4-H LEGO® Engineering Club

On the Farm • Volume 2

MISSISSIPPI STATE UNIVERSITY
EXTENSION

18 U.S.C. 707

CONTENTS

Visit ***http://extension.msstate.edu/publications/4-h-lego-engineering-club-volume-2-the-farm*** to download 4-H LEGO Engineering Club certificates and name tags!

INTRODUCTION

Welcome to Level 2 of the 4-H LEGO Engineering Club. The theme for this curriculum is agriculture. The best time of year to implement this curriculum is in the late summer or early fall. The first lesson teaches children where their lunch comes from, and the last lesson features a grandson helping his grandfather get ready to plant a new garden.

There are six lessons in this curriculum. Each lesson, where appropriate, is aligned with the following national and state standards:

- 4-H Common Measures 2.0
- National Ag Literacy Pillar
- National Ag Literacy Outcomes
- Next Generation Science Standards
- Mississippi College and Career Readiness Standards for Science
- Mississippi College and Career Readiness Standards for English Language Arts

After each lesson, adults who worked directly with Cloverbuds on the lesson should complete the evaluation found at the back of this book. Return evaluations to your Extension agent.

These lessons are designed around the experiential learning model and the 4-H philosophy of learning by doing. This allows youth to experience a new idea and have a hands-on opportunity to construct something new. Lessons can be done in two half-day lessons or six 1-hour lessons, depending on the needs of your group. At the conclusion, print a certificate for each participant. Consider hosting a parent showcase so that youth can show their parents what they have been working on. Or, take photos of their projects to email to parents or post to social media. Be sure to have a written photo release for each child before taking their photo.

Experiential Learning Model

Image from University of Minnesota Extension 4-H (http://www.extension.umn.edu/source/winter-2013/4-h-prepares-youth-to-lead-and-succeed/). Adapted from D.A. Kolb, 1984.

4-H CLOVERBUD AGES AND STAGES

Adapted from Scott D. Scheer, PhD, State 4-H Extension Specialist, The Ohio State University.

Characteristics of 5- and 6-year-olds

Physical

- Energetic
- Learn to cut with scissors

Social

- Like to play with other children; are generally sociable
- Cooperate
- Usually obey rules
- Enjoy the process; end product not important

Emotional

- Desire affection and adult attention
- See situations from own point of view
- Learn self-control in groups
- Begin "selective hearing"

Intellectual

- Need clear and simple directions
- Have 10- to 15-minute attention span (if really interested)
- Learn best by exploring "real" materials

What You Can Do with 5- and 6-year-olds

- Help them work together on 4-H Cloverbud activities.
- Plan activities with materials that are hands-on.
- Provide instructions both visually and verbally.
- Keep activities short.
- Engage them in cooperative-learning activities.
- Plan activities that include large motor skills (jumping, running).
- Plan activities that introduce fine motor skills (writing, cutting, drawing).
- Encourage sharing and listening.
- Provide opportunities for adult-child interaction.
- Plan activities that are broken up by physical movement/exercise.
- Let them know you care.

Characteristics of 7-year-olds

Physical

- Usually grow slowly and steadily
- Like repetitious activities, such as bouncing a ball or jumping rope

Social

- Want to join clubs
- Think about the future and other people

Emotional

- Sensitive to personal criticism and get upset easily
- Want to help with decisions
- Fear school failures and peer rejection
- Friends are important; family is still tops
- Begin to empathize with others' feelings

Intellectual

- Develop a sense of right and wrong
- Assert individuality
- Are very concerned about the rules
- Love to collect things

What You Can Do with 7-year-olds

- Provide encouragement in noncompetitive settings.
- Give them simple responsibilities and the option of choosing their activities.
- Select activities that stimulate their curiosity and creative abilities.
- Explore future career possibilities.
- Promote active involvement in 4-H Cloverbuds.
- Be sensitive to their needs and promote social activities with other children.
- Provide physical activities to meet their skill levels.
- Give clear descriptions about how to be involved in 4-H Cloverbuds.
- Help the them to develop friendships.
- Encourage them to develop and make collections of things.

GUIDELINES FOR 4-H CLOVERBUD PROGRAM

Activity-Based

- A variety of short-term experiences is required for this age group. Young children have short attention spans, especially if there are distractions around them.

Cooperative-Learning Centered

- Activities and lessons are done in small groups.

Noncompetitive

- Children are engaged in activities that are noncompetitive and do not set up categories or classes that create inequities.

Safety

- Special consideration must be given to ensure the safety of 4-H Cloverbud-aged children.

Age-Appropriate

- The activity should be designed at the Cloverbud age level—5–7 years old.

Specialized Activities

- Activities for 4-H Cloverbuds should be different from activities designed for older members.

	4-H CLOVERBUDS	OLDER 4-H MEMBERS (8–18 YEARS OLD)
TYPE OF LEARNING	activity-centered	project-centered
TYPE OF INSTRUCTION	leader-directed	self-study; individual or leader-directed
RECOGNITION	participation	competitions, achievement of standards, achievement of goals, and participation
LEARNING RESOURCES	activity manuals	project manuals

Oriented for Success

- Allow children to gain confidence and promote self-esteem by mastering 4-H Cloverbud activities.
- Any activity must meet the above parameters and 4-H Cloverbud objectives, such as promoting self-understanding (self-esteem) by mastering 4-H Cloverbud activities.

Opportunities

- Children can exhibit work completed in their 4-H Cloverbud clubs or groups in the Clover Shop in the 4-H Village during the State Fair each year. Please refer to the 4-H Village Exhibit's list for specifics. You could also develop a 4-H Clover Shop at the county level!
- 4-H Cloverbuds may also create a robotic animal using either the LEGO WeDo or the Dash robot and showcase at the Robot Round-up during 4-H Day at the State Fair.

Experiential Learning Cycle

- Activities should be fun, positive, and focused on the five general life skill areas that the experiential learning model highlights. See the Experiential Learning Model on page 3.

4-H PLEDGE AND TRADITIONS

4-H Emblem . . .

- The 4-H Emblem is a green four-leaf clover with a white H on each leaf. The Hs stand for HEAD, HEART, HANDS, and HEALTH.

4-H Pledge . . .

- "I pledge —
  My HEAD to clearer thinking,
  My HEART to greater loyalty,
  My HANDS to larger service,
  My HEALTH to better living,
  for my club, my community, my country, and my world.

4-H Motto . . .

- "To Make the Best Better"
  Around the country, 4-H'ers have set their goals for 4-H club work by this motto.

4-H Slogan . . .

- "Learn by Doing"
  The "Learn by Doing" slogan encourages 4-H members to learn new skills, be responsible for their actions, and express their own creativity.

4-H Colors . . .

- The white in the 4-H flag symbolizes purity and high ideals. The green, nature's most common color, represents life, springtime, and youth.

Lesson 1: Pack a Lunch (60 minutes)

Goal

In this lesson, 4-H Cloverbuds will learn about the agricultural sources of common food items.

Objective

Participants will design a lunch box using LEGOs.

Participants will identify healthy food options to pack in their lunch boxes.

Prepare

Based on seasonal availability and funding, consider having an assortment of foods (listed below) for participants to put in their constructed lunchboxes on wax paper. If food items are not available, print, cut, and laminate the food items on the **What's in My Lunchbox** resource sheet for each person. Laminated pictures will be reusable and more durable.

Materials

- *How Did That Get in My Lunchbox? The Story of Food* by Chris Butterworth (ISBN: 978-0-7636-6503-6)
- LEGO 10x10 baseplates, one for each pair of youth
- 100 LEGOs for each pair of youth
- Food for taste-testing: clementines, carrots, cherry tomatoes, chocolate chip cookies, apple juice
- A **What's in My Lunchbox?** (page 13) resource sheet for each participant

  If youth are working on scissor skills, teachers may prefer youth to cut out the food items themselves, but this will need to be factored into the schedule.

  *Alternatively, plastic toy food and empty juice boxes could be used to show the three-dimensional nature of the food items, but it may be difficult to find enough for each pair of youth.
- Hand soap for washing hands before handling food
- Brown paper bags or plastic sandwich bags for children to take any leftover food home

Getting Started

Greet children and their parents/guardians as they arrive. Be sure each participant has a name tag, and direct children to wash their hands before going to their stations. Each child should have a partner.

Welcome

Welcome to our 4-H club meeting! Let's begin by saying the 4-H Pledge:

I pledge
My head to clearer thinking,
My heart to greater loyalty,
My hands to larger service, and
My health to better living,
For my club, my community,
My country, and my world.

Today, we are going to learn how the food you eat gets to you.

Ask one or two of the following questions and allow children to respond:

- Have you ever brought your lunch to school?
- What did you put your lunch in to bring it to school? A lunchbox or a brown bag?
- Do you have a lunchbox? What does it look like?
- What did you put in your lunchbox to eat?

Experiencing

Show children the food items.

Say, "Today, you will work with a friend to build a lunchbox using LEGOs. The lunchbox will need to hold at least three of the food items you see, so you will need to work with your partner to decide how best to build the lunchbox to hold the food you want to put in the lunchbox."

Put children in pairs, and ask them to work together to build a lunchbox using the available LEGOs. Tell them when they have 5 minutes of build time remaining.

Sharing

Let each pair of children share what happened with their lunchbox build. If needed to prompt sharing, ask the following questions:

- How did you decide on the design or structure of the lunchbox?
- What was the most difficult part of building a lunchbox?
- What types of food did you put in your lunchbox? Why did you pick that food?

Processing

Next, help children reflect on what was important about their experience and on the process of completing the challenge. To prompt this reflection, choose from the following questions:

- What did you have to consider when designing your lunchbox?
- Were you able to put at least three pieces of food in your lunchbox? Why or why not?
- What problems did you encounter when building your lunchbox? How did you overcome them?
- Was it easy/fun to work with a partner? What did you do when you did not agree on something?

Generalizing

In this step, children should begin to make the connection between their experience of building a lunchbox and working with a partner to their everyday life as well as other things they are learning. Prompt them with the following questions:

- Have you ever packed a lunch for school or a picnic?
- Did you only pack cookies? What should you pack in a lunchbox?
- What did you learn about making decisions (building the lunchbox or what to pack)?

Applying

Read *How Did That Get in My Lunchbox? The Story of Food* out loud. Once you are finished with the book, ask children to look at the "food" they packed in their lunchboxes. Ask:

- Based on what you learned in the book, do you need to add or take anything out of your lunchbox to make it healthy? (For example, if you only packed cookies, you should add carrots.)
- When might you need to pack a lunchbox?
- What other food would you put in your lunchbox?

Assessment

As the children are wrapping up, have 4-H volunteers, teachers, or parents who stayed for the lesson complete the evaluation on page 38.

Conclusion

Give participants an opportunity to taste the items described in the book. See if they can remember the order of food items in the book and arrange them on their plates/paper towel accordingly.

4-H Common Measures 2.0

4-H Experience: Positive relationship with a caring adult; inclusive environment; safe environment; engagement in learning; opportunity for mastery; opportunity to see oneself as an active participant in the future; opportunity for self-determination; opportunity to value and practice service to others.
4-H Universal: Personal mindset; social skills; universal skills.

National Ag Literacy Pillar

EC Awareness (2d): Identify the agricultural source for common food, fiber, and energy product (e.g., milk from cows, wool from sheep, energy from solar).
EC Awareness (4b): Identify healthy food options.

National Ag Literacy Outcome

T1.K-2: Describe how farmers/ranchers use land to grow crops and support livestock.
T1.K-2: Identify animals involved in agricultural production and their uses.
T3.K-2: Identify healthy food options.
T5.K-2: Discuss what a farmer does.
T5.K-2: Trace the source of agricultural products (plants or animals) used daily.

Next Generation Science Standards

K-2-ETS1-2: Engineering Design: 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.

Mississippi College and Career Readiness Standards for Science

L.K.3B: Students will demonstrate an understanding of the interdependence of living things and the environment in which they live.
P.K.5B: Students will demonstrate an understanding of how solid objects can be constructed from a smaller set.
L.1.1: Students will demonstrate an understanding of the basic needs and structures of plants.
L.2.3B: Students will demonstrate an understanding of the interdependence of living things.

Mississippi College and Career Readiness Standards for English Language Arts

RL.K.1: With prompting and support, ask and answer questions about key details in a text.

RL.K.10: Actively engage in group reading activities with purpose and understanding.

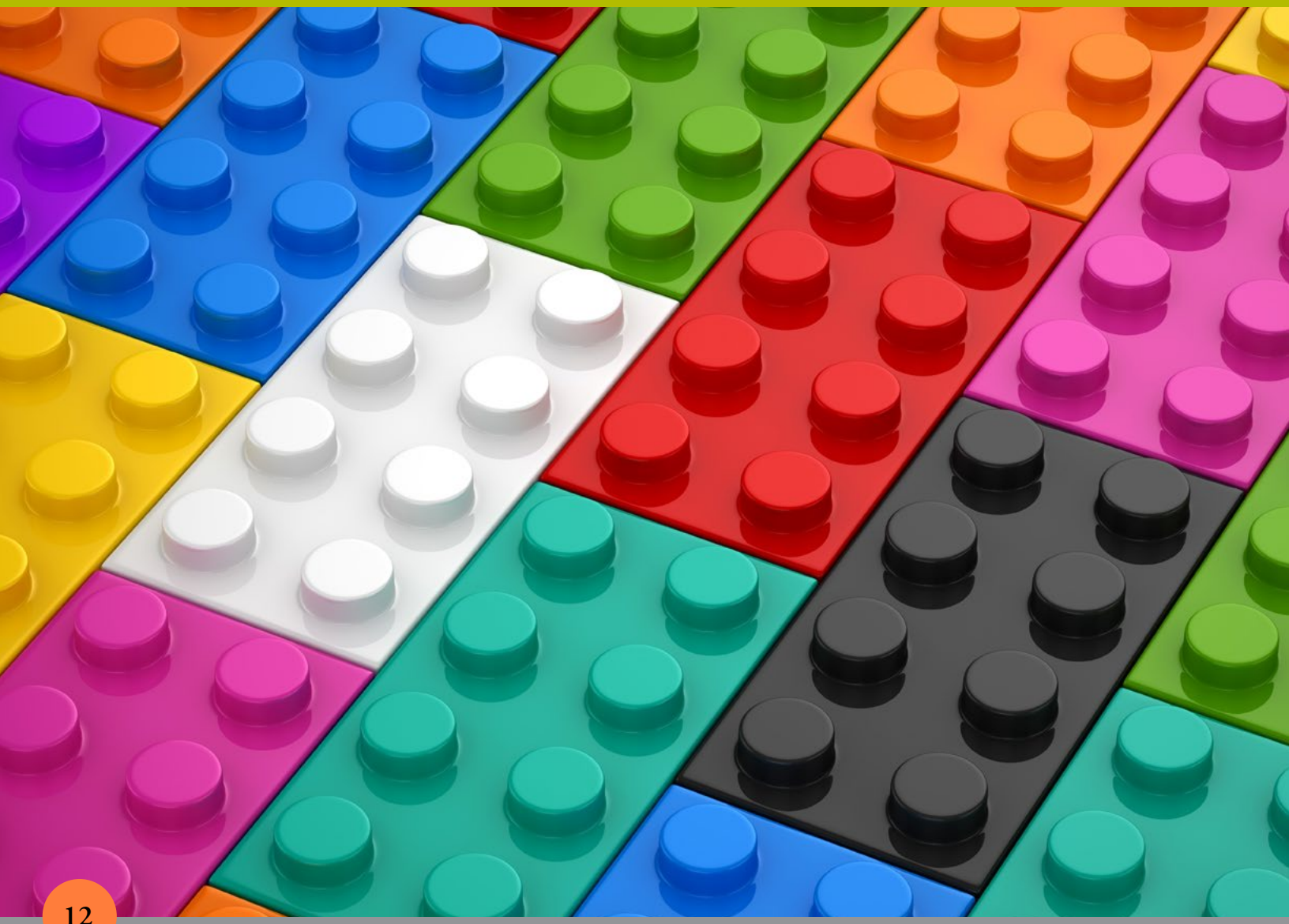
RF.K.2: Demonstrate understanding of spoken words, syllables, and sounds (phonemes).

SL.K.1a: Follow agreed-upon rules for discussions (e.g., listening to others and taking turns speaking about the topics and texts under discussion).

SL.1.1: Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.

SL.2.2: Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.

L.2.5a: Identify real-life connections between words and their use (e.g., describe foods that are spicy or juicy).



What's in My Lunchbox?

Lesson 2: Store Summer in a Bale (60 minutes)

Goal

In this lesson, 4-H Cloverbuds will learn about the relationship between agriculture and technology.

Objective

Participants will design a tractor.

Participants will identify one animal that eats hay.

Prepare

Mix together the ingredients for switchel (listed below) and chill.

Materials

- *Hey, Hey, Hay! A Tale of Bales and the Machines That Make Them* by Christy Mihaly (ISBN: 978-0-8234-3666-8)
- LEGO 10x10 baseplates, one for each pair of youth
- 100 LEGOs for each pair of youth
- Wheels set by LEGO Education #9397 (if your kits do not have wheels and axles)
- Ingredients to make switchel or haymaker's punch (from *The Old Farmer's Almanac*):
  - 1 gallon of water
  - 1½ cups molasses (can sub honey or other sweetener like brown sugar)
  - ⅓ cup apple cider vinegar
  - 1 tablespoon freshly grated ginger
  - Cups for each youth to sample the switchel
- Toy tractors, tedders, balers
- A **Shapes in a Tractor** handout (page 19) for each participant to show the basic shapes of a tractor

Getting Started

Greet children and their parents/guardians as they arrive. Be sure each participant has a name tag, and direct children to wash their hands before going to their stations. Each child should have a partner.

Welcome

Welcome to our 4-H club meeting! Let's begin by saying the 4-H Pledge:

I pledge
My head to clearer thinking,
My heart to greater loyalty,
My hands to larger service, and
My health to better living,
For my club, my community,
My country, and my world.

In today's lesson, we will meet a little girl who managed to capture summer in a hay bale.

Ask one or two of the following questions and allow children to respond:

- Have you ever seen a tractor?
- What does a tractor do?
- Where does hay come from?
- Can you think of any animals that eat hay?

Experiencing

Show children the various toy tractors and ask them to identify familiar shapes (circle for wheels, square for cab, etc.). Show the **Shapes in a Tractor** handout so that they can see the basic shapes that make up a tractor.

Say, "Tractors are a technology used in agriculture to help farmers do their job faster and easier. Today, you will design and build a tractor to move up and down rows you create on your baseplate."

Put children in pairs, and ask them to work together to design and build a tractor that can move up and down a row.

Tell them when they have 5 minutes of build time remaining.

Sharing

Allow each pair of children to share how they designed their tractor. If needed to prompt sharing, ask the following questions:

- What was the hardest part of building a tractor?
- How did you and your partner decide on a tractor design?
- What surprised you the most about building a tractor?

Processing

Next, help children reflect on what was important about their experience and on the process of completing the challenge. To prompt this reflection, choose from the following questions:

- What was one challenge you faced? How did you solve it?
- How did you and your partner communicate? (Draw a plan, write out steps, talk, etc.)
- If you disagreed with each other, how did you come up with a compromise?

Generalizing

Participants should think about what was important while designing and building their tractor. To prompt them to think about what the experience meant to them and what they learned from it, choose from the following questions:

- Why is it important to learn about tractors?
- When have you had to build a vehicle (with wheels and an axle)? What did you use to build the vehicle?
- Is it important for each person to have their own thoughts and opinions about how to build a tractor? Why?

Applying

Read *Hey, Hey, Hay! A Tale of Bales and the Machines That Make Them* out loud. Point out words introduced in the book that children may not have in their vocabulary and see if they can determine from the picture or context what the word describes.

mower: a machine that cuts or mows grass

tedder: a machine used in haymaking that allows the hay to dry better

baler: a machine that compresses or bundles raked hay into compact bales

switchel: also known as "haymaker's punch"; made with water, vinegar, and ginger

windrow: a row of cut or mown hay

Once you are finished with the book, ask children to look at the tractor they built and think about what else they could add to their tractor and rows. Ask the following questions to prompt reflection:

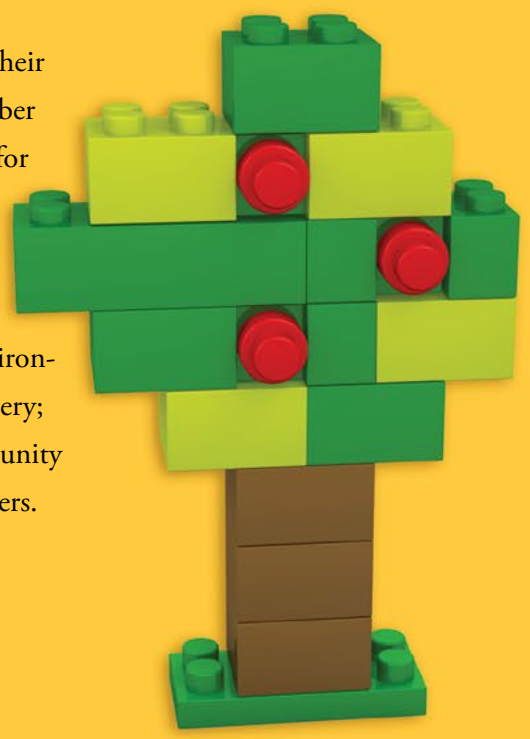
- What would you do differently now that you have seen how a farmer uses the tractor?
- Why is hay important?
- How do tractors help farmers?

Assessment

As the children are wrapping up, have 4-H volunteers, teachers, or parents who stayed for the lesson complete the evaluation on page 38.

Conclusion

Tell children that, in the remaining time, they may make additions to their tractors but that you have a surprise for them! Ask them if they remember the word switchel and ask them what it means. Pour a cup of switchel for each child to sample.



4-H Common Measures 2.0

4-H Experience: Positive relationship with a caring adult; inclusive environment; safe environment; engagement in learning; opportunity for mastery; opportunity to see oneself as an active participant in the future; opportunity for self-determination; opportunity to value and practice service to others.
4-H Universal: Personal mindset; social skills; universal skills.

National Ag Literacy Pillar

EC Awareness (1a): Describe how farmers use land to grow crops.
EC Awareness (1c): Describe the importance of water in raising crops and livestock.
EC Awareness (5a): Describe how technology makes jobs faster and easier in agriculture.
EC Awareness (6a): Discover that there are many jobs in agriculture.

National Ag Literacy Outcomes

T1.K-2: Describe how farmers/ranchers use land to grow crops and support livestock.
T2.K-2: Explain how farmers/ranchers work with the life cycle of plants and animals (planting/breeding) to harvest a crop.
T2.K-2: Identify examples of feed/food products eaten by animals and people.

Next Generation Science Standards

K-2-ETS1-2 Engineering Design: 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.

Mississippi College and Career Readiness Standards for Science

L.K.3A.2: Construct explanations using observations to describe and report what animals need to live and grow (food, water, shelter, and space).
L.K.3B.1: Observe and communicate that animals get food from plants or other animals. Plants make their own food and need light to live and grow.

P.K.5B.1: Use basic shapes and spatial reasoning to model large objects in the environment using a set of small objects (e.g., blocks, construction sets).

P.K.5B.3: Explain why things may not work the same if some of the parts are missing.

E.K.8A: Students will demonstrate an understanding of the pattern of seasonal changes on the earth.

Mississippi College and Career Readiness Standards for English Language Arts

RL.K.4: Ask and answer questions about unknown words in a text.

RL.K.10: Actively engage in group reading activities with purpose and understanding.

RF.K.2: Demonstrate understanding of spoken words, syllables, and sounds (phonemes).

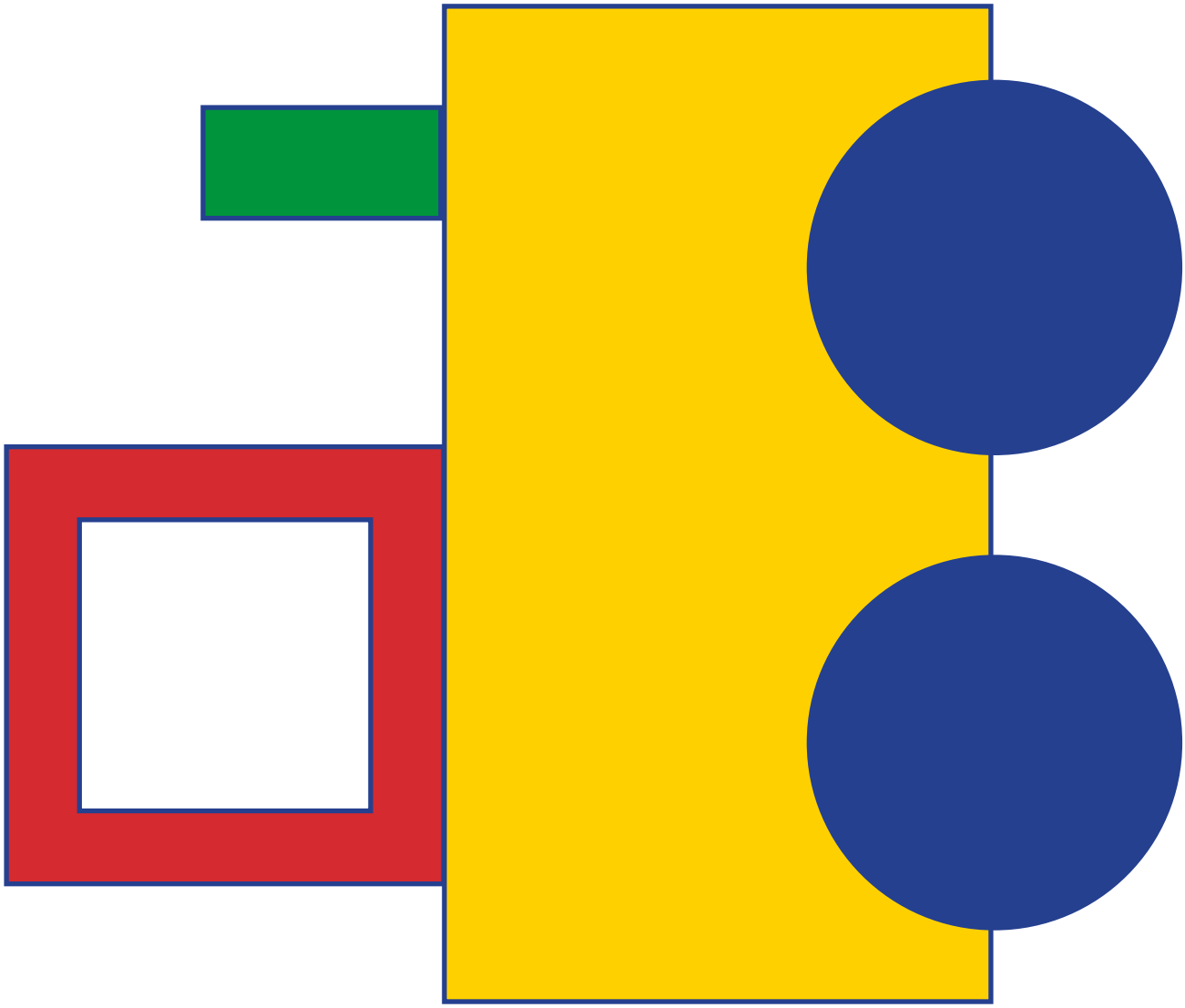
SL.K.1a: Follow agreed-upon rules for discussions (e.g., listening to others and taking turns speaking about the topics and texts under discussion).

SL.1.1: Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.

RI.1.7: Use the illustrations and details in a text to describe its key ideas.

L.2.4: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 2 reading and content, choosing flexibly from an array of strategies.

Shapes in a Tractor



Lesson 3: Soybean Picnic (60 minutes)

Goal

In this lesson, 4-H Cloverbuds will learn how farmers use land to grow crops.

Objective:

Participants will design a picnic table.

Participants will identify soybeans as a crop.

Prepare

Prepare mao dou/edamame (soybean) snacks ahead of time. There are many different ways to prepare edamame snacks, with the most prevalent being the Japanese method of boiling the pods and then sprinkling with coarse salt. The traditional Chinese method uses more spices. Additionally, there are recipes that use a microwave instead of a stovetop to boil the water if that is more accessible or if you want to have the children participate in cooking the snack.

Japanese Method: Place 4 cups of fresh or frozen pods in a large bowl and generously sprinkle coarse salt over them. Let stand for 15 minutes. While they are standing, bring a large pot of water (at least 6 cups) with 1 tablespoon of salt to boil. Place the pods in the boiling water for 5–6 minutes. Do not cover the pot. Drain the beans and let cool before serving.

The children will have a chance to eat the mao dou at the conclusion of this lesson.

(Source: https://www.foodnetwork.com/recipes/edamame-cooked-fresh-soybeans-recipe-1969678)

Materials

- *Auntie Yang's Great Soybean Picnic* by Ginny Lo (ISBN: 978-1-62014-793-1)
- LEGO 10x10 baseplates, one for each pair of youth
- 100 LEGOs for each pair of youth
- Ingredients to make mao dou/edamame snacks:
    - Fresh or frozen edamame pods
    - Coarse salt
- A **Picnic Tables** handout for each pair of children
- 3–5 cans of various size and weight (6 oz. cans, 10.5 oz. cans, etc.)

Getting Started

Greet children and their parents/guardians as they arrive. Be sure each participant has a name tag, and direct children to wash their hands before going to their stations. Each child should have a partner.

Welcome

Welcome to our 4-H club meeting! Let's begin by saying the 4-H Pledge:

I pledge
My head to clearer thinking,
My heart to greater loyalty,
My hands to larger service, and
My health to better living,
For my club, my community,
My country, and my world.

Today, we are going to learn about a family that hosted a giant picnic.

Ask one or two of the following questions and allow children to respond:

- Who has been on a picnic? What did you do?
- Did you sit on the ground or at a table?
- What did the table look like?

Experiencing

Show the various pictures of picnic tables using the Picnic Tables handout. Ask children to work with their partners to build a picnic table that can hold a feast. The "feast" will be various cans of food so that children can test the strength and design of their tables.

Tell them when they have 5 minutes of build time remaining.

Once they are done building, ask children to stack as many cans as they can on their picnic table and see if the picnic table can withstand the weight.

Sharing

Allow each pair of children to share how they designed their picnic table. If needed to prompt sharing, ask the following questions:

- Why did you decide on that particular picnic table design?
- What steps did you use to design and create your table?
- How much weight (or how many cans) did your picnic table hold?

Processing

Next, help children reflect on what was important about their experience and on the process of completing the challenge. To prompt this reflection, choose from the following questions:

- Why is it important to learn the proper way to build a picnic table?
- What did you notice about other designs that would make your picnic table hold more weight?
- What was the most difficult part of building the picnic table?

Generalizing

Ask children to think about what was important while designing and building their picnic tables. To prompt them to think about what the experience meant to them and what they learned, choose from the following questions:

- Have you ever built something like a picnic table before?
- How could you take what you learned about building a picnic table and use that knowledge to build something else? What would you build?
- What are some ideas or suggestions you would give someone who had never built a picnic table before but wanted to try?

Applying

Read *Auntie Yang's Great Soybean Picnic* out loud. Choose one or two of the following questions to help children determine how they can best use the knowledge they have gained:

- What were some of the foods the family cooked and placed on the picnic tables?
- Why was it important for the family to have picnic tables?
- How could building picnic tables at your school, home, or community help?

Assessment

As the children are wrapping up, have 4-H volunteers, teachers, or parents who stayed for the lesson complete the evaluation on page 38.

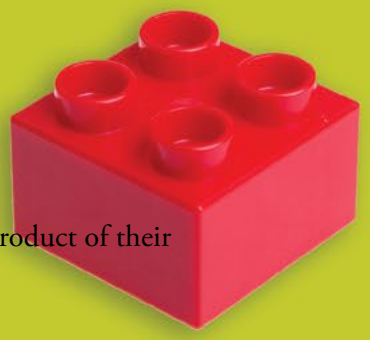
Conclusion

Serve the mao dou/edamame (soybean) snacks to the children and remind them that they should eat the snack like the children in the book did.

4-H Common Measures 2.0

4-H Experience: Positive relationship with a caring adult; inclusive environment; safe environment; en-

gagement in learning; opportunity for mastery; opportunity to see oneself as an active participant in the future; opportunity for self-determination; opportunity to value and practice service to others.
4-H Universal: Personal mindset; social skills; universal skills.



National Ag Literacy Pillars

EC Awareness (1a): Describe how farmers use land to grow crops.

EC Awareness (2e): Discover that farmers plant seeds, care for plants, and harvest the product of their work.

National Ag Literacy Outcomes

T1.K-2: Describe how farmers/ranchers use land to grow crops and support livestock.

T2.K-2: Explain how farmers/ranchers work with the life cycle of plants and animals (planting/breeding) to harvest a crop.

T2.K-2: Identify examples of feed/food products eaten by animals and people.

T5.K-2: Explain why farming is important to communities.

Next Generation Science Standards

K-2-ETS1-2 Engineering Design: 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.

Mississippi College and Career Readiness Standards for Science

P.K.5B.1: Use basic shapes and spatial reasoning to model large objects in the environment using a set of small objects (e.g., blocks, construction sets).

P.K.5B.3: Explain why things may not work the same if some of the parts are missing.

Mississippi College and Career Readiness Standards for English Language Arts

RL.K.1: With prompting and support, ask and answer questions about key details in a text.

RL.K.10: Actively engage in group reading activities with purpose and understanding.

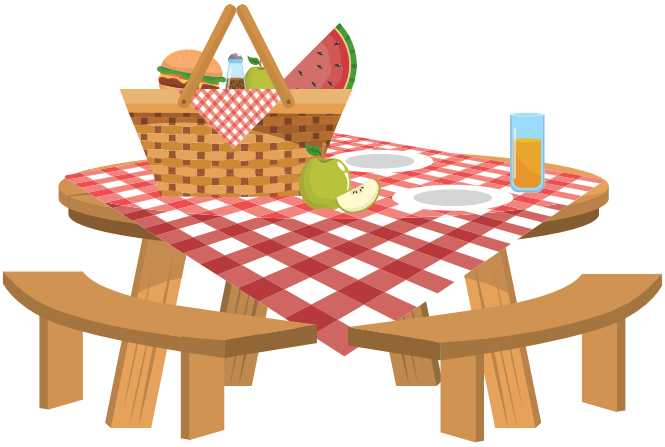
RF.K.2: Demonstrate understanding of spoken words, syllables, and sounds (phonemes).

SL.K.1a: Follow agreed-upon rules for discussions (e.g., listening to others and taking turns speaking about the topics and texts under discussion).

SL.1.1: Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.

SL.2.2: Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.

Picnic Tables



Lesson 4: Pumpkin Patch (60 minutes)

Goal

In this lesson, 4-H Cloverbuds will learn how farmers plant, care for, and harvest crops.

Objective

Participants will build a two- or three-dimensional pumpkin with LEGOs.

Participants will explain how farmers work with the life cycle of plants to harvest a crop.

Prepare

Collect various pumpkins if in season; if not, consider printing pictures of various pumpkins for children to look at.

Bake pumpkin seed snacks using this recipe:

1½ cup raw pumpkin seeds

1 pinch salt

2 teaspoons butter, melted

Preheat oven to 300 degrees. Toss seeds in a bowl with melted butter and salt. Spread seeds in a single layer on a baking sheet and bake for 45 minutes or until golden brown; stir occasionally.

Pumpkin seed snacks can also be prepared in the microwave if preferred.

(Source: https://www.allrecipes.com/recipe/13768/roasted-pumpkin-seeds/)

Materials

- *The Pumpkin Book* by Gail Gibbons (ISBN: 978-0-8234-1636-3)
- LEGO 10x10 baseplates, one for each pair of youth
- 100 LEGOs for each pair of youth
- Additional orange and yellow LEGOs. Children will use a lot of these colors, so you may wish to supplement the LEGOs that you have. Specific colors of LEGOs can be purchased online.
- Pumpkins of various sizes and colors
- Ruler or tape measure for each pair of youth

Getting Started

Greet children and their parents/guardians as they arrive. Be sure each participant has a name tag, and direct children to wash their hands before going to their stations. Each child should have a partner.

Welcome

Welcome to our 4-H club meeting! Let's begin by saying the 4-H Pledge:

I pledge
My head to clearer thinking,
My heart to greater loyalty,
My hands to larger service, and
My health to better living,
For my club, my community,
My country, and my world.

Today, we are going to learn about pumpkins and how they are grown and used.

Ask one or two of the following questions and allow children to respond:

- Where do pumpkins come from?
- What do they look like?
- What can pumpkins be used for?

Experiencing

Allow children to hold the pumpkins, and show them how to knock on them to see if they sound hollow or not.

Say, "Today, your challenge is to build a pumpkin using LEGOs. You can build a two-dimensional pumpkin or a three-dimensional pumpkin. Two-dimensional means it has length and width but no height (depth). Three-dimensional means it has length, width, and height. A real pumpkin is three-dimensional, and a picture of a pumpkin is two-dimensional."

As you walk around the room, be sure to mention the type of pumpkin they are building so that they can become familiar with these terms.

Tell them when they have 5 minutes of build time remaining.

Sharing

Let each pair of children share how they designed their pumpkin. If needed to prompt sharing, ask the following questions:

- Did you need help to come up with design ideas for your pumpkin?
- What was the hardest part of building a pumpkin?
- How did you and your partner resolve disagreements about designing and building the pumpkin?

Processing

Next, help children reflect on what was important about their experience and on the process of completing the challenge. To prompt this reflection, choose from the following questions:

- What steps did you use to build the pumpkin?
- What did you do if you did not have the LEGO brick you needed?
- Did you notice any design elements from other groups that you wish you had included in your design?

Generalizing

Ask children to think about what was important while designing and building their pumpkin. To prompt them to think about what the experience meant to them and what they learned, choose from the following questions:

- Can you identify another object that you have seen that is two-dimensional?
- Can you name something that is three-dimensional?
- What did you learn about pumpkins by doing this activity?

Applying

Read *The Pumpkin Book* out loud. Choose one or two of the following questions to help children determine how they can best use the knowledge they have gained:

- What type of pumpkin did you create?
- How big is your pumpkin?
  (Allow them to use a ruler or tape measure to determine length or circumference.)
- What could you do with a LEGO pumpkin?
  (For example, make one for Halloween or for a Thanksgiving table decoration.)

Assessment

As the children are wrapping up, have 4-H volunteers, teachers, or parents who stayed for the lesson complete the evaluation on page 38.

Conclusion

Serve the roasted pumpkin seeds, and allow children to make modifications to their pumpkin based on what they have learned.

4-H Common Measures 2.0

4-H Experience: Positive relationship with a caring adult; inclusive environment; safe environment; engagement in learning; opportunity for mastery; opportunity to see oneself as an active participant in the future; opportunity for self-determination; opportunity to value and practice service to others.

4-H Universal: Personal mindset; social skills; universal skills.

National Ag Literacy Pillars

EC Awareness (1a): Describe how farmers use land to grow crops.

EC Awareness (2e): Discover that farmers plant seeds, care for plants, and harvest the product of their work.

National Ag Literacy Outcomes

T1.K-2: Describe how farmers/ranchers use land to grow crops and support livestock.

T2.K-2: Explain how farmers/ranchers work with the life cycle of plants and animals (planting/breeding) to harvest a crop.

T2.K-2: Identify examples of feed/food products eaten by animals and people.

Next Generation Science Standards

K-2-ETS1-2: Engineering Design: 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.

Mississippi College and Career Readiness Standards for Science

P.K.5B.1: Use basic shapes and spatial reasoning to model large objects in the environment using a set of small objects (e.g., blocks, construction sets).

P.K.5B.3: Explain why things may not work the same if some of the parts are missing.

Mississippi College and Career Readiness Standards for English Language Arts

RL.K.1: With prompting and support, ask and answer questions about key details in a text.

RL.K.10: Actively engage in group reading activities with purpose and understanding.

RF.K.2: Demonstrate understanding of spoken words, syllables, and sounds (phonemes).

SL.K.1a: Follow agreed-upon rules for discussions (e.g., listening to others and taking turns speaking about the topics and texts under discussion).

SL.1.1: Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.
L.1.5c: Identify real-life connections between words and their use (e.g., note places at home that are cozy).
SL.2.2: Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.

Lesson 5: Sleepy Farm (60 minutes)

Goal

In this lesson, 4-H Cloverbuds will learn how farmers care for the land.

Objective

Participants will build a farm from LEGOs.
Participants will describe how weather patterns affect plant and animal growth for food.

Prepare

Collect various pictures of farms to show children.

Note: Children will see the word "baler" that they learned in lesson two again in this lesson.

Materials

- *Sleep Tight Farm: A Farm Prepares for Winter* by Eugenie Doyle (ISBN: 978-1-4521-2901-3)
- LEGO 10x10 baseplates, one for each pair of youth
- 100 LEGOs for each pair of youth
- Insta-Snow Powder from Steve Spangler Science
  (3.5 oz makes around 3 gallons of Insta-Snow and costs about $11)
- 1 can of compressed air
  (to clean the Insta-Snow off of the LEGOs)

Getting Started

Greet children and their parents/guardians as they arrive. Be sure each participant has a name tag, and direct children to wash their hands before going to their stations. Each child should have a partner.

Welcome

Welcome to our 4-H club meeting! Let's begin by saying the 4-H Pledge:

I pledge
My head to clearer thinking,
My heart to greater loyalty,
My hands to larger service, and
My health to better living,
For my club, my community,
My country, and my world.

Today, we are going to learn about farms and what it takes to put a farm to sleep for the winter.

Ask one or two of the following questions and allow children to respond:

- Have you ever been to a farm?
- What did you see?
- What do you think a farm does to prepare for winter?

Experiencing

Show children pictures of farms.

Say, "Today, your challenge is to build a farm using LEGOs."

Tell them when they have 5 minutes of build time remaining.

Sharing

Allow each pair of children to share how they designed their farm. If needed to prompt sharing, ask the following questions:

- What did you build on your farm? Why?
- How would your farm get ready for winter?
- What was the most fun about doing this activity?

Processing

Next, help children reflect on what was important about their experience and on the process of completing the challenge. To prompt this reflection, choose from the following questions:

- Why is it important to know what is on a farm?
- How did you and your partner decide what to build?
- Name a challenge that you and your partner faced. How did you overcome it?

Generalizing

Help children reflect on what was important while designing and building their farm. To prompt them to think about what the experience meant to them and what they learned from it, choose from the following questions:

- How will learning about farms help you?
- Why are farms important?

Applying

Read *Sleep Tight Farm: A Farm Prepares for Winter* out loud. Choose one or two of the following questions to help children determine how they can best use the knowledge they have gained:

- Why did the farmers have to put the farm to sleep?
- Did everyone have a job on the farm? What were the jobs?
- What job would you like to have on a farm?

Assessment

As the children are wrapping up, have 4-H volunteers, teachers, or parents who stayed for the lesson complete the evaluation on page 38.

Conclusion

Show children how to make the Insta-Snow. Give them time to prepare their farm for winter, and then let them dust their farm with "snow." Use the can of compressed air to blow off the snow before storing the LEGOs.

4-H Common Measures 2.0

4-H Experience: Positive relationship with a caring adult; inclusive environment; safe environment; engagement in learning; opportunity for mastery; opportunity to see oneself as an active participant in the future; opportunity for self-determination; opportunity to value and practice service to others.

4-H Universal: Personal mindset; social skills; universal skills.

National Ag Literacy Pillars

EC Awareness (1a): Describe how farmers use land to grow crops.

EC Awareness (1b): List ways that farmers care for the land.

EC Awareness (2d): Identify the agricultural source for common food, fiber, and energy products.

EC Awareness (2e): Discover that farmers plant seeds, care for plants, and harvest the product of their work.

National Ag Literacy Outcomes

T1.K-2: Describe how farmers/ranchers use land to grow crops and support livestock.

T1.K-2: Provide examples of how weather patterns affect plant and animal growth.

T2.K-2: Explain how farmers/ranchers work with the life cycle of plants and animals (planting/breeding) to harvest a crop.

T2.K-2: Identify examples of feed/food products eaten by animals and people.

T5.K-2: Discuss what a farmer does.

Next Generation Science Standards

K-2-ETS1-2: Engineering Design: 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.

Mississippi College and Career Readiness Standards for Science

P.K.5B.1: Use basic shapes and spatial reasoning to model large objects in the environment using a set of small objects (e.g., blocks, construction sets).

P.K.5B.3: Explain why things may not work the same if some of the parts are missing.

Mississippi College and Career Readiness Standards for English Language Arts

RL.K.1: With prompting and support, ask and answer questions about key details in a text.

RL.K.10: Actively engage in group reading activities with purpose and understanding.

RF.K.2: Demonstrate understanding of spoken words, syllables, and sounds (phonemes).

SL.K.1a: Follow agreed-upon rules for discussions (e.g., listening to others and taking turns speaking about the topics and texts under discussion).
SL.1.1: Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.
SL.2.2: Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.

Lesson 6: Creepy Crawlies in the Garden (60 minutes)

Goal

In this lesson, 4-H Cloverbuds will learn how farmers care for the land.

Objective

Participants will build bugs with LEGOs.
Participants will describe the importance of natural resources (sun, soil, water) in farming.

Prepare

Collect various pictures of bugs and worms to show children (beetles, worms, slugs, snails, caterpillars, aphids, ladybugs).

Materials

- *Grandpa's Garden* by Stella Fry and Sheila Moxley (ISBN: 978-1-84686-809-2)
- LEGO 10x10 baseplates, one for each pair of youth
- 100 LEGOs for each pair of youth
- Small cups or seed trays for each youth
- Seeds (that youth can use to grow seedlings)
- Optional: LEGO Bricks and Eyes #11003 set

  To provide youth with "eyes" for their creepy crawly creations. Compatible "eye" bricks can also be found at various online retailers.

Getting Started

Greet children and their parents/guardians as they arrive. Be sure each participant has a name tag, and direct children to wash their hands before going to their stations. Each child should have a partner.

Welcome

Welcome to our 4-H club meeting! Let's begin by saying the 4-H Pledge:

I pledge
My head to clearer thinking,
My heart to greater loyalty,
My hands to larger service, and
My health to better living,
For my club, my community,
My country, and my world.

Today, we are going to learn about what I like to call "creepy crawlies"! What is a creepy crawly?! It's a bug or an insect.

Ask one or two of the following questions and allow children to respond:

- What is the last bug or insect you saw?
- What bugs or insects do you like the most?
- Would you step on a bug?

Experiencing

Show children pictures of bugs and insects.

Say, "Today, your challenge is to build creepy crawly bugs and insects."

Tell children when they have 5 minutes of build time remaining.

Sharing

Let each pair of children share how they designed their bugs and insects. If needed to prompt sharing, ask the following questions:

- How did you decide which bugs or insects to build?
- Which was the easiest bug or insect to build?
- Did you need help to build the creepy crawlies?

Processing

Next, help children reflect on what was important about their experience and on the process of completing the challenge. To prompt this reflection, choose from the following questions:

- What were some of the most common bugs and insects that were built?
- Why do you think they were the most common?
- What would you do if your bug or insect came to life?

Generalizing

Help children think about what was important while designing and building their bugs and insects. To prompt them to think about what the experience meant to them and what they learned from it, choose from the following questions:

- What advice would you give someone who wanted to learn more about bugs or insects?
- How did you and your partner decide what to build if you both wanted to build something different?
- Why is it important to know about bugs?

Applying

Read *Grandpa's Garden* out loud. Choose one or two of the following questions to help children determine how they can best use the knowledge they have gained:

- Did the bugs or insects help the garden or hurt the garden?
- How can knowing about the types of bugs in a garden help a gardener/farmer?
- Could you build something that would eat the bugs and insects in the garden (frogs, birds, etc.)?

Assessment

As the children are wrapping up, have 4-H volunteers, teachers, or parents that stayed for the lesson complete the evaluation on page 38.

Conclusion

Show children the small cups, dirt, and seeds. Show them how to plant the seeds so that they become seedlings. Tell children when they can plant the seedlings (depends on type of seeds and time of year when the lesson is conducted).

4-H Common Measures 2.0

4-H Experience: Positive relationship with a caring adult; inclusive environment; safe environment; engagement in learning; opportunity for mastery; opportunity to see oneself as an active participant in the future; opportunity for self-determination; opportunity to value and practice service to others.

4-H Universal: Personal mindset; social skills; universal skills.

National Ag Literacy Pillars

EC Awareness (1a): Describe how farmers use land to grow crops.

EC Awareness (2e): Discover that farmers plant seeds, care for plants, and harvest the product of their work.

National Ag Literacy Outcomes

T1.K-2: Describe how farmers/ranchers use land to grow crops and support livestock.

T2.K-2: Explain how farmers/ranchers work with the life cycle of plants and animals (planting/breeding) to harvest a crop.

T2.K-2: Identify examples of feed/food products eaten by animals and people.

T2.K-2: Identify the importance of natural resources (e.g., sun, soil, water, minerals) in farming.

T5.K-2: Discuss what a farmer does.

Next Generation Science Standards

K-2-ETS1-2: Engineering Design: 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.

Mississippi College and Career Readiness Standards for Science

P.K.5B.1: Use basic shapes and spatial reasoning to model large objects in the environment using a set of small objects (e.g., blocks, construction sets).

P.K.5B.3: Explain why things may not work the same if some of the parts are missing.

Mississippi College and Career Readiness Standards for Science

RL.K.1: With prompting and support, ask and answer questions about key details in a text.

RL.K.10: Actively engage in group reading activities with purpose and understanding.

RF.K.2: Demonstrate understanding of spoken words, syllables, and sounds (phonemes).

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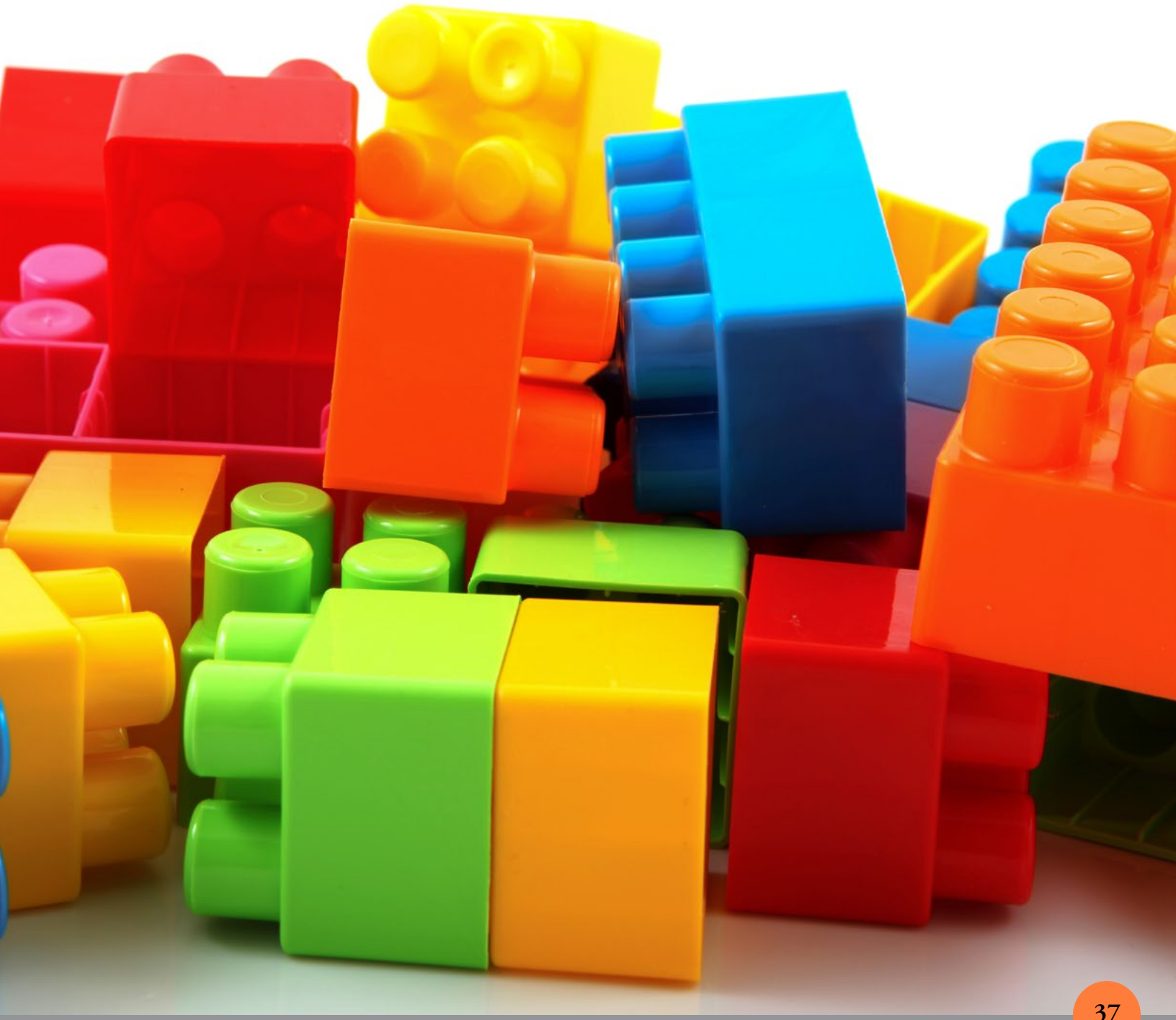
SL.2.2: Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.



Evaluation

This is an observational instrument designed to measure the influence of the 4-H Cloverbud LEGO Engineering Club program on children who have actively participated in the program.

Please indicate today's date and select which lesson(s) was (were) delivered today. ____/____/____

☐ Lesson 1: Pack A Lunch
☐ Lesson 2: Store Summer in a Bale
☐ Lesson 3: Soybean Picnic
☐ Lesson 4: Pumpkin Patch
☐ Lesson 5: Sleepy Farm
☐ Lesson 6: Creepy Crawlies in the Graden

Instructions: For each item, use an X to indicate a response that represents the number of children who exhibit/experience the listed behavior/setting as a result of their involvement with the 4-H Cloverbud Program.

1. Because of participation in the 4-H Cloverbud LEGO Engineering Club program, I observed that the 4-H Cloverbud children:

	None of the children	Some of the children	Half of the children	Most of the children	All of the children
Gained self-confidence or self-esteem. Children displayed confidence and positive self-esteem as observed in their ability to participate in the 4-H Cloverbud activities, ask/answer questions, and interact with others.					
Improved their physical skills. Children exhibited fine (writing, cutting, drawing, etc.) and gross (jumping, arm and leg movement, body coordination, etc.) motor skills.					
Gained subject-matter knowledge. Children expressed verbal and nonverbal knowledge related to the subject-matter content of their 4-H Cloverbud activity involvement.					
Improved ability to get along with others. Children were able to share, communicate, and make friends with peers in the 4-H Cloverbud group.					

	None of the children	Some of the children	Half of the children	Most of the children	All of the children
Increased decision-making skills. Children were able to make decisions in regard to activity input and interaction with peers and adult leaders.					
Experienced positive relationships with caring adults. Children learned and developed in an adult-leader-directed environment; the learning environment was positive, caring, supportive, and fun.					
Experienced inclusive environments. Cooperative-learning techniques encouraged children to work on activities together; engaged the children in activities that were noncompetitive without setting up categories or classes; valued and respected the diversity of all participants.					
Experienced opportunities for mastery/competence. Children were allowed to be creative across eight different subject areas; used the experiential learning cycle through the activities as children experienced, shared, processed, and generalized; curriculum and activities met the needs of the children.					
Experienced opportunities to value and practice service to others. Children learned to appreciate community service through 4-H Cloverbud activities; cleaned up after activities and helped each other; shared materials and respected fellow 4-H Cloverbud members.					
Experienced an emotionally and physically safe environment. Children's needs were met on their emotional, physical, social, and cognitive level; low-risk, safe activities ensured the safety of 4-H Cloverbud children; ratio of children to adults was low (about 6 to 1).					

	None of the children	Some of the children	Half of the children	Most of the children	All of the children
Experienced opportunities for self-determination. Children gained confidence through success-oriented activities; noncompetitive activities fostered intrinsic motivation; activities focused on the process of doing activities, rather than the product.					
Experienced opportunities for engagement in learning. Children had fun, positive experiences; children had access to numerous subject areas that interested them; leaders were nurturing, enthusiastic, and sensitive role models.					
Experienced opportunities to see oneself as an active participant in the future. Children were given choices in upcoming activities; explored a variety of future career options; discussed and role-played the reality that what one does today often determines what happens tomorrow.					
Experienced opportunities for leadership and independence. Children gained skills and confidence for leadership and self-discipline; learned responsibility for decisions made and actions taken; led simple tasks.					
Increased interest and engagement in STEM (Science, Technology, Engineering, and Math). Children expressed interest in science and were engaged by the science-based lessons and activities.					
Improved attitudes toward STEM. Children expressed positive attitudes and aspirations toward science.					

	None of the children	Some of the children	Half of the children	Most of the children	All of the children
Developed STEM skills and abilities. Children developed skills such as listening, observing, searching, asking questions, and gathering information.					
a. Asked questions about a problem					
b. Defined a problem					
c. Developed a simple model					
d. Used a simple model					
e. Constructed explanations					
f. Designed solutions					
g. Evaluated information					
h. Communicated information					
i. Answered questions about a problem					
j. Spoke audibly					
k. Expressed thoughts, feelings, and ideas clearly					
l. Used a combination of drawing, dictating, and writing to communicate about a topic					
m. Added drawings or other visual displays to descriptions to provide additional detail					
n. Participated in collaborative conversations with peers and adults					
Developed knowledge about agriculture, such as:					
a. What a farmer does					
b. How farmers use land to grow crops					
c. How farmers/ranchers use land to support livestock					
d. The agricultural source for common food, fiber, and energy (e.g., milk from cows, wool from sheep, energy from solar)					
e. Feed/food products eaten by animals and people					
f. The life cycle of plants (e.g., plant seeds, care for plants, and harvest plants)					

Adapted from Scott D. Scheer, PhD, State 4-H Extension Specialist, The Ohio State University.

2. Number of children represented in this evaluation _____

3. Number of girls _____ and boys _____

4. How was this program delivered?

_____ 4-H club

_____ 4-H camp

_____ After-school program

_____ In-school program

5. Number of meetings this evaluation represents _____

6. Number of weeks over which this evaluation occurred _____

7. Person completing this evaluation _____

8. Which county does this evaluation represent? _____

9. What is your role?

_____ 4-H Cloverbud volunteer leader

_____ 4-H Cloverbud parent

_____ Youth worker

_____ Teacher

_____ Extension agent

_____ Other: _____

10. How long (e.g., months, years) have you served as a 4-H Cloverbud volunteer leader?_____

Thank you!

Please return this completed form to your 4-H Cloverbud leader or your Extension agent.

Visit ***http://extension.msstate.edu/publications/4-h-lego-engineering-club-volume-2-the-farm*** to download printable 4-H LEGO Engineering Club certificates and name tags!

I Pledge:

My Head to Clearer Thinking

(Right hand touches forehead)

My Heart to Greater Loyalty

(Right hand over heart)

My Hands to Larger Service

(Arms slightly bent, palms up)

and My Health to Better Living

(Arms at sides)

For My Club, My Community, My Country, and My World

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By **Mariah Smith Morgan**, PhD, Assistant Extension Professor, Center for Technology Outreach.

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