Lesson 4: Farm Equipment Engineers

Grade Level: Kindergarten

Time: 60 minutes

Subjects: ELA, Science, Agriculture

Overview: This lesson is Lesson 4 of 5 in the *Jobs Farmers Do* unit within the *Growing Readers* micro-curriculum, based on a series of books written by Kansas author Dan Yunk. Building on Lesson 2's work repairing farm equipment, students examine a photograph of a farmer carrying feed by hand and learn that farmers solve problems by choosing, adapting, repairing, and sometimes building the equipment they need. Students then become farm equipment engineers, designing and building something that moves a load of feed or crops from one place to another. They test their equipment, find a problem, change their design, and test it again. Students then write a narrative recording sheet describing what they built, what happened during testing, what they changed, and how they felt about their work. The lesson closes with students comparing two designs and connecting their work to Kansas farmers.

Skillset: Activating prior knowledge across lessons, defining a simple problem, designing and building a physical model, testing and improving a design, comparing two designs, recalling information from a hands-on investigation, narrating events in order and providing a reaction through drawing, dictating, and writing, spelling words phonetically, matching consonant sounds to letters, and leaving spaces between words in print.

Kansas Academic Standards
Kansas ELA Standards
RF.K.1.c Understand that words are separated by spaces in print and can point with one-to-one correspondence.
RF.K.3.a Demonstrate basic knowledge of phoneme-grapheme correspondences of predictable consonants.
W.K.3 Use a combination of drawing, dictating and writing to narrate a single event or several loosely linked events, tell about the events in the order in which they occurred and provide a reaction to what happened.
W.K.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
W.K.11.d Spell simple words phonetically, drawing on knowledge of letter-sound relationships.

Kansas Science Standards
K-2-ETS1-2 Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
K-2-ETS1-3 Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

National Agriculture Literacy Outcomes

Science, Technology, Engineering, and Mathematics
T4.K-2.b Recognize and identify examples of simple tools and machines used in agricultural settings (e.g., levers, screws, pulley, wedge, auger, grinder, gears, etc.).

Objectives
English Language Arts Objectives
Students will be able to:
- Recall information from the Farm Equipment Engineers challenge to answer questions.
- Narrate what they built, what happened when they tested it, and what they changed, telling the events in order.
- Provide a reaction to how their equipment worked.
- Spell simple words phonetically, drawing on knowledge of letter-sound relationships.
- Match predictable consonant sounds to the letters that spell them.
- Leave a space between words and point to each word with one-to-one correspondence.

Science Objectives
Students will be able to:
- Build a physical model that solves the problem of moving a load from one place to another.
- Explain how the shape of their equipment helps it function as needed to move a load from one place to another.
- Test their equipment, find a problem, and change their design to improve it.
- Compare their equipment to another student's equipment and describe what each one did well.

Agriculture Objectives
Students will be able to:
- Identify simple equipment farmers use to move feed and crops.
- Explain how farmers solve problems with their equipment on the farm.

Materials Needed
Whole Group:
- Book: *Jobs Farmers Do* by Dan Yunk, illustrated by Michele Johnson, photographs by Scott Stebner and John Schlageck (physical copy, page 8 only)
- "Farmer Problem Solvers" chart paper, with the four picture cards posted ahead of time and no written words
- Farmer Problem Solvers picture cards, companion document
- Markers
- Chart paper with the four sentence frames written out ("I built a _____." "First, _____." "Next, I _____." "I felt _____.")
- Chart paper for the modeled writing
- 1 teacher sample piece of equipment, built ahead of time from a paper cup and tape, used only to model the writing after the build
- Word Bank, displayed where all students can see it
- Feelings chart, displayed where all students can see it

Farm Equipment Engineers Challenge (per student):
- 1 starter base, either a paper cup or a small box, chosen by the student
- 1 small pile of pom-poms, cotton balls, dry beans, or large counters to represent that student's load of feed or crops

Farm Equipment Engineers Challenge (shared per small group of 3 to 4 students):

- 1 basket, tray, or container holding the building materials below
- Extra paper cups and small boxes, so every student can choose a starter base
- Small cardboard pieces, cut ahead of time into a mix of small rectangles and squares
- Craft sticks
- Drinking straws
- Index cards or cardstock
- Tape, with several strips torn ahead of time and placed along the table edge
- String or yarn
- Pipe cleaners
- Small cardboard tubes, optional, cut to safe sizes ahead of time
- 1 testing area per group: a tray, a section of table, a piece of butcher paper, or a space marked with painter's tape
- START and FINISH points marked in each testing area, about 2 to 3 feet apart

Writing:

- My Farm Equipment recording sheet, companion document (one per student)
- Word Bank, companion document
- Feelings chart displayed where all students can see it during writing.
- Pencils and crayons

Notes: 1)The sentence frames stay on chart paper, not on the recording sheet. Students write their own sentences on the lines, choosing the frames that fit what they want to say, and write at least two. 2) The "Farmer Problem Solvers" chart carries the four picture cards, not sentences. The teacher says each question aloud and points to the matching card. Kindergartners read connected text on a chart far more slowly than they listen, so the teacher delivers the challenge orally and demonstrates it. 3) See the separate Teacher Preparation instructions below for setting up the material baskets and testing areas before the lesson begins. Do not build an example for students to copy. Use the teacher sample cup only during the writing model, after every student has finished building. In Section 3, the teacher demonstrates with a bare starter cup only, so no student sees a finished solution before building. Each student builds and tests their own equipment, so each student writes about their own work. Groups share one basket of materials and one testing area, and take turns testing.

Lesson Procedures

1. Connecting to What We Know. Explain to students: "In our last lessons, we became farm mechanics and farm business owners. Today we are going to find out about one more job farmers do, and this one is a building job."
    a. Ask students:
        - "Who remembers what equipment means?"
        - "What is one piece of farm equipment we fixed when we were mechanics?"
    b. Explain to students: "That's right. Equipment is the machines and tools farmers use to do their work. Today we are not going to fix equipment. We are going to build it."
2. Spotting the Farmer's Problem. Explain to students: "We are not going to read our whole book again today. We are just going to look at one photograph, because it shows us a problem we are going to solve."
    a. Turn to page 8 and show the photograph of the farmer feeding sheep out of a bucket.
    (Keep this section brief. Students look at one photograph only. The purpose is to define the problem students will solve, not to reread the book.)
    b. Ask students:

- "What is this farmer doing?"
- "What is the farmer using to carry the feed?"
- "The farmer has a whole flock of sheep to feed. Do you think one bucket is enough? Why or why not?"

c. Explain to students: "A bucket can carry feed, but carrying feed this way may take many trips because you can only move a small amount at a time. That is a problem. Farmers solve problems like this all the time. Remember what Grandpa told Kailey. He said it takes many skills and lots of hard work to be a successful farmer, and that farmers have to know how to solve problems too. Today we are going to solve a farmer's problem."

3. Introducing the Farm Equipment Engineers Challenge. Gather students so everyone can see the chart paper and the sample materials. Do not distribute any baskets or materials yet.
   a. Explain to students: "Today you are going to be farm equipment engineers. An engineer is a person who builds something to solve a problem."
   b. Display the testing area and point to the ‘START’ and ‘FINISH’ points. Explain to students: "Here is the farmer's field. The feed is piled up right here. The farmer needs it over here." Pick up one piece of feed, carry it slowly from START to FINISH, and set it down. Repeat once more, slowly.
   c. Ask students:
      - "If I keep going one piece at a time, how long will this take?"
      - "What could I build to move a lot of pieces at once?"
   d. Explain to students: "That is your job today. Build something that carries a load. A load is something that is being moved or hauled."
   e. Hold up one empty paper cup and one empty small box. Explain to students: "Every engineer gets to pick one of these to start with. A cup or a box. This is just your starting piece. It is not finished yet, and it is not strong enough yet. Your job is to make it work."
   f. Model one test with a bare starter cup, so students see the routine before they build. Fill the cup with feed where students can see. "Watch me. I am going to move my load from ‘START’ to ‘FINISH’." Carry it across, tipping enough that a few pieces spill, and set it down at ‘FINISH’.
   g. Ask students:
      - "What did you see happen?"
      - "What went wrong?"
   h. Explain to students: "Some of my feed fell out, and my cup was hard to carry. This is an example of a problem that you would need to fix. After you test your equipment, you will change one thing and try again. I am not going to show you what to change. Every engineer decides that for their own equipment."
   i. Display one sample basket of building materials without passing it out. Name each material as you hold it up: cardboard pieces, craft sticks, straws, index cards, tape, string, pipe cleaners, and tubes. Explain to students: "Everyone builds their own. You sit with your group and share the basket, but each engineer makes their own equipment."
   j. Point to each picture card on the "Farmer Problem Solvers" chart and say the matching question aloud:
      - Point to the container: "What will hold the feed?"
      - Point to the arrow: "How will you move it?"
      - Point to the lid: "How will you keep it from falling out?"

- Point to the strong arm: "What will make it strong?"
- Explain to students: "There is no one right thing or way to build. Every engineer at your table might solve the problem a different way."

k. Explain the directions, holding up one finger for each step: "One, pick your cup or box. Two, build it. Three, fill it up. Four, move it to 'FINISH'. Five, fix what went wrong. Six, try again." Ask a student to repeat the first step back to you, as a quick check that the whole group understood before materials are handed out.

4. Farm Equipment Engineers Challenge: Build and Test. Divide students into small groups of 3 to 4 and seat each group at their work area.
   a. Place one basket of building materials in the center of each group's work area, within reach of every student.
   b. Have each student choose one starter base, a paper cup or a small box, and keep it in front of them.
   c. Explain to students: "Your base belongs to you. Keep it in front of you, not in the middle with the shared basket."
   d. Students build their own equipment. Students may build a wagon, cart, scoop, sled, carrier, or any other design they choose.
   e. Circulate and support while students build:
      - Prompt for the problem: "What job will your equipment do?"
      - Prompt for shape: "What part will hold the feed? What keeps it from falling out?"
      - Prompt for strength: "Which piece is strongest?"
      - Prompt for testing: "How will you know if it works?"
   f. When a student is ready, give them their own small pile of feed or crops at the 'START' point.
   g. Students take turns at their group's testing area, fill their equipment, and move the load from 'START' to 'FINISH'.
   h. After each student's first test, ask that student:
      - "Did anything fall out?"
      - "Did any part bend or fall over?"
      - "Was it easy to move?"
   i. Give students time to change one thing about their own equipment.
   j. Students test their equipment a second time.
   k. Have students leave their finished equipment in front of them where they can see it during writing. Return any unused materials to the shared basket.
      (Two tests are enough. Students who finish early may add more feed and test again, or add a handle or a lid. Students who need additional support may start from a cup and add only one piece, or have an adult hold a piece steady while they tape. Taping is the hardest part of this lesson for kindergartners, so pre-torn strips and an extra adult at the table matter more than extra building time.)
5. Bridge to Writing. Gather students together with their equipment. Explain to students: "You just did something real. You picked a cup or a box, built your own equipment, tested it, found a problem, and fixed it. Nobody told you what to build. You figured it out."
   a. Explain to students: "Engineers write down what they built and what happened so that other people can learn from their work. Right now you know your equipment better than anyone, because you are the one who built it."
   b. Ask students: (This step is intentional. Having students say it aloud before they write helps them organize their thinking and gives emerging writers a sentence to hold in mind as they begin. Take 2 to 3 minutes here.)

- "If you had to tell a friend what you built, what would you say?"
- "What happened the first time you tested it?"
- "What did you change? Can you say that in one sentence?"

6. Shared Writing: Modeling the Writing Process. Gather students on the carpet so they can clearly see the chart paper. Students leave their equipment at their tables.
    a. Hold up the teacher sample cup with tape on it. Explain to students: "We are going to write about our equipment together first. I will show you how a writer thinks, and then you will write your own."
    b. Display the Word Bank and the Feelings chart.
    c. Introduce the sentence frames on chart paper before writing anything:
        - "I built a _____."
        - "First, _____."
        - "Next, I _____."
        - "I felt _____."
    d. Explain to students: "These are our sentence frames. A sentence frame shows you how a sentence is built. They already have some words to help you get started, and your job is to finish them. Let us read them together, and I will show you how I use them."
    e. Begin the modeled writing. Think aloud at every step. Explain to students: "I am going to use the first frame. I say my sentence in my head first: I built a cup. Now I am going to write it. Watch every move I make." Set a listening purpose: "Listen carefully as I reread a few pages. Our purpose today is to find words we don't know yet and figure out what they mean." Keep this return to the text brief and focused on technology, income, and expenses; markets, GPS, and records are introduced briefly and added to the word wall, but are not discussed in the same depth today.
        - Model writing "I built a cup." step by step, naming each action aloud.
            - "My first word is 'I'. The word 'I' is always a capital letter. Watch me write it: big stick going down. Capital 'I'."
            - "Now I need a space before my next word. I use my finger as a space keeper. I put it right after the I to save a spot, so my reader knows where one word ends and the next begins."
            - "My next word is built. Built is tricky, so I check our Word Bank. There it is, with the picture. B-u-i-l-t."
            - "Finger space. Now a. That is just one letter, a."
            - "Finger space. Now cup. I say it slowly: /c/ (first finger), /u/ (second finger), /p/ (third finger). The c makes /c/. The p makes /p/. Cup: c-u-p."
            - "Now I end my sentence with a period."
            - Point to the completed sentence and explain to students: "Now watch what I do after I finish writing. I go back and point to each word as I read it. I check that each word I say matches exactly one word on the page. Let us do it together: point with me."
        - Explain to students: "Now my second frame. I say it first: First, the corn fell out. First and its comma are already on our chart, so I copy them."
        - Model writing while naming the consonant sounds explicitly.
            - "'The' is a word we know by heart. T-h-e." Leave a finger space.
            - "'Corn' is tricky, so I check our Word Bank. C-o-r-n. The c makes /c/ and the n makes /n/." Leave a finger space.

        - "'Fell' is one we can sound out together. What is the first sound you hear in fell?"
        - "What letter makes that sound?"
        - Model sounding out fell while thinking aloud: "/f/ (first finger), /e/ (second finger), /l/ (third finger). The f makes /f/. The l makes /l/. I write f, e, l."
        - "Fell is not in our Word Bank, so I write the sounds I hear: f, e, l." Leave a finger space.
        - Finish the sentence: "'Out' is on our word wall. O-u-t. Period at the end."
    - Explain to students: "Now my third frame. I say it first: Next, I put on tape. Next, 'I' is already on our chart, so I copy it."
    - Model writing each word.
        - "'Put' I can sound out: /p/ (first finger), /u/ (second finger), /t/ (third finger). The p makes /p/. The t makes /t/. P-u-t." Leave a finger space.
        - "On is a word we know by heart. O-n." Leave a finger space.
        - "Tape is tricky, so I check our Word Bank. T-a-p-e. Period."
    - Explain to students: "My last frame tells how I felt. My corn stayed in, and that made me feel proud."
    - Point to the Feelings chart, read the four words with students, then model writing "I felt proud."Model writing each word.
        - "Capital I, because the word I is always a capital." Leave a finger space.
        - "Felt: /f/ (first finger), /e/ (second finger), /l/ (third finger), /t/ (fourth finger). F-e-l-t." Leave a finger space.
        - "Proud is right here on our Feelings chart. I copy it: p-r-o-u-d. Period."
    - Read all four sentences back with one-to-one pointing. Explain to students: "Look at what is on our page. Every word I said is right here in print. The sounds became letters, the letters became words, and the words are separated by spaces. That is exactly what writers do. They turn their voice into print."

f. Ask students to try a sentence orally using a frame before writing their own:
    - "Turn to a partner. Tell them one sentence about your own equipment, using a frame from our chart. Say the whole thing out loud before you write it."
    - Allow 1 to 2 minutes for oral rehearsal. Students who say their sentence aloud are far more likely to write it with confidence.

7. Informative Writing: My Farm Equipment. Distribute the My Farm Equipment recording sheet and pencils to each student at their table, where their equipment is waiting.
    a. Explain to students: "Now it is your turn. The sentence frames are right here on the chart. First, draw your equipment in the drawing box. Then write at least two sentences. Say each sentence out loud before you write it, just like we practiced."
    b. Point to the chart paper sentence frames and say: "You may choose any frames that fit what you want to say. You can also write your own sentence if you know what you want to say. The frames are here to help you, not to limit you."
    c. As students write, circulate and support:

- Prompt for recall: "What did you build? What happened when you tested it?"
- Prompt for order: "What happened first? What did you do next?"
- Prompt for consonant sounds: "Say it slowly. What is the first sound? What letter makes that sound?"
- Prompt for spacing: "Point to each word as you reread. Where does your finger space go?"
- Prompt for reaction: "Which word on our Feelings chart tells how you felt?"
- Prompt the next sentence for students who finish early: "Can you tell me one more thing about your equipment?"
  (Students who are not yet writing independently should dictate their sentences to the teacher, who writes them while naming each letter aloud. Students ready for a challenge can add a sentence telling what they would build differently next time.)

8. Closing Discussion and Kansas Connection. Gather students with their completed recording sheets and their equipment. Choose two students who solved the problem differently and place their equipment where everyone can see.
   a. Have students hold up what they built and say one thing they changed.
   b. Ask students, pointing to the two pieces of equipment on display:
      - "Both of these move feed. How are they different?"
      - "What did this one do well?"
      - "What did this one do well?"
      - “Did either design have a problem during testing?
      - “Which design kept the load inside better? What makes you think that?
      - "What problem did you fix today?"
      - "Which word did you write for how you felt, and why?"
   c. Kansas Connection. Explain to students: "Kansas farmers move feed and crops every single day, and they really do use equipment to do it, like wagons, carts, buckets, augers, and big grain trucks. When the crops are ready to be harvested, farm equipment helps farmers move thousands of pounds of wheat and corn out of Kansas fields. When something breaks or does not work well enough, farmers have to try to solve the problem, just like you did today. They may need to repair it, adjust it, replace a part, or modify the equipment to make it work better. Today you solved a farm equipment problem by building, testing, and improving your own design."
   d. Ask students:
      - "Have you ever seen a wagon, a cart, or a truck moving something heavy, maybe at a farm, a farmers market, or a grocery store?"
      - "Think about the food in your kitchen at home. Someone had to move it from a field all the way to you. What is one piece of equipment that might have helped?"
      - "What is one thing you could tell your family tonight about the equipment you built?"

Assessment: Teacher observation during the challenge, the writing model, and independent writing provide the main evidence of student understanding. Watch for whether students build a physical model that solves the problem of moving a load, explain how the shape of their equipment holds the load, find a problem after testing, and change their design to improve it.

During the closing, note whether students compare two designs and describe what each one did well. Also note whether students identify equipment farmers use to move feed and crops and explain that farmers build and improve their own equipment. The completed recording sheet is the primary written artifact. Teacher should note whether students write at least two sentences using the frames, tell what happened in order, give a reaction to how their equipment worked, produce the correct letter for predictable consonant sounds, spell simple words phonetically, leave finger spaces between words, and point to each word with one-to-one correspondence when rereading. The finished equipment serves as the second artifact.

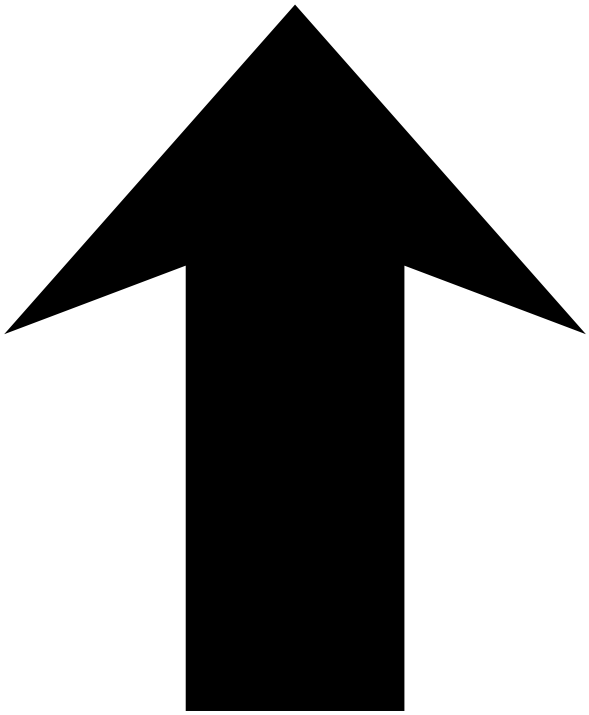
Supplemental Activities: Display the finished equipment alongside the completed recording sheets under a title such as "Farm Equipment Engineers at Work!" Add load and engineer to the word wall, and continue adding new vocabulary throughout the unit. For an extension activity, set up a building center where students design equipment for a different farm job, such as carrying water to animals or moving hay bales, and test it the same way.

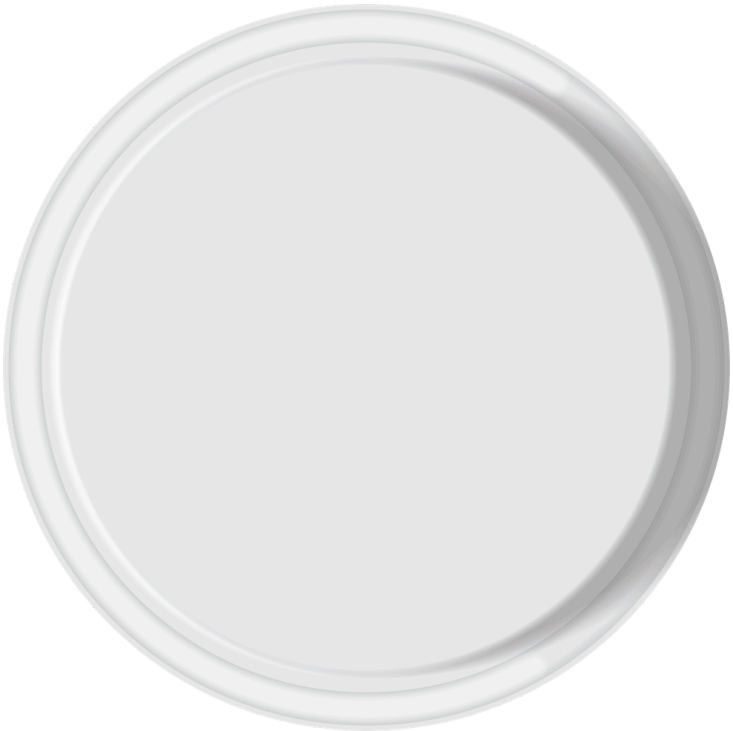
Author: Kelsy Sproul, M.S., Literacy Specialist, 2026 KFAC Teacher of the Year, KFAC Curriculum Advisory Council, Former Elementary Teacher, Graduate Teaching Assistant and doctoral student at Kansas State University College of Education. Edited by Marissa Cook, KFAC intern, Kansas State University Secondary Education.

Teacher Preparation Instructions

1. Before students arrive, place the shared building materials into one basket, tray, or container for each small group.
2. Set out enough paper cups and small boxes for every student to choose one starter base, plus a few extras.
3. Print and cut out the four Farmer Problem Solvers picture cards and post them on the chart before the lesson begins. Do not add written words to the chart.
4. Prepare one testing area for each group. This can be:
    - A tray
    - A section of table
    - A piece of butcher paper
    - A space marked with painter's tape
5. Mark a clear START and FINISH point in each testing area. The distance only needs to be about 2 to 3 feet.
6. Set aside enough pom-poms, cotton balls, dry beans, or counters so each student has their own small load at the START point. These will represent feed or crops.
7. Make sure each group has access to tape. If possible, tear off several strips ahead of time and place them along the edge of the table so kindergarten students can use them independently.
8. Cut cardboard into small, easy-to-handle pieces ahead of time. A mix of rectangles and squares works well.
9. If using cardboard tubes or boxes, make sure they are already cut to safe sizes before the lesson.
10. Do not build an example for students to copy. The goal is for students to create their own solution.
11. Keep one simple teacher sample of the challenge materials nearby in case students need to see what the testing area looks like.
12. Before beginning, check that all materials are safe, clean, and free of sharp edges.









Name: _____

My Farm Equipment Recording Sheet

Part 1: My Equipment

Draw your equipment.

Write at least two sentences about your equipment.

Word Bank

 wagon	 cart
 basket	 tube
 straw	 cardboard
 string	 tape
 built	 corn

Feelings Chart



happy proud sad mad