	DOESN'T NEED

Does a seed need air?

NEEDS	DOESN'T NEED

Does a seed need a light bulb?

NEEDS	DOESN'T NEED

Does a plant need music?

NEEDS	DOESN'T NEED

Observation and Recording Sheet

Team: _____

Date: _____ Day _____ of the experiment.

Observations: (explain what you observe about your plant)

Draw a picture of what you observe:

Team: _____

Date: _____ Day _____ of the experiment.

Observations: (explain what you observe about your plant)

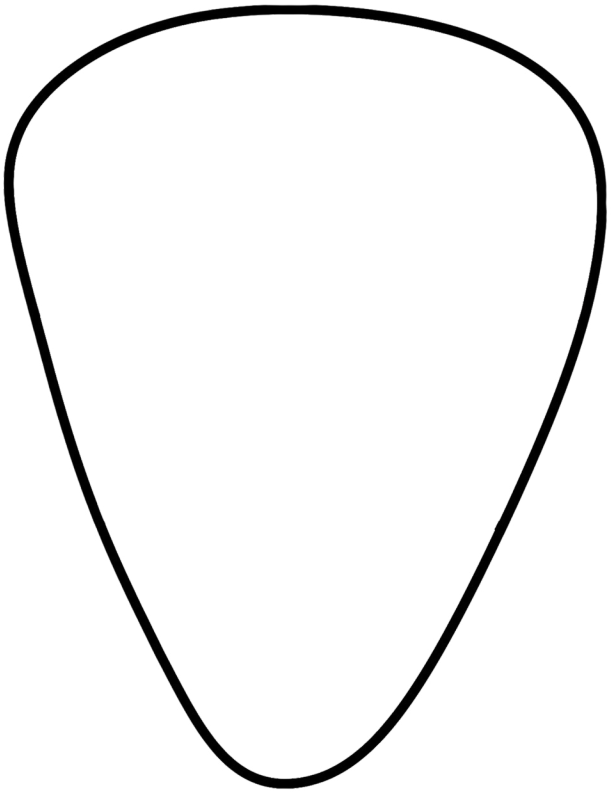
Draw a picture of what you observe:

Corn Kernal Diagram

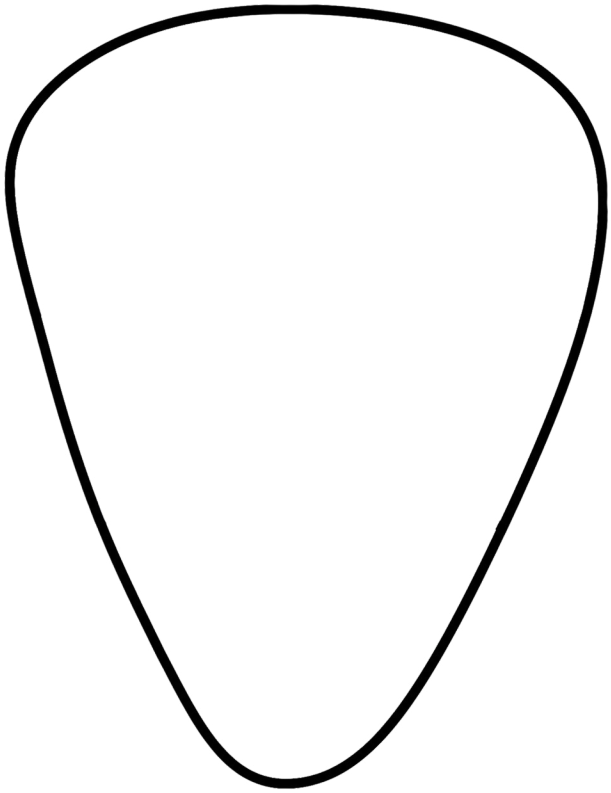
Lesson 1

Name: _____

What I think is inside:



What is really inside:

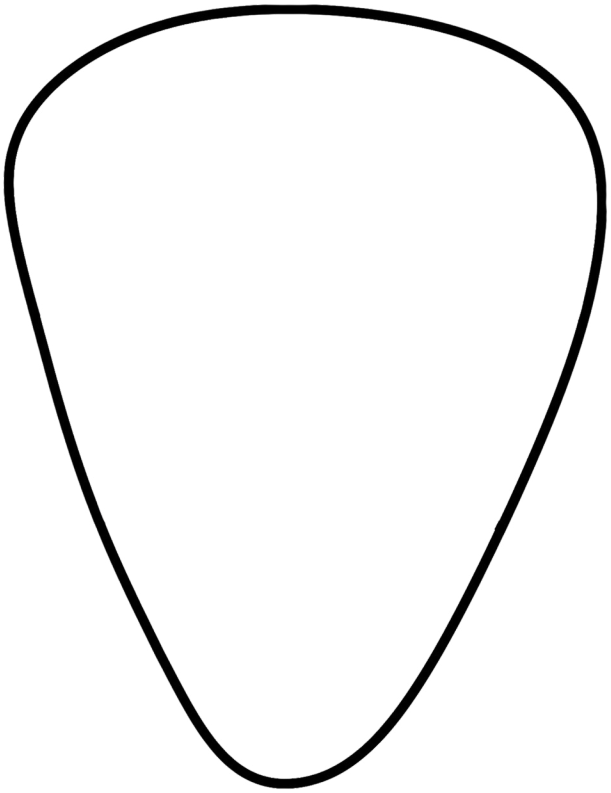


Corn Kernal Diagram

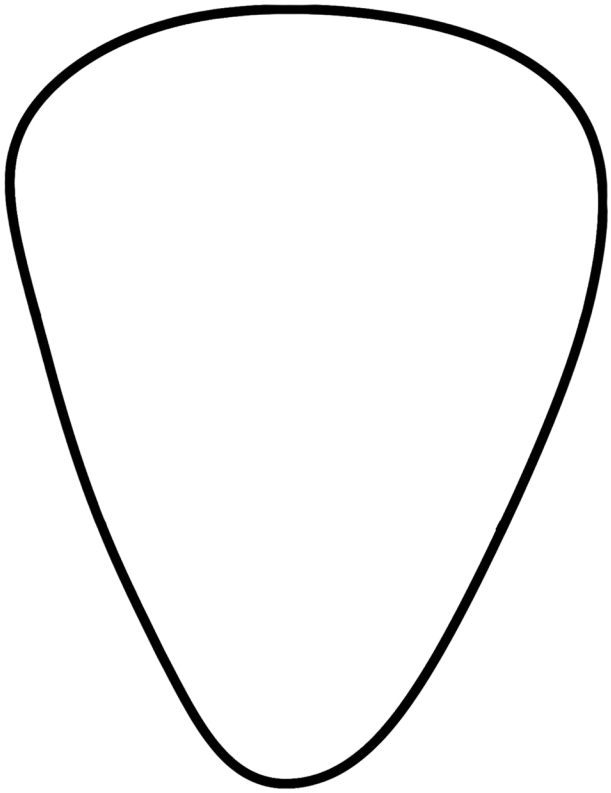
Lesson 2

Team Name: _____

What the kernal looks like on the outside:



What the kernal looks like on the inside:



Label the parts inside the seed: seed coat, endosperm, embryo