KANSAS CORN STEM

KANSAS CORN:
A Kernel's Adventure

This lab is made possible with the support and content contributions of the Kansas Corn Commission.

KANSAS CORN COMMISSION

Kansas Corn: *A Kernel's Adventure*
Grade Level: 1

Overview
Students explore how important corn is in our daily lives by discovering the many products made of corn, that corn is grown in Kansas, and what corn plants look like. They delve into discovering where the seed of a corn plant is by planting different parts of the plant to test their ideas. They expand their observation skills, form explanations based on evidence, and develop motor skills in the context of corn. Each lesson could be taught as a stand-alone lesson, though they are designed to form a complete unit.

Kansas College and Career Ready Standards
Science
- **1-LS3-1.** Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.
- **2-PS1-1.** Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

Language Arts
- **SL.1.1.** Participate in collaborative conversations with diverse partners about kindergarten and/or first grade topics and texts with peers and adults in small and larger groups.
- **SL.1.4.** Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.
- **SL.1.5.** Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.

Learning Objectives
- Students will propose an answer to the question, "Why do we need farmers to grow corn?"
- Students will provide evidence that many everyday products are made from corn.
- Students will propose an answer to the question, "Where is the seed in a corn plant?" for further exploration.
- Students will make observations of their plantings to construct an evidence-based account that corn kernels are corn seeds.

Materials
- Book: We Grow Corn: Raising Corn on a Kansas Family Farm, by Sharon Thielen, Ph.D.
- A variety of products made with corn (ketchup, glue sticks, popcorn, etc.) (pg. S1-2)
- Pictures of "no corn"/pictures of "corn" (pg. S3-4)
- Complete full grown corn stalks with at least one ear on each (dried is OK)
- Planting containers
- Soil
- Spray bottle

- Growth chart (pg. S5)
- How Does Corn Grow? sequence worksheet (pg. S6-7)
- Time lapse video corn seed produces the same variety of corn

Note: If a product cannot be found in the store or is too large to bring into the classroom, photos of all corn-derived products listed in this unit can be found with the electronic version of this guide at www.kansascornstem.com.

Safety Considerations

Be aware of student allergies or seeds treated with chemicals, remind students to not put seeds in their mouths, ears, or nose.

Lesson 1: Why is Corn Important to Me?

(30 minutes)

Key question

Why do we need farmers to grow corn?

Learning Objectives

- Students will propose an answer to the question, "Why do we need farmers to grow corn?"
- Students will provide evidence that many everyday products are made from corn.

Materials

- Book: We Grow Corn: Raising Corn on a Kansas Family Farm, by Sharon Thielen, Ph.D.
- A variety of products made with corn (pg S1-2)
- Pictures of "No Corn"/ Pictures of "Corn" (pg. S3-4)

Note: If a product cannot be found in the store or is too large to bring into the classroom, photos of all corn-derived products listed in this unit can be found with the electronic version of this guide at www.kansascornstem.com.

Procedures for Instructions

1. Introduce the topic and assess students for prior understanding with such questions:
   - "Who knows what corn is?"
   - "How would you describe corn?"

- "Where do we find corn?"
- "How do you know it's corn?"
- "Why do farmers grow corn?"

2. Read aloud: ***We Grow Corn: Raising Corn on a Kansas Family Farm***, by Sharon Thielen, Ph.D.

3. Discuss that corn grows in Kansas and it is all around them. "Do you know what products corn is used to make?" (Let students discuss without cueing them as to whether they are right or wrong. Ask them how they could find out, how they could find evidence.)

4. Play a game with products that contain corn.
   - Set up 2 stations in the room with the pictures of "no corn" or "corn" used as signs. Show students one product at a time and ask if they think it contains corn. If no, they should go to the "no corn" station. If yes, they should go to the "corn" station.

5. Reveal the answers and discuss. All the products contain corn. Discuss with the following prompts:
   "Can you find the word 'corn' on the list of ingredients?"
   "Are you surprised that so many of our everyday products use corn?"
   "What do you think about so many products containing corn?"
   "Is it important that our farmers grow corn? Why?"
   "What do you think would happen if farmers could not grow corn?"

6. Conclude: "You discovered how important corn is to our lives, and that Kansas farmers grow corn. We will continue to learn more about corn. Until then, be on the lookout for corn in your world! Is it in the products you use? Is it growing in a nearby field?"

7. Assessments:
   - Formative assessments: Assess contributions in first discussion for prior understanding and adjust instruction if needed; assess responses on checklist or during game – are they finding evidence of corn in the product by finding the word "corn" in the ingredients (if they can read)?
   - Informal summative assessment: Verbal responses in final discussion – do students recognize that corn is an important agricultural product because it is used in so many of our products?

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Lesson 2: Where is the Corn Seed?

(30-40 minutes, with follow-up observations and a 15-20 minute discussion in 7-10 days)
Consider moving to an outdoor space for the messier part of the lesson.

Key question

How does corn grow?

Learning Objectives

- Students will propose an answer to the question, "Where is the seed in a corn plant?" for further exploration.
- Students will make observations of their plantings to construct an evidence-based account that corn kernels are corn seeds.

Materials

- Complete full grown corn stalks with at least one ear on each (dried is OK)
- Planting containers
- Soil
- Growth chart (pg. S8)
- Art paper
- Spray bottle
- How Does Corn Grow Activity Sheet (pg. S9)

1. Introduce the topic and activate prior learning. Review the importance of corn discovered in the previous lesson, and introduce the question of how it grows with such questions:
   - "What products did we discover are made from corn?"
   - "Did you discover any other products at home made from corn?"
   - "Is it important that our farmers grown corn? Why?"
   - "How do farmers grow corn? What do they need to do?"

2. Small group discussion and exploration:
   - Split students into small groups for discussion to answer the questions, "How do new corn plants grow? How do new plants grow?"
   - As students discuss, provide a complete and intact corn stalk (with at least one ear) to each group. (*We recommend you direct students to an outdoor space as this can now get messy.)
   - Guide them to think about seeds, and the role that seeds play in growing new corn plants.

- Instruct each group to find the seeds on the corn plant. Encourage them to take apart the corn stalk.
- Students will propose various parts of the cornstalk they believe may be seeds (the leaves, the roots, the tassels, the kernels, etc.).
- Then ask, "How can we test what is a seed and what is not a seed?" Guide them to decide that they need to plant what they propose is a seed.

3. Plant all the parts of the plant:
   - Distribute planting containers with soil, and have students plant the part they propose is the seed (or have them bring their "seed" to the planting containers).
   - Each student will plant only one "seed."
   - Be sure to label the container with what was planted.
   - Water the containers with a spray bottle.
     Note: Optimum planting depth of corn kernel is 1-2 inches deep. Emergence of leaf above the soil will take approximately 5-7 days.

4. Document their thinking: Distribute art paper, and have students draw a picture of where they found their proposed "seed," and what they think will emerge from it. Once the plants begin to grow, have students review their predictions and draw another picture if needed.

5. Observe and record results over 5-10 days:
   - Have students water the soil of all the planting containers so they stay damp with spray bottles over the next 5-10 days (how will they get watered on the weekend?).
   - Create a class observation chart (or checklist) to indicate which pots sprout new corn plants.
   - Have students observe and record which plantings sprouted new corn plants and which did not.
   - Have students use the growth chart to record the growth of their "seed."

6. Analyze findings and discuss after 7-10 days (15-20 minutes): Draw students' attention to the planting containers and the observation chart. Discuss with the following or similar prompts.
   - "What parts of the corn plant were able to sprout new corn plants? The leaves? Tassels? Roots? Kernels?"
   - "How do you know?"
   - "What does this tell you about where the seeds are in the corn plant?"
   - "If you wanted to plant corn plants, what part of the plant would you plant? What are the seeds?"

- "What does a farmer plant in her/his field in order to grow corn?"

7. Conclude: Prompt students to explain how they know the corn kernel is a seed, based on their first-hand observations (evidence). Discuss and review the class observation chart. Have each student compare their previous prediction drawing to the results on their growth chart. Have students complete the "How Does Corn Grow" sequence worksheet to assess understanding of corn life cycle.

8. Assessments
   - Formative assessments: assess students' understanding of plant life cycles based on their propositions of how to create a new corn plant; do they know that farmers plant seeds and grow plants? Adjust instruction and prompts accordingly.
   - Informal summative assessment: verbal responses in final discussion – do students recognize that their observations provide evidence that the kernel is the corn seed? Do they understand the role of seeds in a plant's life cycle?

Common Items Containing Corn

Toothpaste: Sorbitol is an ingredient in toothpaste derived from corn. It helps create toothpaste's flavoring and texture.

Yogurt: Uses high-fructose corn syrup as a sweetener; the cows that make the milk also eat corn in their daily meals.

Gum: Uses high fructose corn syrup and maltitol as sweeteners and sorbitol for flavoring.

Cosmetics: Blush and eye shadow often contain zea mays, which is another name for corn.

Shampoo: Citric acid is a common ingredient in shampoos and conditioners and is derived from corn.

Diapers: Corn starch is used to soak up moisture in diapers.

Envelopes: Corn is used to make nitrocellulose glue, which holds envelopes closed so they can be mailed.

Corn Bread: The main ingredient is corn meal, which gives corn bread its gritty texture compared to other types of bread.

Handsoap: For many different purposes, at least 25% of the ingredients in some hand soaps contain or were derived from corn.

Windex: This glass cleaner contains at least 5 different ingredients derived from corn.

Jellybeans and Licorice: These candies not only include corn syrup of some form to give them their texture but also, powdered corn starch is used to coat their molds and allows manufacturers to more easily pop them out after they're finished being molded.

Corn Flakes: If you are someone who enjoys a hearty bowl of flakes for breakfast, you're eating the corn grit that has been steamed and flaked.

Paper, Recycled Paper and Cardboard: Industrial corn starch is used during the paper-making process.

Crayons and Chalk: Utilize industrial corn starch to get them out of their molds and corn products also help the paper labels adhere to the crayons.

Running Shoes- Currently, most shoes are made with oil-based plastics, but Reebok has announced that it will begin to make the sole of their new sustainable shoe with petroleum-free, non-toxic, industrial-grown corn.

Spark Plugs: Spark plugs in your car are made from metal and ceramics. When the crystalline structures of cornstarch are heated to very high temperatures, they harden and it becomes a type of ceramic. The ceramic is able to withstand high temperatures and also withstands the corrosive properties of some specific acids.

Rubber Tires: Instead of using oil-based rubber, Goodyear and their research partner Genencor are using cornstarch to chemically bind the ingredients of its new kind of tire.

Fireworks: Some of the compounds in fireworks require a "binder" in order to burn properly. A common binder is dextrin, a light carbohydrate most commonly made from corn.

Popcorn: Popcorn is its own type of corn. There are three common types of corn; sweet corn, popcorn and field corn. The two we eat in their natural form are sweet corn and popcorn.

Pet Food: Pet food is regulated to the same level of safety as human food. Corn is used in pet food to create a balanced diet for all kinds of pets including dogs, cats and even fish.

Batteries: Corn starch is often used as an electrical conductor in batteries.

Deodorant: Uses corn starch because of its absorbent nature.

Hand Sanitizer: Contains ethanol which typically is made by fermenting corn.

Carpet and Other Textile Products: Corn-based textile products are often preferred to the petroleum based products because they are more environmentally friendly.

Plastic Products: While it's not a widespread use like the other products, bioplastic is being used in many different products such as bags, containers and cups. Corn-based plastics are biodegradable and use up to 68% less fossil fuels during production than traditional plastics and are estimated to emit 55% less greenhouse gases.

Watch My Corn Plant Grow

Use the boxes below to draw and record your corn plant's growth.

DATE:_____ **DATE:**_____

DAYS OF GROWTH:_____ **DAYS OF GROWTH:**_____

DATE:_____ **DATE:**_____

DAYS OF GROWTH:_____ **DAYS OF GROWTH:**_____

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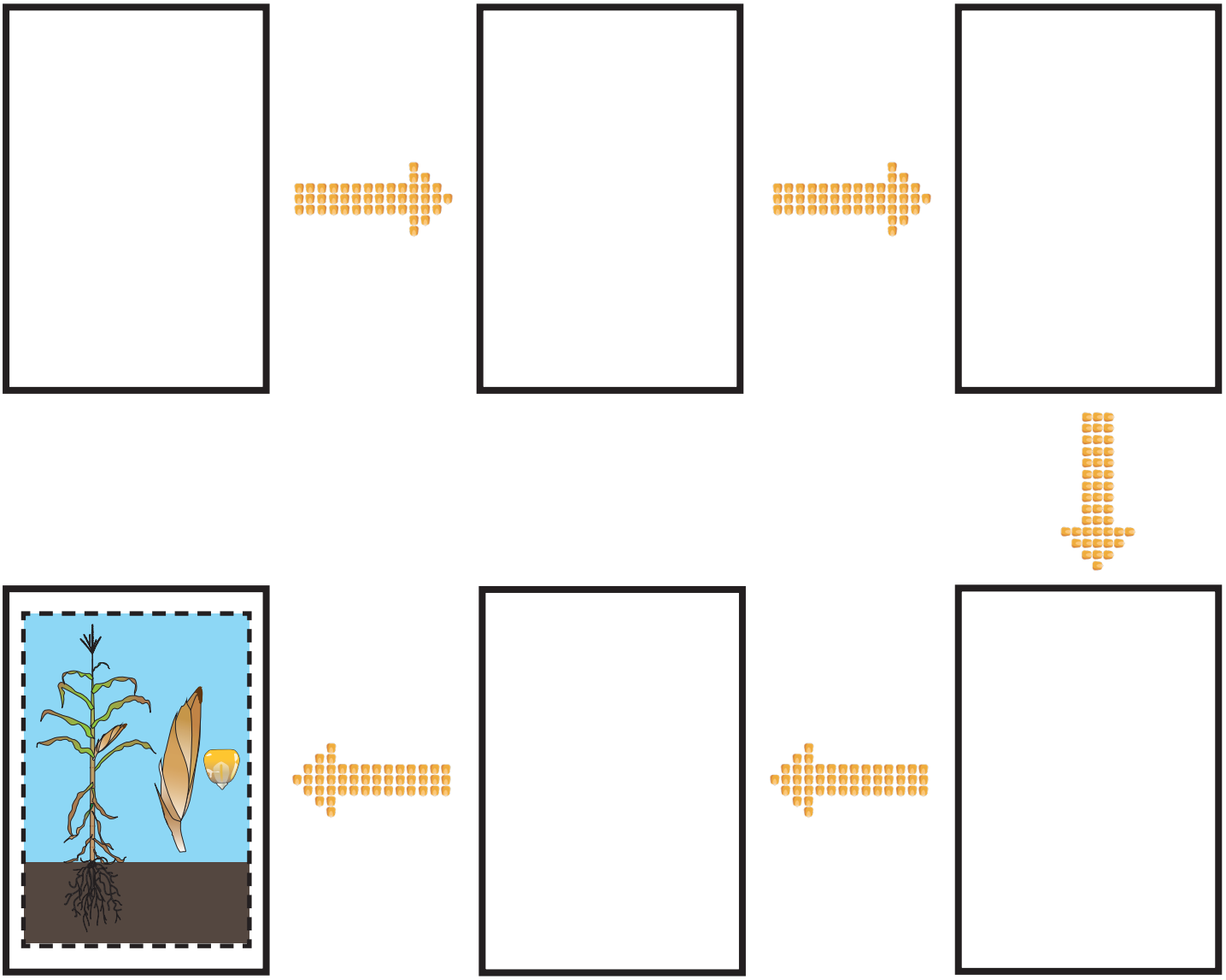
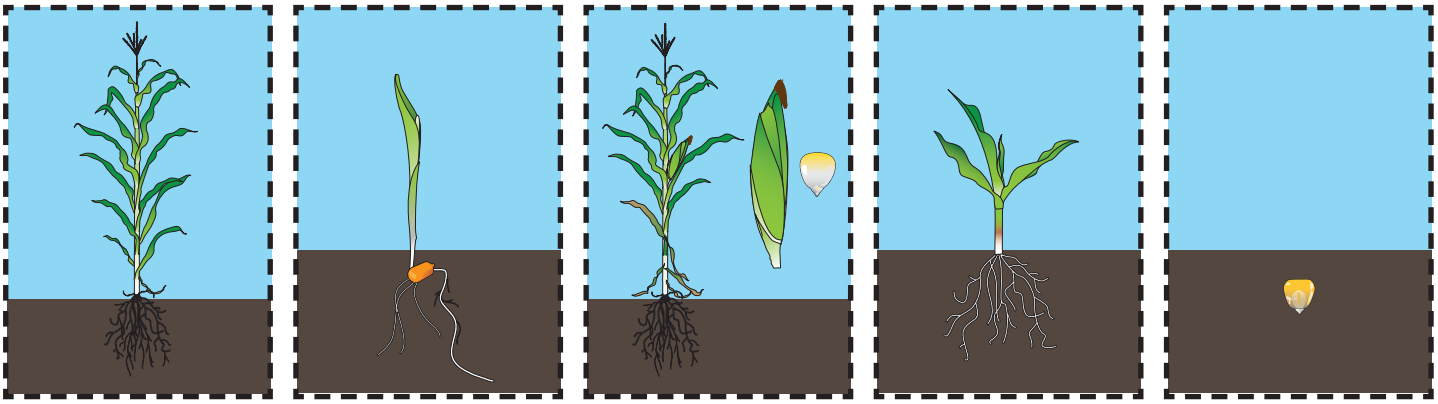
How Does Corn Grow?

Cut out the pieces at the bottom and paste them in order of how the corn plant grows.





Answer Key

How Does Corn Grow?

Cut out the pieces at the bottom and paste them in order of how the corn plant grows.

1 → 2 → 3 ↓

4 ← 5 ←