

Backpack Garden

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Milestone 1: Entry Event

Situation: Our school participates in a Backpack Program to discreetly provide students in need with nutritious food when they are at home on the weekends. The program would like to offer more fresh fruits and vegetables to the students they serve.

Driving Question (Teacher Guided, Student Constructed): How can we use our school resources to grow fruits and vegetables for our school Backpack Program?

Key Student Questions:

- What is food insecurity?
- How does food insecurity affect elementary students?
- What is the Backpack Program?
- What are the benefits of having a Backpack Program at our school?
- How are fruits and vegetables beneficial to our health?

Formative Assessment:

- Class discussion
- Fruits and Vegetables Group List

Materials:

- Garden Journal, 1 per student
- *Katie's Cabbage* by Katie Stagliano and/or [Katie Stagliano–The Girl With One Hundred Gardens](#)
- [What is the BackPack Program?](#) video or guest speaker
- [MyPlate Food Groups](#) video
- [MyPlate Image](#)
- *I Will Never Not Ever Eat a Tomato* by Lauren Child
- [What if You Never Ate Fruits and Vegetables?](#) video
- [Fruit and Vegetable Scattergories](#) instruction sheet, 1 per group
- Timers, 1 per group

Day 1 Instructional Procedures:

1. Provide each student with a Garden Journal, and ask them to complete the sentence, "When I feel hungry, I _____." Ask volunteers to share what they wrote.

(Answers may vary, but may include, “get grumpy,” “feel sick,” “can’t concentrate,” “feel tired.”)

2. Explain to the class that food security means having consistent access to enough safe, nutritious food for an active, healthy life. Food insecurity is not having consistent access to enough safe, nutritious food.
3. Ask the students, “What are some ways food insecurity might affect elementary students?” After listening to their ideas, emphasize the following points:
 - Children who are hungry can experience headaches and feel tired. They may have frequent colds or other illnesses which cause them to be less active.
 - Students who are hungry may have difficulty concentrating on their school work. They are also more likely to be frequently absent from school.
 - Hungry children have an increased risk of mental health issues and behavioral problems.
4. Read the book *Katie’s Cabbage* by Katie Stagliano and/or watch the video [Katie Stagliano–The Girl With One Hundred Gardens](#). Discuss the ways Katie helped people in need in her community.
5. Ask the students, “What are some ways we can help students who experience food insecurity?”
6. Show the [What is the Backpack Program?](#) video or invite a guest speaker from the school Backpack Program, local food pantry, or food bank to visit the class and explain the program.
7. Tell the class that their school participates in a Backpack Program to discreetly provide students in need with nutritious food for the weekends. The program would like to offer more fresh fruits and vegetables to the students they serve.
8. Guide the students to construct a question similar to, “How can we use our school resources to grow fruits and vegetables for our School Backpack Program?” Have them write the driving question in their Garden Journal.

Day 2 Instructional Procedures:

1. Show the [MyPlate Food Groups](#) video.
2. Project the [MyPlate Image](#) onto a large screen. Discuss the section sizes:
 - Each food group’s size is slightly different because our bodies need different amounts from each food group to stay healthy.
 - The fruits and vegetables sections take up half the plate, with the vegetable food group being slightly larger than the fruit group.
 - The grains section is larger than the protein section.
3. Read the story, *I Will Never Not Ever Eat a Tomato* by Lauren Child.
4. Ask the students, “What would happen if you never ate fruits and vegetables?”
5. Show the [What if You Never Ate Fruits and Vegetables?](#) video.
6. Lead the students through a discussion about why it is recommended to make half your plate fruits and vegetables daily. Integrate the following points into the discussion:
 - Fruits and vegetables are the only source of vitamin C in the diet. Vitamin C helps the body heal wounds and lowers the risk of infection. It also helps keep

the body from bruising and builds the tissue that holds muscles and bones together. Vitamin C, also known as ascorbic acid, helps the body absorb the iron found in foods and strengthens the immune system.

- Leafy greens, carrots, sweet potatoes, squash, spinach, apricots, and green peppers are all excellent sources of vitamin A. Serving several functions in the body, vitamin A helps maintain good vision, fight infection, support cell growth, and keep skin healthy.
 - Fruits and vegetables are a good source of complex carbohydrates, whose energy release is slow, gradual, and long-lasting. Sugar provides quick energy, but its effects are short-lived. This knowledge is important when choosing foods to eat before an athletic event.
 - Fruits and vegetables contain fiber. Fiber helps move food through the body to prevent constipation and provide a sense of fullness.
 - Fruits and vegetables are quick, often ready to eat, easy to carry, and tasty foods to have as snacks. They provide the energy needed to function throughout the day.
 - Eating a variety of fruits and vegetables provides health benefits. People who eat more fruits and vegetables as part of a healthy eating style are likely to have a reduced risk of some chronic diseases.
 - Fruits and vegetables provide nutrients that help us grow and stay healthy.
 - Fruits and vegetables are naturally low in fat and calories. No fruits or vegetables contain cholesterol.
7. Organize the class into groups of five students. Identify a leader for each group. Provide the leader with the [Fruits and Vegetables Scattergories](#) instruction sheet and a timer. Tell them to lead their group through the instructions to brainstorm many, varied fruits and vegetables.
- Using fruits as the first category, give everyone one minute to write down as many fruits as they can think of. Tell the group that the goal is to list as many fruits as they can think of, including fruits that other students might not think of. Start the timer for 1 minute and say, “Go.”
 - When the timer beeps say, “Pencils down.”
 - Choose one person to read their list. The rest of the group should raise their hand if they listed the same fruit and everyone who has it on their list must put an X next to the word. Continue until every student has had a chance to read their list.
 - Each person should count the words that do not have an X by them.
 - Repeat steps 1-4 with vegetables as the category.
 - Each person should add the points from their two categories together to determine who had the most words that no one else thought of.
 - Compile a list of all the fruits and vegetables the group thought of in their Garden Journal. The list will be used in the next activity.

Milestone 2: Research

Driving Question (Teacher Guided, Student Constructed): How can we use our school resources to grow fruits and vegetables for our school Backpack Program?

Key Student Questions:

- Which fruits and vegetables does our school community prefer?
- What elements need to be considered when planning a garden?
- Which locally appropriate seeds should we plant to meet the preferences and nutritional needs of our school community?

Formative Assessments:

- Fruit and Vegetable Preference Survey
- Decision Making Chart

Materials:

- Garden Journal
- Fruits and Vegetables Group List (from Day 2)
- Your state's [Agricultural Facts Sheet](#)
- [Cooperative Extension Services](#) website for your state
- [Google Forms](#) or similar survey maker
- [Decision Making Chart](#)

Day 3 Instructional Procedures:

1. Have the students get back into their teams from Day 2 and review their lists of fruits and vegetables from the Scattergories brainstorm activity.
2. Ask each team to refer to your state's [Agricultural Facts Sheet](#) and resources from your state's [Cooperative Extension Services](#) website to identify fruits and vegetables on their list and add additional fruits and vegetables to their list that can be grown in your state.
3. Instruct the teams to create a survey to identify the types of fruits and vegetables that can be grown in your state that students at the school prefer. Use [Google Forms](#) or a similar survey maker to create a digital survey, or have the students create a hand-written survey.
 - Have each group choose 10 fruits and 10 vegetables from their list to include in the survey.
 - Create a scale from 1-5 for participants to rate each fruit and vegetable. (Ex., 1 = strongly dislike; 2 = dislike; 3 = neutral; 4 = like; 5 = strongly like)
4. Choose a time for teams to survey students in the school (lunch, recess, visiting classrooms, etc.).

Day 4 Instructional Procedures:

1. Have the teams analyze the results of the student surveys and identify the top five fruits and vegetables preferred by the survey participants.

2. Explain to the students that each team will use a decision making strategy to decide on the fruit or vegetable their team will grow in the school garden.
3. Provide each student with a [Decision Making Chart](#). Model for the students how to complete their charts:
 - Write the five fruits and vegetables in the first column under “Alternatives.” Every member of the team should write them in the same order on their chart.
 - Determine five criteria questions that are important to making the decision.
Examples include:
 - Do I like to eat this fruit or vegetable?
 - Do I think students at my school will like to eat this fruit or vegetable?
 - Can this fruit or vegetable be grown inside?
 - Can this fruit or vegetable be grown during the school year?
 - Do we have the room to grow this fruit or vegetable?
 - Write the five criteria questions in the first row next to “Criteria.” Every member of the team should use the same questions in the same order.
 - Each person should consider the criteria questions for each fruit or vegetable and rate them according to the rating scale, using each number 1-5 once per fruit or vegetable.
 - After the rating is complete, students should add up their ratings for each fruit or vegetable and write the total in the corresponding box.
 - Add all of the scores together to determine a total group score for each fruit or vegetable. The fruit or vegetable with the highest score is what the team will grow in the school garden.

Milestone 3: Garden Planning and Construction

Driving Question (Teacher Guided, Student Constructed): How can we use our school resources to grow fruits and vegetables for our school Backpack Program?

Key Student Questions:

- What elements need to be considered when planning a garden?
- What is our budget and how does it affect the type of garden we can construct or the improvements we can make?
- How does our climate affect the type of garden we will have? Will we need to grow an indoor garden or an outdoor garden?
- What locations can we use for our garden?
- How much space do we have?
- Why is light important for plants?
- How much light do our plants need (intensity, quality, duration)?
- What materials will we need to construct our garden?
- What skills do we need to construct our garden?
- How will we construct our garden?

Formative Assessment:

- Desktop greenhouse observations
- Photosynthesis Interactive Science Notebook
- Plant light requirements
- Garden plan

Materials:

- Garden Journal
- [School Garden Center](#)
- [Desktop Greenhouses](#) video
- 16-ounce clear plastic cups with lids,* 2 per group
- 18-ounce black plastic cups,* 2 per group
- Black electrical tape*
- Black card stock* disks, 2 per group
- mL measuring cup or ruler
- 1/8 teaspoon
- Jiffy 7 peat pellets,* 2 per group
- Seeds* (we tested alfalfa and lettuce seeds)
- Labels, 2 per group
- White 5 mm LED lights,* 1 per group
- 3-volt coin cell batteries,* 1 per group
- Craft knife
- [Desktop Greenhouse Observation Sheets](#), 1 packet per student
- *The Magic School Bus Gets Planted: A Book About Photosynthesis* by Lenore Notkin
- [Photosynthesis Interactive Science Notebook Packet](#)
- Glue sticks
- Scissors
- [Interactive Periodic Table](#)
- [Molecular Model Cards](#), 6 carbon dioxide cards, 6 water cards, 6 oxygen cards, and 1 glucose card per group
- [Atom Disks](#), 12 hydrogen atoms, 6 carbon atoms, and 18 oxygen atoms per group
- Flashlights
- [Planning Your Garden](#) video
- Clipboard
- Graph paper
- Tape measure or string and rulers
- [Gallery Walk Recording Sheet](#)
- Materials, tools, and equipment for constructing or improving the school garden

*These items are included in the [Desktop Greenhouses Kit](#), which is available for purchase from agclassroomstore.com.

Days 5-13 Instructional Procedures: Prior to day 5, determine a budget for the garden based on grants, donations, fundraising, and available funds. Refer to the [Funding Opportunities](#)

section of the [School Garden Center](#) for ideas. If creating a new garden, identify possible locations.

1. Lead a discussion about the type and location of a new school garden to construct or improvements to be made to an existing garden. Integrate the following topics into the discussion:
 - What is our budget? Discuss available funds and fundraising opportunities. How does our budget affect the type of garden we can construct or the improvements we can make?
 - How does our climate affect the type of garden we will have? Will we need to grow an indoor garden or an outdoor garden? Refer the [Indoor Gardening Inspirations](#) and the [Outdoor Gardening Inspirations](#) sections of the [School Garden Center](#) for ideas as appropriate.
 - What locations can we use for our garden? How much space do we have? How much light do our plants need (intensity, quality, duration)? If the class will be constructing an outdoor garden, invite the school principal to visit the class and discuss location options around the school campus and/or tour location sites.
2. Explore the importance of light to plant growth by completing the 8-day Desktop Greenhouses investigation. We recommend beginning this investigation on a Friday (Investigation Day 1) to allow for germination of the seeds over the weekend. Lights will be added to the greenhouse the following Monday (Investigation Day 4), plant observations and data collection take place throughout the week, and the investigation will be completed the following Friday (Investigation Day 8). This schedule allows for key procedures to take place on school days as opposed to the weekend.
 - **Investigation Day 1:** Prior to this activity, an adult should prepare the desktop greenhouse lids. For each lid, cut out a lid-sized disk from black card stock, place it on top of the lid, and secure it with two layers of electrical tape so that no clear part of the lid is exposed. Watch the [Desktop Greenhouses](#) video to view a tutorial about how to set up the greenhouses.
 - a. Explain to the students that they are going to investigate the importance of light to plants by creating desktop greenhouses.
 - b. Organize the students into their teams. Provide each team with 2 clear plastic cups, 2 black plastic cups, 2 prepared lids, 2 labeling stickers, 2 peat pellets, a bag of seeds, access to water, a mL measuring cup, a $\frac{1}{8}$ teaspoon, and a permanent marker.
 - c. Instruct the students to label both clear plastic cups with their name, the date, and the type of seed they are planting. Label one greenhouse with the number 1 and the other greenhouse with the number 2.
 - d. Fill each of the cups with 50 mL of water or mark a line on each cup $\frac{3}{4}$ inch from the bottom, and fill the cups up to the line with water.
 - e. Place a peat pellet, with the small hole facing up, into each of the cups of water.

- f. It takes about 15 minutes for the peat pellets to hydrate and expand. When the peat pots are completely hydrated, use a pencil to loosen the top $\frac{1}{4}$ inch of peat moss.
 - g. Evenly spread $\frac{1}{8}$ teaspoon of seeds on top of each of the peat pots. Press the seeds down gently with your finger so that they contact the damp peat.
 - h. Have each group write their names, the date, and the type of seed they are planting on two stickers and place one on each of the black plastic cups. Label one greenhouse with the number 1 and the other greenhouse with the number 2.
 - i. Provide each student with the [Desktop Greenhouse Observation Sheets](#). Have the students complete the observations for Day 1.
- **Investigation Day 4:** Prior to this activity, an adult should use a craft knife to cut an X (similar to the straw X in the plastic lid) into the top of the greenhouse lid through the black card stock disk and plastic lid for each student's greenhouse number 1 lid only. Do not cut an X for greenhouse number 2. The students will place their LED light through this X.
 - a. Have the students check their greenhouses and complete the observations for Day 4 on their [Desktop Greenhouse Observation Sheet](#).
 - b. Lead a discussion about the question from Investigation Day 1, "Do seeds need light to germinate?" Integrate the following points into the discussion:
 - The seeds in the desktop greenhouses were not exposed to light and germinated.
 - Most seeds germinate best in dark conditions.
 - Seeds are dormant until they are exposed to specific conditions.
 - Seeds require the proper amount of warmth, moisture, and air to germinate.
 - c. Ask the students, "Do plants need light to grow and be healthy?" After listening to their responses, explain that they will add an LED light to one of their greenhouses.
 - d. Provide each student with a 3-volt battery, an LED light, and a 4" piece of electrical tape. Explain to the students that the battery will provide power to the LED light.
 - e. Have the students straddle the light's prongs around the battery so that the longer prong is touching the positive side of the battery. Once the light is lit, hold the prongs in place by wrapping the electrical tape around the prongs and battery.
 - f. Insert the light into the X on the greenhouse lid.
 - g. Explain to the students that they will observe any changes in the plants for the next four days.
 - h. Ask the students, "Do you think you will see any differences between the plant growing in the greenhouse with the light and the plant in the dark

greenhouse?” If they answer yes, ask them what kind of differences they think they will see. Have the students predict which plant they think will be healthiest and record their prediction in their observation sheet.

- **Investigation Days 5-8:**

- a. Allow time each day for students to observe their plants.
 - b. Have the students record their observations on their [Desktop Observation Sheets](#).
 - c. On Day 8, discuss the differences the students observed between their plant growing in the greenhouse with the light and their plant in the dark greenhouse. Which plant is the healthiest? Was their prediction correct?
 - d. Have the students record their conclusions on their observation sheet.
 - e. Lead a discussion about the question from Investigation Day 4, “Do plants need light to grow and be healthy?” Integrate the following points in the discussion:
 - The plants in the desktop greenhouses with light were healthier than the plants in the dark greenhouses.
 - Plants require nutrients, water, air, and light to survive and grow.
 - Light requirements—intensity, quality, and duration vary by plant species.
 - Not all light bulbs can be used as grow lights.
 - Plants also need a rest from light.
 - Different plant species require different amounts of light each day.
3. Have the students research the plants they will be growing in the school garden to determine their light requirements. Record the light requirements in their Garden Journal.

Day 14 Instructional Procedures:

1. Ask the students, “Why is light important for plants?” After listening to their responses, explain that they are going to explore this question.
2. Read *The Magic School Bus Gets Planted: A book About Photosynthesis* by Lenore Notkin.
3. Repeat the question, “Why is light important for plants?” (*Plants use energy from light to make food through a process called photosynthesis.*)
4. Provide each student with a [Photosynthesis Interactive Science Notebook Packet](#). Instruct the students to cut out the “Plant Diagram Cards.”
5. Using a glue stick, have the students glue the plant card onto a page of their Garden Journal.
6. On the other four label cards, fold on the line, apply glue to the back of the tab, and attach the cards around the plant card so that the light card is above the plant, the water card is below the plant, and the oxygen and carbon dioxide cards are along the side of the plant.
7. Underneath the label cards, describe the role each element plays in the photosynthesis process. Draw arrows to or from each label card to the part of the plant that is affected. The descriptions and arrows should be similar to the following:

- **Light:** Light is absorbed by the chlorophyll in the leaves. (Draw an arrow from the “Light” card to the leaf.)
 - **Oxygen:** Oxygen is released from the leaves into the atmosphere. (Draw an arrow from the leaf to the “Oxygen” card.)
 - **Carbon Dioxide:** Carbon dioxide from the air passes through small holes in the leaves (stomata). (Draw an arrow from the “Carbon Dioxide” card to the leaf.)
 - **Water:** Water is absorbed by the roots and travels through the stem to the leaves. (Draw an arrow from the “Water” card to the roots.)
8. Allow time for the students to cut out and read the “Photosynthesis in Plants Reading.” Discuss the definitions of any unfamiliar words. Have the students glue the reading onto the next page in their science notebooks.
 9. Instruct the students to cut out the “Leaf Diagram” shapes and glue the bottom leaf (the leaf with the chloroplasts) onto the next page in their Garden Journal. Apply glue from the stem to the line on the bottom leaf. Attach the top leaf to the bottom leaf and fold the top leaf open at the glue line.
 10. Have the students cut out the “Arrows” and attach them to the leaf diagram to show how light, water, and carbon dioxide enter the leaf and how oxygen leaves the leaf.
 11. Show the students the [Interactive Periodic Table](#) and point out that it is a display of all the known chemical elements. Locate hydrogen (H), oxygen (O), and carbon (C) on the periodic table.
 12. Help students understand that atoms are the smallest amount of an element and molecules are combinations of atoms connected by chemical bonds. Help the students record the chemical formulas of each molecule in the “Photosynthesis in Plants Reading”—water (H₂O), carbon dioxide (CO₂), glucose (C₆H₁₂O₆), and oxygen (O₂). Clarify that the number in the formula indicates the number of atoms of that element in the molecule. For example, H₂O contains two atoms of hydrogen.
 13. Organize the students into their teams. Provide each group with [Molecular Model Cards](#)—6 carbon dioxide cards, 6 water cards, 6 oxygen cards, and 1 glucose card. Pass out a section of [Atom Disks](#)—12 hydrogen atoms, 6 carbon atoms, and 18 oxygen atoms—for the groups to cut out.
 14. Have the students place the atoms onto the water and carbon dioxide molecular models. Turn off the lights and tell the students to shine their flashlights on the models to simulate light energy. Explain that, using light energy, the water molecules are split into hydrogen and oxygen. Hydrogen is combined with carbon dioxide to form glucose and oxygen molecules.
 15. Help the students write the balanced chemical equation for photosynthesis on the bottom of their “Photosynthesis in Plants Reading” (6CO₂ + 6H₂O -Light Energy-> C₆H₁₂O₆ + 6O₂).
 16. Review the following with the students:
 - The chlorophyll in a plant’s leaves absorbs the energy from light.
 - The light energy is used to split water molecules into hydrogen and oxygen.
 - The hydrogen is combined with carbon dioxide to form glucose.

- Glucose is a sugar that is used as food for the plant or stored by the plant for later use.
 - Oxygen is released through the stomata into the atmosphere.
17. Invite the students to use their understanding of photosynthesis to write an explanation in their Garden Journal for the differences they observed in their plants from the desktop greenhouse investigation.

Days 15-16 Instructional Procedures:

1. Finalize the budget, type of garden, and location.
2. View the [Planning Your Garden](#) video to learn tips for designing a garden.
3. Invite each team to create a garden plan. Provide the teams with a clipboard, graph paper, a tape measure or string and a ruler, a list of the plants that will be grown, and the light requirements for each plant. Visit the garden site and instruct them to draw a garden plan (within budget) that includes:
 - Garden dimensions
 - How the space will be used to provide room for each teams' plants
 - Access to water
 - Availability of appropriate light
 - A list of materials and equipment needed
4. Conduct a gallery walk with the completed garden designs. Consider inviting guests, such as a master gardener, extension agent, principal, teachers, parents, to participate in the gallery walk.
5. Tell the students and guests to use the [Gallery Walk Recording Sheet](#) to record their feedback and rate the plan:
 - Complete the sentences to describe what you like and wonder about the garden plans.
 - Rate each required element.
6. Total the ratings to determine which plan will be used for the project. Use the feedback from the gallery walk to make adjustments to the plan before it is finalized.

Days 17-18 Instructional Procedures: Prior to Day 7, gather the necessary materials, tools, and equipment for constructing or improving the school. Recruit volunteers to assist with the work. Refer to the [Recruiting Volunteers](#) section of the [School Garden Center](#) for ideas.

1. Construct or improve the garden according to the finalized garden plan.
2. Assign each volunteer to a student team. Provide each team with a list of specific tasks to complete.
3. Have the students create thank you notes for the volunteers.

Milestone 4: Seed Germination and Plant Growth

Driving Question (Teacher Guided, Student Constructed): How can we use our school resources to grow fruits and vegetables for our school Backpack Program?

Key Student Questions:

- What do our seeds need to germinate?
- What do our plants need to grow and thrive?

Formative Assessments:

- Ragdoll Germination
- What Do Plants Need to Grow? Diagram
- Garden planner
- Garden maintenance schedule

Materials:

- Garden Journal
- [Bean Seed Diagram](#), 1 per student
- Lima beans soaked in water overnight, 1 per student
- Hand lenses
- 100 lima beans
- 10 paper towels (the non-quilted paper towels typically found in schools work best)
- 10 pieces of plastic wrap
- 20 rubber bands
- [Needs of a Plant PowerPoint](#)
- [What Do Plants Need to Grow? Grid](#), 1 per student
- [What Do Plants Need to Grow? Cards](#), 1 per student copied front to back
- Clear tape
- [Garden Planner](#) available for purchase from agclassroomstore.com or create your own
- [School Garden Center](#)
- Materials for plant markers (paint, markers, stakes, rocks, clothespins, wooden spoons, fabric, pinwheels, etc.)

Day 19 Instructional Procedures:

1. Ask the students, “What is inside a seed?”
2. Pass out a [Bean Seed Diagram](#) to each student to add to their Garden Journal. Point out that inside a seed there is an embryo—what will become a new plant—and food for the embryo. On the outside of the seed is a seed coat. Its purpose is to protect the seed.
3. Tell the students that they are going to have the chance to look carefully at a lima bean seed that has been soaked overnight in water. They will observe the seed coat, embryo, and cotyledon of the seed.
4. Give each student one lima bean seed. Show them how to rub the seed between their fingers to remove the seed coat. Ask the students why the seed coat is important. (*it protects the seed*)
5. Show the students how to split the seed in half. Give each student a hand lens to observe the inside of the seed. Point out the embryo and cotyledons. Explain that the embryo is the beginning of a new plant. When the seed receives warmth and moisture, it will begin to germinate, which means it becomes active and sprouts. The cotyledons

provide food for the embryo until it grows leaves. The leaves will then use energy from sunlight to carry out photosynthesis, making food for the plant.

6. Explain that dormant means to be inactive, like in a deep sleep. Active is the opposite of dormant. The seeds they will be planting are dormant until they receive warmth, moisture, and air, at which time they will begin to germinate—become active and sprout.
7. Tell the students that they are going to germinate seeds through a process called ragdoll germination. Gardeners, farmers, and plant scientists use this process to test germination rates of seeds.
8. Organize the students into their teams. Supply each group with a paper towel, plastic wrap, ten lima bean seeds, and two rubber bands. Have each group moisten a paper towel and squeeze out the excess water. Make enough extra to equal ten ragdolls.
9. Lay the plastic wrap out flat on a desk with the paper towel laid flat on top. Line ten seeds in the middle of the paper towel.
10. Fold the plastic wrap and paper towel in half and roll them into a round tube. Use rubber bands to cinch each end of the tube.
11. Leave the ragdoll undisturbed in a warm place. After about one week, have each group open their ragdoll and count the seeds that germinated. Add each group's count together with the extra ragdolls and determine the percentage of seeds that germinated. This is the germination rate for the seed batch.
12. Allow the students to observe the seedlings. Ask them what the seeds needed in order to germinate. (*warmth, moisture, and air*)

Day 20 Instructional Procedures:

1. Ask the students if they have ever taken care of a plant. If they have, ask them to describe what they did to care for their plant.
2. Ask the students, "What are the basic needs of plants?" (*nutrients, water, air, and light*) Use the [Needs of a Plant PowerPoint](#) to introduce the four basic needs of a plant.
3. Distribute the What Do Plants Need to Grow? [Grid](#) and [Cards](#) to each student.
4. Instruct the students to cut out the cards and place them on the grid in the column under the plant necessity described and the row number indicated on the card.
5. After the students have arranged all of their cards, review the PowerPoint to check that the cards have been properly placed on the grid.
6. Once the students are satisfied with the arrangement of their cards, instruct them to tape the cards together exactly how they are placed on the grid, being careful not to tape them to the grid below.
7. When all of the card pieces have been taped together, ask the students to turn the cards over to reveal the diagram of the needs of a plant. Have them add the diagram to their Garden Journal. Using information from the PowerPoint and the cards, discuss the basic needs of a plant.

Days 21-22 Instructional Procedures:

1. Use the crop strips and cards from the [Garden Planner](#) (or make your own) to plan out the planting and harvesting dates for the school garden.

2. Have each team use the crop card for their plant and other garden resources to determine the following:
 - Planting depth
 - Plant spacing
 - Light requirements
 - Water usage
 - Germination length
 - Harvest time
 - Instruct each team to use the crop strips (or make their own) to indicate on the Garden Planner when they will plant their seeds and harvest their fruits or vegetables.
3. Have each team create a Garden Maintenance schedule to add to their Garden Journal. The schedule should include the following:
 - When and who will water their plants
 - When and who will weed their area of the garden
4. At the appropriate time for their plant, teams should plant their seeds according to the required depth and spacing.
5. Have each team design and create garden markers to indicate the location of and type of plant growing. Refer to the [Children's Garden Features](#) of the [School Garden Center](#) for inspiration.
6. During the growing process, each student should record weekly observations in their Garden Journal.

Milestone 5: Final Presentation

Driving Question (Teacher Guided, Student Constructed): How can we use our school resources to grow fruits and vegetables for our school Backpack Program?

Key Student Questions:

- How will we present our learning?
- What will our guests want to know about our garden?
- How can we effectively communicate our project to our school community?

Formative Assessments:

- Healthy recipe
- Information cards, brochures, or signs

Summative Assessment:

- Final presentation

Materials:

- [Presentation Rubric](#)
- Materials for making information cards, brochures, and garden signs (paper, poster board, markers, stakes, etc.)

- Peer Collaboration Evaluation (Use this template and instructions to create a [Peer Collaboration Evaluation Google Form](#) customized to your class.)

Days 23-25 Instructional Procedures:

1. Explain to the students that they will be presenting their garden to the school community by conducting a garden tour. During the tour, each team will be located at a station around the garden where they will offer a short (3-5 minutes) oral presentation to the guests. To prepare for the garden tour teams will:
 - Create information cards, brochures, or garden signs that describe what they planted, why they chose to plant it, and how they are meeting the needs of their plants.
 - Make recipe cards to share how their fruit or vegetable can be used in a healthy recipe.
 - Prepare an oral presentation to tell the story of the garden, what is grown in it, and how they are distributing the food to those in need.
2. Share the [Presentation Rubric](#) with the students, and review the expectations.
3. Allow time for teams to plan and prepare their presentations.
4. Pair teams with another team, and have them practice their presentation in front of each other. Instruct the teams to use the Presentation Rubric to provide feedback.
5. Using the feedback provided, teams should make any necessary adjustments to their final presentations.

Day 26 Instructional Procedures:

1. Invite the school community—students, teachers, administrators, school board members, parents, garden volunteers—to the garden tour.
2. As guests tour the garden, they will visit stations where teams will offer their oral presentations and recipe cards.
3. Use the [Presentation Rubric](#) to assess the presentations.
4. Following the tour, students should complete a Peer Collaboration Evaluation. (Use this template and instructions to create a [Peer Collaboration Evaluation Google Form](#) customized to your class.)
5. Provide a wrap-up and reflection that ties together the presentations with the project objectives.