Learning in the School Garden

School Garden Unit

Upper Elementary
3rd – 5th Grades

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Plan & Plant Garden Guide

LESSON: Planning for Plants that Thrive

GRADE: 3rd grade **TIME: At least four 45 minute sessions**

SUMMARY:

Today students will plan their future garden. They will begin by discussing types of plants that thrive in their garden habitat. While mapping their garden space, they will dream about plants to include in the school garden. They will research growing conditions necessary for specific plants, and construct arguments why plants should be included on the class garden map. Finally, they will plant their garden and prepare to see their plants thrive!

GARDEN TASK*: Planning and Planting*

OBJECTIVES: Iowa Core

Social Studies

- **SS-3-5.G.1** Understand the use of geographic tools to locate and analyze information about people, places, and environments.

Science

Biological Evolution: Unity and Diversity

- **3-LS4-3.** Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

21st Century Skills

- **21.3-5.ES.1** Communicate and work appropriately with others emphasizing collaboration and cultural awareness to produce quality work.
- **21.3-5.ES.2** Recognize different roles and responsibilities and understand the need to be flexible to change.

MATERIALS & RESOURCES:

- *In Mary's Garden* by Tina & Carson Kugler
- Paper, pencils, and crayons
- Clipboard for each student
- Chart paper
- Tape
- Empty seed packets – 1 per group
- Seeds or seedlings
- Trowel or hoe – 1 per group
- Garden journal notebooks

Management tip

Plan to complete all activities outside in or near the school garden, weather permitting. Materials could be easily transported in backpacks carried by student leaders. Consider storing tools in a small shed near the garden. Before going outside, discuss boundaries, expectations for student behavior, attention getting signals, and specific tasks. Review again when outside.

PRESENTATION / INTRODUCTION:

Look around and make observations. What plants live in the area around our garden? Point out different plants such as trees, bushes, grass, newly sprouted grass, etc. What do these plants need to grow? Does this habitat provide those things? Yes, that's why the plants grow here. What plants could not live in this habitat? Cactus? Palm tree?

Today we will learn about different plants and construct arguments that some plants can survive well in this habitat while others would survive less well and others would not survive at all. We will make decisions about plants, spacing, and timing while we create a garden map. Then, in time we will get to see how well our plants survive.

DIRECTIONS:

1. **Activity 1 - Mapping the space**: Explain that each student will create a dream garden map. Show examples of maps and talk about the purpose of a map. Give students a few minutes to explore the garden's key features such as water access, compost bins, rabbit fences, amount of space, soil, sunlight, etc. Encourage them to imagine the plants that could be in the garden beds, perhaps a theme like "ingredients for pizza" or favorite fruits and vegetables. Have them include these imaginary plants as well.

- Distribute clipboards, notecards, and pencils, and model paper set up. Have students spread out and find a place to sit and draw. Give them time to explore, examine, and draw maps.
- Bring students together. Do a museum walk of their maps, pointing out different plant ideas.
- How could we determine which plants could survive well in an Iowa garden? On a piece of chart paper, use student input to draw a class garden map, leaving the garden beds blank for now.

Recommended resource

For additional support setting up a new outdoor classroom or garden, check out the U.S. Fish & Wildlife Service planning guide: https://www.fws.gov/cno/pdf/HabitatGuideColor.pdf

2. **Activity 2 – Research plants:** Small groups of students will research growing conditions needs for different fruits and vegetables. Seed packets are a good resource for information. Model reading a seed packet to find information such as planting dates, planting depth, required sunlight, and special instructions. Also, refer to the Iowa State Extension file, **"Planting a home vegetable garden,"** for a table with planting recommendations. https://store.extension.iastate.edu/Product/Planting-a-Home-Vegetable-Garden
    - Students will construct an argument whether their fruit or vegetable should be included in the garden. In addition to growing conditions, encourage them to consider expense, space, etc.
    - Add their recommendations to the class garden map.

3. **Activity 3 – Plan for planting day:** What will we need to do to plant seeds? Have students divide tasks into smaller roles and determine job descriptions for each student in the class. For example, perhaps one group will take the task of planting the pea plants. One person in the group could hoe, another place the

Tool safety

Role play with students procedures for getting out, using, and storing garden tools. For example, pointy ends of trowels and shovels should always be down. Students will only walk while carrying tools. Teachers will pay close attention to students using tools and will give other jobs to students not following procedures.

seeds, another covers the seed with soil, and a final student waters the area. Each student should create a notecard nametag for themselves showing their role and tasks they will complete.

- While planning the specifics for planting day, help students make connections to the yearly cycle for the garden. First, we plan and plant, then we will maintain the garden, finally we will harvest and celebrate. Watch this video: http://iptv.pbslearningmedia.org/resource/thnkgard.sci.ess.gardenatoz/think-garden-a-year-in-the-garden/ On the class map, include student sketches of what they hope their plants will look like.
- For more information about planting with students, please see additional information located at the end of this lesson.

Expert advice

If the goal of the garden is to produce food or beauty, don't do it with kids! Remember, the goal is for the kids to learn. Focus on their academic goals, not on producing food.

4. **Activity 4 – Planting Day:** Model using the tools and planting the seeds. Refer to the garden map and plan to ensure every child has a job and is ready to make discoveries in the garden. Extra staff or parent/community volunteers could be helpful on planting day. Have fun!

REFLECTION / GARDEN JOURNAL PROMPT:

1. **Make a garden journal**: Each student can make a garden journal out of a recycled notebook. Encourage students to decorate the covers with a collage of recycled materials, perhaps including garden catalog photos.

2. **Adopt-a-Plant journal prompt:** Each child will adopt a plant to observe and document weekly throughout the garden season. Have them sketch their seed in the ground; provide extra seeds for them to closely observe. What growing conditions are present that will help this plant thrive?

School Garden Unit
Maintain Garden Guide

LESSON: Measuring Plant Growth

GRADE: 3rd grade **TIME: 45-minute sessions as needed**

SUMMARY:

In the garden, students will observe, measure, photograph, and chart weather conditions and plant growth. Students will sketch and photograph plants at various stages of life cycles. Based on their observations they will determine when to water, weed, and care for their garden.

GARDEN TASK*: Maintain*

OBJECTIVES: Iowa Core

Science

- **3-LS1-1.** Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
- **3-LS4-3.** Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
- **3-ESS2-1.** Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

Mathematics

- **3.MD.B.4**. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units.

21st Century Skills

- **21.3-5.ES.5** Demonstrate productivity and accountability by producing quality work.

MATERIALS & RESOURCES:

- Chart paper for graphing weather data
- Cameras or a device to take garden photos
- Rulers
- Gardener Checklist –copies for each child *(found at the end of this lesson)*
- Garden gloves and "rainmakers" – recycled plastic containers with holes in the bottom for watering
- 60 counters (or poker chips, buttons, etc.)
- Garden journal notebooks / colored pencils

PRESENTATION / INTRODUCTION:

When visiting the garden, have students complete the Think Like a Gardener Checklist. What patterns are you seeing in the weather? As a class, chart the weather data daily. Why is weather data important for gardeners?

All living things go through life cycles. Based on your observations today, what part of the life cycle are our plants currently in? As a class, photograph the plant every other week to show how it changes as it progresses through the life cycle.

Based on student observations, plan how students can maintain their plants today.

DIRECTIONS:

1. **Weeding**: Gardeners should pull weeds to ensure their plants get the sunlight, water, space, and nutrients from the soil that they need. Weeding is easiest when weeds are small, so short but frequent weeding sessions are helpful.
    - As seedlings first grow, students may have difficulty differentiating the plants and weeds. Point out patterns the plants were planted in (rows, clusters, etc.). Also refer to the seed packages or online resources for photos of baby plants. Making garden signs with photos can be helpful.
    - As weeding could become tedious, make it into a game with challenges. Who can pick the largest pile of weeds? See how many

different kinds of weeds they can find. Have students search for the smallest weed, largest weed, longest root, etc.

Expert advice

Make it a goal to avoid watering the garden. Mulching around small plants not only cuts down on weeds but also helps the soil hold water. Wet newspapers, cardboard, or straw are recommended mulching materials, two or three inches deep.

2. **Watering**: As a class, observe and chart the weather daily. After several days without rain, test the ground by inserting a trowel or dowel a few inches. If it comes out clean, the soil is dry. Damp soil will cling to the trowel. Ask students to observe plants. Plants' leaves will begin to wilt or turn colors if they are lacking water. **Generally, plants will need water whenever less than an inch of rain falls in a week. If it rains, do not water.** Watch the following video for additional information: http://iptv.pbslearningmedia.org/resource/thnkgard.sci.ess.water/think-garden-the-importance-of-water/

3. **Thinning**: Some plants need to be thinned, which means removing some plants to allow more room for others to grow. For example, carrots will not have space or nutrients to grow to full size unless they are thinned. Refer to seed packages for details about the amount of space plants need and thinning dates. Students may be interested to see what happens if a few plants are not thinned.

Management tip

Handing water hoses to children can be too tempting. Consider having buckets of water available so students can water plants by filling "rainmakers," recycled yogurt or orange juice jugs with their tops cut and holes poked in the bottoms with nails. Water gently falls to ground like a rain storm, reducing puddles and drowning of seedlings.

- **Human Carrots Game**: Students sit on the ground about six inches to the next nearest person. Evenly distribute 60 counters on the ground. Explain that the counters represent nutrients in the soil that plants need to survive and thrive. When you say, "Go," students will pick up as many counters as they can. After this first round, students will notice they each only got a few counters.
- Half of the students should stand up and move to the side to become observers. Repeat the game with the same number of counters. Were

the carrots able to get more nutrients this time? Why? Why is it helpful to thin the carrots?

- Repeat again with some students representing weeds. How could we help our carrots if we pulled the weeds?
- Play a variation including water and sunlight. Throw slips of blue paper (rainwater) and yellow paper (sunlight) to "rain" on the group like confetti. See how many slips they collect with all the plants as compared to a few. Discuss that it's easier for plants to get the sunlight, water, and nutrients needed when thinned.

4. **Pests and disease**: Not all bugs are bad. Encourage students to examine plants closely so they get to know what a healthy plant looks like. Then, they will be able to spot changes in the plant such as yellow or brown spots, which can be signs of disease. Iowa State Extension offices can be a source of information about specific plants: http://www.yardandgarden.extension.iastate.edu/Hortline.htm This video helps students understand bugs that are pests and helpers. http://iptv.pbslearningmedia.org/resource/thnkgard.sci.ess.pests/think-garden-garden-pests-and-helpers/

5. **Think ahead to summer break**: If students will not be maintaining the garden during the summer, consider these ideas:
   - **Garden Guardians**: Have community volunteers and parents sign up to maintain the garden for a week or two.
   - **Mulch**: Cover the ground around the plants with wet newspapers or straw to cut down on weed growth and help hold water.
   - **Plant for fall**: Plant produce that will be ready to harvest in the fall such as popcorn, pumpkins, potatoes, eggplant, etc.
   - **Weed well before any breaks**: Any tiny plants before break will be quite tall when students return.

6. **Additional lesson ideas in the garden:** Find these lessons and more at http://www.teachers-going-green.com/teachers-going-green/clean-and-green/3rd-grade
   - Design and Cook with Solar Ovens
   - Flying Bags
   - Graphing with Rain Gauges

- Beach Ball Bee Pollination Game
- Plant Life Cycles Lesson
- Power of the Wind
- Sticky Seed Situation
- To Wriggle or Not to Wriggle

Expert advice

Be courteous to custodial staff. Encourage students to wash their hands outside. Place a rug near the door and remind students to brush off dirt and leave mud outside.

REFLECTION / GARDEN JOURNAL PROMPT:

1. **Adopt-a-Plant journal prompt:** Each child will adopt a plant to observe and document weekly throughout the garden season.
   . Sketch what they see while maintaining the garden.
   a. Sketch and label plants that are thriving. Also include plants that are not surviving well. Why do you think you are seeing differences? How does the weather impact plant survival?

Expert advice

To help students remember which plant they "adopted" have students choose a button. Gently tie a loose string and that button around their plant. Their button can remind them which plant to observe and sketch.

Think Like a Gardener Checklist

Today's date: _____ Type of plant: _____

1. Observe the leaves and stem of your plant. Look at the color, size, and shape. Compare it to other plants. Does it look healthy? Why?

2. How tall is your plant? How much has it grown since your last measurement?

3. Sketch your plant and its habitat.

4. Do you see weeds in the area? Pull them!

5. Describe current weather conditions. When did it last rain?

6. Touch the soil. Is it wet enough to stick in a ball? If not, water it.

My Daily Garden Scavenger Hunt

Look for…

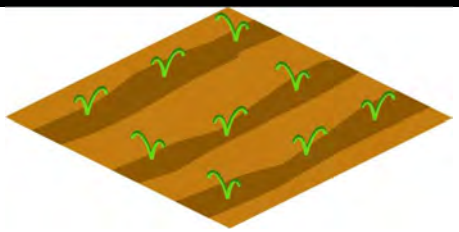
Sun

How tall is the seedling compared to you?

Weeds - Pull these!

Healthy plants

Touch…



Will **soil** stick in a ball? If not, it's too dry. Water the plants!

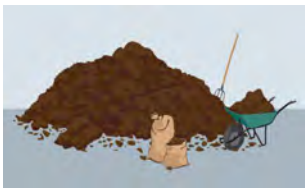
Taste…

Not yet!!
Taste **ripe produce** soon!

Smell…

Flowers

Herbs



Compost

Hear…

Be still and listen. Can you hear a pollinator? A bird?

School Garden Unit
Celebrate Harvest Garden Guide

LESSON: Fruity Life Cycles

GRADE: 3rd Grade **TIME: 45 minute sessions as needed**

SUMMARY:

Today students will use their senses to observe and identify unripe, ripe, and overripe produce. They will learn the role fruits, seeds, and pollination play in life cycles. In the garden, they will learn how to harvest produce, eat it in tasty recipes, and plan a garden party to celebrate their learning. Finally, they will reflect on their learning in the garden and make recommendations for next year.

GARDEN TASK*: Celebrate Harvest*

Management tip

Plan to complete all activities outside in or near the school garden. Many materials such as trowels, harvest baskets, and kitchen tools could be stored in a small garden shed. Other materials could be easily transported in backpacks carried by student leaders.

OBJECTIVES: Iowa Core

Science

- **3-LS1-1.** Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
- **3-LS4-3.** Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

21st Century Skills

- **21.3-5.ES.3** Practice leadership skills, and demonstrate integrity, ethical behavior, and social responsibility in all activities.
- **21.3-5.ES.5** Demonstrate productivity and accountability by producing quality work.

MATERIALS & RESOURCES:

- 3 tomatoes – 1 unripe, 1 ripe, and 1 overripe tomatoes (or other fruit) in boxes
- *The Reason for a Flower: A book about flowers, pollen, and seeds* by Ruth Heller or *From Seed to Plant* by Gail Gibbons
- Harvest baskets or bags
- Trowels
- Spray bottles
- Garden gloves (optional)
- Bucket of soapy water or outdoor sink
- Kitchen tools for recipes – bowl, spoon, kitchen scissors or knives, plates and napkins, seasonings, additional ingredients, etc.
- Notecards / pencils
- Garden journal notebooks / colored pencils

PRESENTATION / INTRODUCTION:

It's almost time to harvest, but how will we know when it is ready? Tell students there are three tomatoes – they will determine which one is unripe, ripe, and overripe. Divide students into three groups:

- Blindfold one group and have them *touch* the tomatoes, noting differences in how they feel.
- Blindfold another group and have them *smell* the tomatoes, noting differences.
- The third group may only *look* at the tomatoes, observing differences.

Based on their observations, each group should determine which tomato is ripe. Then, each student should get together with students from the two other groups and discuss their findings. What differences did you notice? How can we determine if produce is ready to harvest? What indicators should we look for?

Cut one tomato open. Have students locate the seeds. Not only does fruit taste good, but it serves an important role for plants. In a plant's life cycle, what role does fruit play?

- The seeds for the next generation of fruit are formed through a process called pollination. Read *The Reason for a Flower* or *From Seed to Plant*.

- For six additional lessons about pollinators check out http://www.teachers-going-green.com/teachers-going-green/resources/story-county-conservation

As we cook and eat today, look for seeds and think about fruits being a structure where seeds are housed.

DIRECTIONS:

1. **Harvest:** Visit the garden every few days and have students check for ripe produce. Students will work in the garden in small groups to harvest items that are ready. Additional ideas are located at the end of this lesson.

2. **Eat it in the garden!** Many recipes can be found online. Check out this school garden recipe book listing produce alphabetically: http://dcgreens.org/wp-content/uploads/2013/10/Fun-Cook-Book.pdf Other easy ideas:
   - **Lettuce buffet** (fall and spring): Harvest several types of greens and arrange them on a plate as a lettuce salad.
   - **Garden salsa** (summer)**:** Mix chopped tomatoes, peppers, onions, cilantro, garlic, and black beans with salt and pepper. Each student receives a spoonful on a lettuce leaf to fold up and enjoy.
   - **Flavored water:** Add crumpled mint leaves to a glass or bottle of water. Shake and enjoy! Or try slices of strawberries or cucumber.
   - **Garden pasta salad**: Mix precooked whole wheat pasta with chopped broccoli, cucumber, summer squash, and Italian dressing.
   - **Cucumber and tomato salad** (late summer and fall): Mix cucumber, cherry tomatoes, and Italian dressing.

Expert advice
Let them try their produce – even raw green pumpkin! Some students wanted to try it, we did not stop them, and it was a learning experience they will not soon forget.

3. **Celebrate**: As a culmination to the kids' hard work in the garden, host a garden party. Facilitate as students plan. Invite administrators, custodians, staff, parents, community volunteers, and other students to taste and see the students' work. Customize to your setting, but ideas include:
   - Eat! Feature some of the students' favorite recipes using their produce.

- Make art to take home – garden signs, wind chimes, sun prints, or mosaics are a just a few ideas.
- Plant something – in the garden or to take home.
- Display garden photographs taken by students as well as their journal entries and planning maps.
- Publicly thank volunteers for their efforts.
- Put them to work – encourage students to show guests how to harvest or pull up plants for a compost pile.

REFLECTION / GARDEN JOURNAL PROMPT:

1. **Adopt-a-Plant journal prompt:** Students will sketch and label their plant and its produce. Ask them to reflect on their drawings throughout the garden season. Which plants survived well in this habitat? Which varieties did not survive as well? What evidence did you observe?

   Draw a model illustrating the life cycle of garden plant. How is this life cycle similar or different than other plants? How does it compare to the life cycle of animals?

2. **Give advice to future gardeners:** If you could give advice to the students who will care for this garden next year, what would you tell them? What would you recommend? What would you do differently? Write advice on notecards and create a class poster with their words of wisdom.

Expert advice

Remember that the success of the garden is not measure by how much produce was grown, but by how much the students learned. Even plants that did not produce fruits and vegetables are valuable in the garden as compost that provides nutrients in the soil for next year's garden.

4th Grade
School Garden Unit

School Garden Unit
Plan & Plant Garden Guide

LESSON: Starting with Seeds

GRADE: 4th grade **TIME: At least four 45 minute sessions**

SUMMARY:

Today students will plan their future garden. They will begin by discussing the roles seeds play in the plant lifecycle. While mapping their garden space, they will dream about plants to include in the school garden. They will research different fruits and vegetables, study seeds, and create a class garden map. Finally, students will plant their garden and prepare to watch the plant lifecycle!

GARDEN TASK*: Planning and Planting*

OBJECTIVES: Iowa Core

Social Studies

- **SS-3-5.G.1** Understand the use of geographic tools to locate and analyze information about people, places, and environments.

Science

From Molecules to Organisms: Structures and Processes

- **4-LS1-1.** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

21st Century Skills

- **21.3-5.ES.1** Communicate and work appropriately with others emphasizing collaboration and cultural awareness to produce quality work.
- **21.3-5.ES.2** Recognize different roles and responsibilities and understand the need to be flexible to change.

MATERIALS & RESOURCES:

- *Plant Secrets* by Emily Goodman
- *In Mary's Garden* by Tina & Carson Kugler
- Paper, pencils, and crayons
- Clipboard for each student
- Chart paper
- Tape
- Empty seed packets – 1 per group
- Bin of seeds
- Copies of the Seed Investigation Guide – located at the end of lesson
- Seeds or seedlings
- Trowel or hoe – 1 per group
- Garden journal notebooks

Management tip

Plan to complete all activities outside in or near the school garden, weather permitting. Materials could be easily transported in backpacks carried by student leaders. Consider storing tools in a small shed near the garden. Before going outside, discuss boundaries, expectations for student behavior, attention getting signals, and specific tasks. Review again when outside.

PRESENTATION / INTRODUCTION:

Look around and make observations. What plants live in the area around our garden? Point out different plants such as trees, bushes, grass, newly sprouted grass, etc. What things do these plants all have in common? Read *Plant Secrets*. One of many similarities is that they all started from seeds. Why are seeds important for plant survival and growth? Learn more about seeds here: https://iptv.pbslearningmedia.org/resource/tdc02.sci.life.stru.insideseed/inside-a-seed/#.WMrv7vnytPY

Today we will plan our garden and learn about different fruits and vegetables. We will make decisions about plants, spacing, and timing while we create a garden map. Then, in time, we will watch our plants grow!

DIRECTIONS:

1. **Activity 1 - Mapping the space**: Explain that each student will create a dream garden map. Show examples of maps and talk about the purpose of a map. Give students a few minutes to explore the garden's key features such as water access, compost bins, rabbit fences, amount of space, soil, sunlight, etc. Encourage them to imagine the plants that could be in the garden beds,

perhaps a theme like "ingredients for pizza" or favorite fruits and vegetables. Have them include these imaginary plants as well.

- Distribute clipboards, notecards, and pencils, and model paper set up. Have students spread out and find a place to sit and draw. Give them time to explore, examine, and draw maps.
- Bring students together. Do a museum walk of their maps, pointing out different plant ideas.
- On a piece of chart paper, use student input to draw a class garden map, leaving the garden beds blank for now.

Recommended resource

For additional support setting up a new outdoor classroom or garden, check out the U.S. Fish & Wildlife Service planning guide: https://www.fws.gov/cno/pdf/HabitatGuideColor.pdf

2. **Activity 2 – Research plants:** Small groups of students will research growing conditions needs for different fruits and vegetables. Seed packets are a good resource for information. Model reading a seed packet to find information such as planting dates, planting depth, required sunlight, and special instructions. Also, refer to the Iowa State Extension file, **"Planting a home vegetable garden,"** for a table with planting recommendations. https://store.extension.iastate.edu/Product/Planting-a-Home-Vegetable-Garden
    - In their small groups, students will observe the seeds of their fruits or vegetable. Ask them to complete the seed observation guide found on page five of this lesson.
    - Based on their research, students will make recommendations for planting their fruit or vegetable. Add their recommendations to the class garden map.

Tool safety

Role play with students procedures for getting out, using, and storing garden tools. For example, pointy ends of trowels and shovels should always be down. Students will only walk while carrying tools. Teachers will pay close attention to students using tools and will give other jobs to students not following procedures.

3. **Activity 3 – Plan for planting day:** What will we need to do to plant seeds? Have students divide tasks into smaller roles, and determine job descriptions for

each student in the class. For example, perhaps one group will take the task of planting the pea plants. One person in the group could hoe, another place the seeds, another covers the seed with soil, and a final student waters the area. Each student should create a notecard nametag for themselves showing their role and tasks they will complete.

- While planning the specifics for planting day, help students make connections to the yearly cycle for the garden. First, we plan and plant, then we will maintain the garden, finally we will harvest and celebrate. Watch this video: http://iptv.pbslearningmedia.org/resource/thnkgard.sci.ess.gardenatoz/think-garden-a-year-in-the-garden/ On the class map, include student sketches of what they hope their plants will look like.
- For more information about planting with students, please see additional information located at the end of this lesson.

Expert advice

If the goal of the garden is to produce food or beauty, don't do it with kids! Remember, the goal is for the kids to learn. Focus on their academic goals, not on producing food.

4. **Activity 4 – Planting Day:** Model using the tools and planting the seeds. Refer to the garden map and plan to ensure every child has a job and is ready to make discoveries in the garden. Extra staff or parent/community volunteers could be helpful on planting day. Have fun!

REFLECTION / GARDEN JOURNAL PROMPT:

1. **Make a garden journal**: Each student can make a garden journal out of a recycled notebook. Encourage students to decorate the covers with a collage of recycled materials, perhaps including garden catalog photos.

2. **Adopt-a-Plant journal prompt:** Each child will adopt a plant to observe and document weekly throughout the garden season. Have them sketch their seed in the ground; provide extra seeds for them to closely observe. Why are seeds important for plant survival and growth?

Name: _____

Seed Observation Guide

1. Choose a seed from the bin.

2. Look closely at the seed using a magnifying glass.
    a. What shape is your seed?

    b. What colors do you see?

3. Touch your seed with your fingers.
    a. Is your seed smooth or rough?

    b. How big is your seed compared to your fingernail?

4. Sketch your seed.

5. Mix your seed back in with the others.

Can you find your seed again? *Your observation skills make it easy to do.* ☺

School Garden Unit
Maintain Garden Guide

LESSON: Maintaining the Growing Garden

GRADE: 4th grade **TIME: 45 minute sessions as needed**

SUMMARY:

In the garden, students will observe, measure, and sketch plants. They will discuss plant structures that support survival and growth. As they collect data over time, they will graph the growth of the plants. Based on their observations they will determine when to water, weed, and care for their garden.

Expert advice

Make it a goal to avoid watering the garden. Mulching around small plants not only cuts down on weeds but also helps the soil hold water. Wet newspapers, cardboard, or straw are recommended mulching materials, two or three inches deep.

GARDEN TASK*: Maintain*

OBJECTIVES: Iowa Core

Science

- **4-LS1-1.** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Mathematics

- **4.MD.B.4**. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots.

21st Century Skills

- **21.3-5.ES.5** Demonstrate productivity and accountability by producing quality work.

MATERIALS & RESOURCES:

- Gardener Checklist –copies for each child *(found at the end of this lesson)*
- Graph paper
- Rulers
- Garden gloves and "Rainmakers" – recycled plastic containers with holes in the bottom for watering
- 60 counters (or poker chips, buttons, etc.)
- Garden journal notebooks / colored pencils

PRESENTATION / INTRODUCTION:

When visiting the garden, have students complete the Think Like a Gardener Checklist. What structures does the plant develop that support its survival and growth? To learn about plant structures, watch https://iptv.pbslearningmedia.org/resource/5dea21b4-6c92-46ff-982c-8650f9429c01/think-garden-plant-structure/#.WNBtiPnytPY As the plant grows, create graphs of the measurements students collect.

Discuss weather conditions and the overall growth of plants. Based on student observations, plan how students can maintain their plants today.

DIRECTIONS:

1. **Weeding**: Gardeners should pull weeds to ensure their plants get the sunlight, water, space, and nutrients from the soil that they need. Weeding is easiest when weeds are small, so short but frequent weeding sessions are helpful.
    - As seedlings first grow, students may have difficulty differentiating the plants and weeds. Point out patterns the plants were planted in (rows, clusters, etc.). Also refer to the seed packages or online resources for photos of baby plants. Making garden signs with photos can be helpful.

- As weeding could become tedious, make it into a game with challenges. Who can pick the largest pile of weeds? See how many kinds of weeds they can find. Have students search for the smallest weed, largest weed, longest root, etc.

2. **Watering**: As a class, observe and chart the weather daily. After several days without rain, test the ground by inserting a trowel or dowel a few inches. If it comes out clean, the soil is dry. Damp soil will cling to the trowel. Ask students to observe plants. Plants' leaves will begin to wilt or turn colors if they are lacking water. **Generally, plants will need water whenever less than an inch of rain falls in a week. If it rains, do not water that day.** Watch the following video for additional information: http://iptv.pbslearningmedia.org/resource/thnkgard.sci.ess.water/think-garden-the-importance-of-water/

3. **Thinning**: Some plants need to be thinned, which means removing some plants to allow more room for others to grow. For example, carrots will not have space or nutrients to grow to full size unless they are thinned. Refer to seed packages for details about the amount of space plants need and thinning dates. Students may be interested to see what happens if a few plants are not thinned.
   - **Human Carrots Game**: Students sit on the ground about six inches to the next nearest person. Evenly distribute 60 counters on the ground. Explain that the counters represent nutrients in the soil that plants need to survive and thrive. When you say, "Go," students will pick up as many counters as they can. After this first round, students will notice they each only got a few counters.
   - Half of the students should stand up and move to the side to become observers. Repeat the game with the same number of counters. Were the carrots able to get more nutrients this time? Why? Why is it helpful to thin the carrots?
   - Repeat again with some students representing weeds.

Management tip

Handing water hoses to children can be too tempting. Consider having buckets of water available so students can water plants by filling "rainmakers," recycled yogurt or orange juice jugs with their tops cut and holes poked in the bottoms with nails. Water gently falls to ground like a rain storm, reducing puddles and drowning of seedlings.

How could we help our carrots if we pulled the weeds?

- Play a variation including water and sunlight. Throw slips of blue paper (rainwater) and yellow paper (sunlight) to "rain" on the group like confetti. See how many slips they collect with all the plants as compared to a few. Discuss that it's easier for plants to get the sunlight, water, and nutrients needed when thinned.

4. **Pests and disease**: Not all bugs are bad. Encourage students to examine plants closely so they get to know what a healthy plant looks like. Then, they will be able to spot changes in the plant such as yellow or brown spots, which can be signs of disease. Iowa State Extension offices can be a source of information about specific plants: http://www.yardandgarden.extension.iastate.edu/Hortline.htm This video helps students understand bugs that are pests and helpers. http://iptv.pbslearningmedia.org/resource/thnkgard.sci.ess.pests/think-garden-garden-pests-and-helpers/

5. **Think ahead to summer break**: If students will not be maintaining the garden during the summer, consider these ideas:
   - **Garden Guardians**: Have community volunteers and parents sign up to maintain the garden for a week or two.
   - **Mulch**: Cover the ground around the plants with wet newspapers or straw to cut down on weed growth and help hold water.
   - **Plant for fall**: Plant produce that will be ready to harvest in the fall such as popcorn, pumpkins, potatoes, eggplant, etc.
   - **Weed well before any breaks**: Any tiny plants before break will be quite tall when students return.

6. **Additional lesson ideas in the garden:** Find these lessons and more at http://www.teachers-going-green.com/teachers-going-green/clean-and-green/4th-grade
   - Design and Cook with Solar Ovens
   - Making and Using Rain Gauges
   - Greens and Browns of Composting
   - Plants to Dye For
   - Making a Sundial

- Water Cycle Fun
- Mapping the Route from School to Home

REFLECTION / GARDEN JOURNAL PROMPT:

1. **Adopt-a-Plant journal prompt:** Each child will adopt a plant to observe and document weekly throughout the garden season.
    a. Sketch what they see while maintaining the garden.
    b. What structures, both internal and external, help a plant survive and grow? Sketch and label these structures.

Expert advice

To help students remember which plant they "adopted" have students choose a button. Gently tie a loose string and that button around their plant. Their button can remind them which plant to observe and sketch.

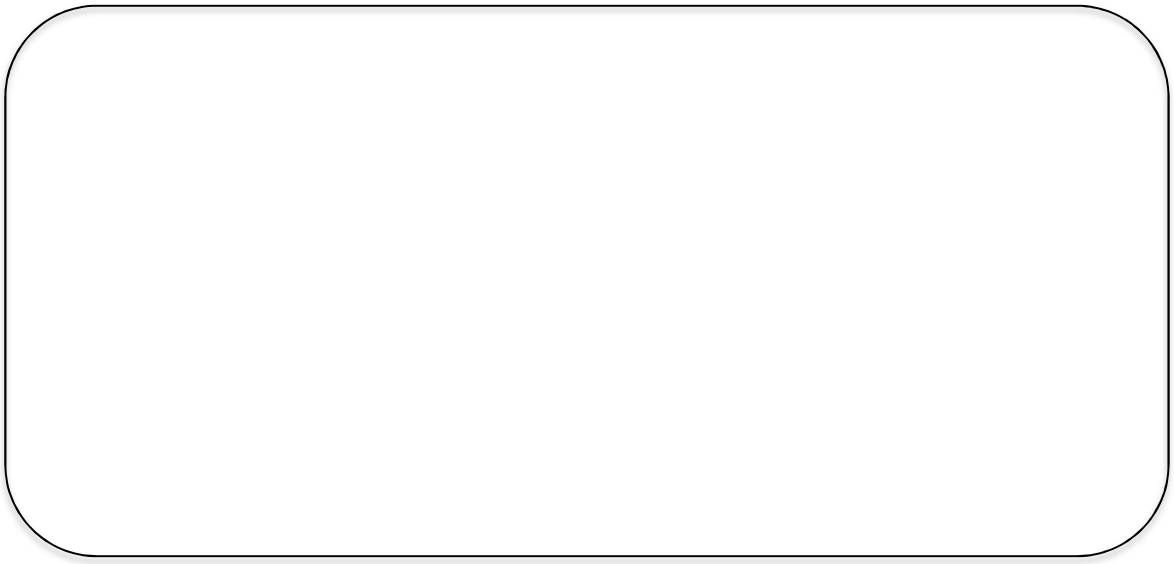
Think Like a Gardener Checklist

Today's date: _____ Type of plant: _____

1. Observe the leaves and stem of your plant. Look at the color, size, and shape. Compare it to other plants. Does it look healthy? Why?

2. How tall is your plant? How much has it grown since your last measurement?

3. Sketch your plant and its habitat.



4. Do you see weeds in the area? Pull them!

5. Describe current weather conditions. When did it last rain?

6. Touch the soil. Is it wet enough to stick in a ball? If not, water it.

My Daily Garden Scavenger Hunt

Look for…

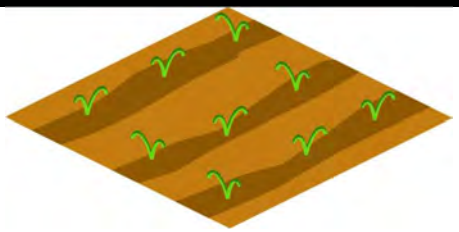
Sun

How tall is the seedling compared to you?

Weeds - Pull these!

Healthy plants

Touch…



Will **soil** stick in a ball? If not, it's too dry. Water the plants!

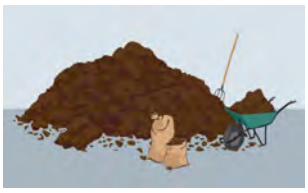
Taste…

Not yet!!
Taste **ripe produce** soon!

Smell…

Flowers

Herbs



Compost

Hear…

Be still and listen. Can you hear a pollinator? A bird?

School Garden Unit
Celebrate Harvest Garden Guide

LESSON: Seeds, Fruit, and Pollinators

GRADE: 4th Grade **TIME: 45 minute sessions as needed**

SUMMARY:

Today students will use their senses to observe and identify unripe, ripe, and overripe produce. They will learn about the structures plants have that support pollination. In the garden, they will learn how to harvest produce, eat it in tasty recipes, and plan a garden party to celebrate their learning. Finally, they will reflect on their learning in the garden and make recommendations for next year.

GARDEN TASK*: Celebrate Harvest*

OBJECTIVES: Iowa Core

Science

- **4-LS1-1.** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

21st Century Skills

- **21.3-5.ES.3** Practice leadership skills, and demonstrate integrity, ethical behavior, and social responsibility in all activities.
- **21.3-5.ES.5** Demonstrate productivity and accountability by producing quality work.

MATERIALS & RESOURCES:

- 3 tomatoes – 1 unripe, 1 ripe, and 1 overripe tomatoes (or other fruit) in boxes
- *From Seed to Plant* by Gail Gibbons or *The Reason for a Flower: A book about flowers, pollen, and seeds* by Ruth Heller
- Harvest baskets or bags

- Trowels
- Spray bottles
- Garden gloves (optional)
- Bucket of soapy water or outdoor sink
- Kitchen tools for recipes – bowl, spoon, kitchen scissors or knives, plates and napkins, seasonings, additional ingredients, etc.
- Notecards / pencils
- Garden journal notebooks / colored pencils

PRESENTATION / INTRODUCTION:

It's almost time to harvest, but how will we know when it is ready? Tell students there are three tomatoes – they will determine which one is unripe, ripe, and overripe. Divide students into three groups:

- Blindfold one group and have them *touch* the tomatoes, noting differences in how they feel.
- Blindfold another group and have them *smell* the tomatoes, noting differences.
- The third group may only *look* at the tomatoes, observing differences.

Based on their observations, each group should determine which tomato is ripe. Then, each student should get together with students from the two other groups and discuss their findings. What differences did you notice? How can we determine if produce is ready to harvest? What indicators should we look for?

Cut one tomato open. Have students locate the seeds. Not only does fruit taste good, but it serves an important role for plants. Why do plants form fruit? The seeds for the next generation of fruit form through a process called pollination.

- Read *The Reason for a Flower* or *From Seed to Plant*. Some fruits such as raspberries and apples need a pollinator like bees or hummingbirds, while other plants like corn, peas, and tomatoes complete a similar process without pollinators.
- For six additional lessons about pollinators check out http://www.teachers-going-green.com/teachers-going-green/resources/story-county-conservation

As we harvest and eat today, look for seeds and think about fruit being a structure where seeds are housed.

DIRECTIONS:

1. **Harvest:** Visit the garden every few days and have students check for ripe produce. Students will work in the garden in small groups to harvest items that are ready. Additional ideas are located at the end of this lesson.

2. **Eat it in the garden!** Many recipes can be found online. Check out this school garden recipe book listing produce alphabetically: http://dcgreens.org/wp-content/uploads/2013/10/Fun-Cook-Book.pdf Other easy ideas:
   - **Lettuce buffet** (fall and spring): Harvest several types of greens and arrange them on a plate as a lettuce salad.
   - **Garden salsa** (summer)**:** Mix chopped tomatoes, peppers, onions, cilantro, garlic, and black beans with salt and pepper. Each student receives a spoonful on a lettuce leaf to fold up and enjoy.
   - **Flavored water:** Add crumpled mint leaves to a glass or bottle of water. Shake and enjoy! Or try slices of strawberries or cucumber.

   Expert advice

   Let them try their produce – even raw green pumpkin! Some students wanted to try it, we did not stop them, and it was a learning experience they will not soon forget.

   - **Garden pasta salad**: Mix precooked whole wheat pasta with chopped broccoli, cucumber, summer squash, and Italian dressing.
   - **Cucumber and tomato salad** (late summer and fall): Mix cucumber, cherry tomatoes, and Italian dressing.

3. **Celebrate**: As a culmination to the kids' hard work in the garden, host a garden party. Facilitate as students plan. Invite administrators, custodians, staff, parents, community volunteers, and other students to taste and see the students' work. Customize to your setting, but ideas include:
   - Eat! Feature some of the students' favorite recipes using their produce.
   - Make art to take home – garden signs, wind chimes, sun prints, or mosaics are a just a few ideas.
   - Plant something – in the garden or to take home.

- Display garden photographs taken by students as well as their journal entries and planning maps.
- Publicly thank volunteers for their efforts.
- Put them to work – encourage students to show guests how to harvest or pull up plants for a compost pile.

REFLECTION / GARDEN JOURNAL PROMPT:

1. **Adopt-a-Plant journal prompt:** Students will sketch and label their plant and its produce.

   What structures, both internal and external, help a plant survive, grow, and reproduce? Sketch and label these structures. Draw a model illustrating the pollination process.

2. **Give advice to future gardeners:** If you could give advice to the students who will care for this garden next year, what would you tell them? What would you recommend? What would you do differently? Write advice on notecards and create a class poster with their words of wisdom.

Expert advice
Remember that the success of the garden is not measure by how much produce was grown, but by how much the students learned. Even plants that did not produce fruits and vegetables are valuable in the garden as compost that provides nutrients in the soil for next year's garden.

5th Grade
School Garden Unit

School Garden Unit
Plan & Plant Garden Guide

LESSON: Investigating Air and Water

GRADE: 5th grade **TIME: At least five 45 minute sessions**

SUMMARY:

Today students will plan their future garden. They will begin by discussing what plants need to grow and survive. While mapping their garden space, they will dream about plants to include in the school garden. They will research different fruits and vegetables, create an investigation of the importance of air and water, and create a class garden map. Finally, the students will plant their garden and prepare to watch the plant lifecycle!

GARDEN TASK*: Planning and Planting*

OBJECTIVES: Iowa Core

Social Studies

- **SS-3-5.G.1** Understand the use of geographic tools to locate and analyze information about people, places, and environments.

Science

From Molecules to Organisms: Structures and Processes

- **5-LS1-1.** Support an argument that plants get the materials they need for growth chiefly from air and water.

21st Century Skills

- **21.3-5.ES.1** Communicate and work appropriately with others emphasizing collaboration and cultural awareness to produce quality work.
- **21.3-5.ES.2** Recognize different roles and responsibilities and understand the need to be flexible to change.

MATERIALS & RESOURCES:

- *Seedfolks* by Paul Fleischman
- *In Mary's Garden* by Tina & Carson Kugler
- Paper, pencils, and crayons
- Clipboard for each student
- Chart paper
- Tape
- Empty seed packets – 1 per group
- Seeds or seedlings
- Trowel or hoe – 1 per group
- Garden journal notebooks

Management tip

Plan to complete all activities outside in or near the school garden, weather permitting. Materials could be easily transported in backpacks carried by student leaders. Consider storing tools in a small shed near the garden. Before going outside, discuss boundaries, expectations for student behavior, attention getting signals, and specific tasks. Review again when outside.

PRESENTATION / INTRODUCTION:

What do plants need to survive? Start reading *Seedfolks*. While reading, discuss the many reasons people plant gardens. Once the seeds were in the ground, what did the plants need?

Today we will plan our garden and learn about different fruits and vegetables. We will make decisions about plants, spacing, and timing while we create a garden map. We will plan an investigation to show if plants need air and water. Then, in time we will watch our plants grow!

DIRECTIONS:

1. **Activity 1 - Mapping the space**: Explain that each student will create a dream garden map. Show examples of maps and talk about the purpose of a map. Give students a few minutes to explore the garden's key features such as water access, compost bin, amount of space, soil, sunlight, etc.
    - Distribute clipboards, notecards, and pencils, and model paper set up. Have students spread out and find a place to sit and draw. Give them time to explore, examine, and draw maps.
    - Bring students together. Do a museum walk of their maps, pointing out different plant ideas.

- On a piece of chart paper, use student input to draw a class garden map, leaving the garden beds blank for now.

2. **Activity 2 – Research plants:** Small groups of students will research growing conditions needs for different fruits and vegetables. Seed packets are a good resource for information. Model reading a seed packet to find information such as planting dates, planting depth, required sunlight, and special instructions. Also, refer to the Iowa State Extension file, **"Planting a home vegetable garden,"** for a table with planting recommendations. https://store.extension.iastate.edu/Product/Planting-a-Home-Vegetable-Garden Add students' recommendations to the class garden map.

3. **Activity 3 – Preparing the investigation:** Along with planting, maintaining, and harvesting the garden, students will be conducting an investigation: ***Do plants get the materials for growth from water and air?***
   - **Ask questions**. Have students further develop the research question. As a class, choose two or three questions to investigate.
   - **Discuss components of a fair test**. How could they add "test plots" to their garden so they could find the answers to their questions? Model designing two plots where the only different is the amount of water, one plot receiving the recommended amount of water and the other receiving much less. Ensure the same types of seeds are planted, same soil, same fertilizer, etc.
   - **Add the test plots to the garden map.** Refer to the garden map to determine areas that receive differing amounts of sunlight or water.

4. **Activity 4 – Plan for planting day:** What will we need to do to plant seeds? Have students divide tasks into smaller roles, and determine job descriptions for each student in the class. For example, perhaps one group will take the task of planting the pea plants. One person in the group could hoe, another place the seeds, another covers the seed with soil, and a final student waters the area. Each student

Tool safety
Role play with students procedures for getting out, using, and storing garden tools. For example, pointy ends of trowels and shovels should always be down. Students will only walk while carrying tools. Teachers will pay close attention to students using tools and will give other jobs to students not following procedures.

should create a notecard nametag for themselves showing their role and tasks they will complete.

- While planning the specifics for planting day, help students make connections to the yearly cycle for the garden. First, we plan and plant, then we will maintain the garden, finally we will harvest and celebrate. Watch this video: http://iptv.pbslearningmedia.org/resource/thnkgard.sci.ess.gardenatoz/think-garden-a-year-in-the-garden/ On the class map, include student sketches of what they hope their plants will look like.
- For more information about planting with students, please see additional information located at the end of this lesson.

5. **Activity 5 – Planting Day:** Model using the tools and planting the seeds. Refer to the garden map and plan to ensure every child has a job and is ready to make discoveries in the garden. Extra staff or parent/community volunteers could be helpful on planting day. Have fun!

Expert advice
If the goal of the garden is to produce food or beauty, don't do it with kids! Remember, the goal is for the kids to learn. Focus on their academic goals, not on producing food.

REFLECTION / GARDEN JOURNAL PROMPT:

1. **Make a garden journal**: Each student can make a garden journal out of a recycled notebook. Encourage students to decorate the covers with a collage of recycled materials, perhaps including garden catalog photos.

2. **Adopt-a-Plant journal prompt:** Each child will adopt a plant to observe and document weekly throughout the garden season. Have them sketch their seed in the ground; provide extra seeds for them to closely observe. What do plants need for survival? What evidence have you collected so far that water and air provide the materials needed for plant growth?

School Garden Unit
Maintain Garden Guide

LESSON: Growing Plants, Living Sunlight

GRADE: 5th grade **TIME: 45 minute sessions as needed**

SUMMARY:

In the garden, students will observe, measure, and sketch plants. They will collect evidence about the importance of air, water, and sunlight. Then, they will learn more about photosynthesis and role play the process. Based on their observations they will determine when to water, weed, and care for their garden.

GARDEN TASK*: Maintain*

OBJECTIVES: Iowa Core

Science

- **5-LS1-1.** Support an argument that plants get the materials they need for growth chiefly from air and water.
- **5-PS3-1.** Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

Expert advice

Make it a goal to avoid watering the garden. Mulching around small plants not only cuts down on weeds but also helps the soil hold water. Wet newspapers, cardboard, or straw are recommended mulching materials, two or three inches deep.

21st Century Skills

- **21.3-5.ES.5** Demonstrate productivity and accountability by producing quality work.

MATERIALS & RESOURCES:

- Gardener Checklist –copies for each child *(found at the end of this lesson)*
- *Living Sunlight: How plants bring the earth to life* by Molly Bang and Peggy Chisholm
- *Seedfolks* by Paul Fleischman
- Rulers

- Garden gloves
- "Rainmakers" – recycled plastic containers with holes in the bottom for watering
- 60 counters (or poker chips, buttons, etc.)
- Garden journal notebooks / colored pencils

PRESENTATION / INTRODUCTION:

When visiting the garden, have students complete the Think Like a Gardener Checklist. What evidence have you observed that plants need rely on water and air to grow? Describe what happened to plants in the test plots that did not have enough sunlight, water, or air. Learn more about photosynthesis by reading *Living Sunlight: How Plants Bring the Earth to Life*. How does energy from the sun transfer into chemical energy in plants? What role do water and air play? Then, students may role play the photosynthesis process. Refer to the lesson *Photosynthesis, Oh the Drama* at http://www.teachers-going-green.com/teachers-going-green/clean-and-green/5th-grade

Discuss current weather patterns and the overall growth of plants. Based on student observations, plan how students can maintain their plants today.

DIRECTIONS:

1. **Weeding**: Gardeners should pull weeds to ensure their plants get the sunlight, water, space, and nutrients from the soil that they need. Weeding is easiest when weeds are small, so short but frequent weeding sessions are helpful.
    - As seedlings first grow, students may have difficulty differentiating the plants and weeds. Point out patterns the plants were planted in (rows, clusters, etc.). Also refer to the seed packages or online resources for photos of baby plants. Making garden signs with photos can be helpful.
    - As weeding could become tedious, make it into a game with challenges. Who can pick the largest pile of weeds? See how many kinds of weeds they can find. Have students search for the smallest weed, largest weed, longest root, etc.

2. **Watering**: As a class, observe and chart the weather daily. After several days without rain, test the ground by inserting a trowel or dowel a few inches. If it comes out clean, the soil is dry. Damp soil will cling to the trowel. Ask students to observe plants. Plants' leaves will begin to wilt or turn colors if they are lacking water. **Generally, plants will need water whenever less than an inch of rain falls in a week. If it rains, do not water that day.** Watch the following video for additional information: http://iptv.pbslearningmedia.org/resource/thnkgard.sci.ess.water/think-garden-the-importance-of-water/

Management tip

Handing water hoses to children can be too tempting. Consider having buckets of water available so students can water plants by filling "rainmakers," recycled yogurt or orange juice jugs with their tops cut and holes poked in the bottoms with nails. Water gently falls to ground like a rain storm, reducing puddles and drowning of seedlings.

3. **Thinning**: Some plants need to be thinned, which means removing some plants to allow more room for others to grow. For example, carrots will not have space or nutrients to grow to full size unless they are thinned. Refer to seed packages for details about the amount of space plants need and thinning dates. Students may be interested to see what happens if a few plants are not thinned.
    - **Human Carrots Game**: Students sit on the ground about six inches to the next nearest person. Evenly distribute 60 counters on the ground. Explain that the counters represent nutrients in the soil that plants need to survive and thrive. When you say, "Go," students will pick up as many counters as they can. After this first round, students will notice they each only got a few counters.
    - Half of the students should stand up and move to the side to become observers. Repeat the game with the same number of counters. Were the carrots able to get more nutrients this time? Why? Why is it helpful to thin the carrots?
    - Repeat again with some students representing weeds. How could we help our carrots if we pulled the weeds?
    - Play a variation including water and sunlight. Throw slips of blue paper (rainwater) and yellow paper (sunlight) to "rain" on the group like confetti. See how many slips they collect with all the plants as

compared to a few. Discuss that it's easier for plants to get the sunlight, water, and nutrients needed when thinned.

4. **Pests and disease**: Not all bugs are bad. Encourage students to examine plants closely so they get to know what a healthy plant looks like. Then, they will be able to spot changes in the plant such as yellow or brown spots, which can be signs of disease. Iowa State Extension offices can be a source of information about specific plants: http://www.yardandgarden.extension.iastate.edu/Hortline.htm This video helps students understand bugs that are pests and helpers. http://iptv.pbslearningmedia.org/resource/thnkgard.sci.ess.pests/think-garden-garden-pests-and-helpers/

5. **Think ahead to summer break**: If students will not be maintaining the garden during the summer, consider these ideas:
    - **Garden Guardians**: Have community volunteers and parents sign up to maintain the garden for a week or two.
    - **Mulch**: Cover the ground around the plants with wet newspapers or straw to cut down on weed growth and help hold water.
    - **Plant for fall**: Plant produce that will be ready to harvest in the fall such as popcorn, pumpkins, potatoes, eggplant, etc.
    - **Weed well before any breaks**: Any tiny plants before break will be quite tall when students return.

6. **Additional lesson ideas in the garden:** Find these lessons and more at http://www.teachers-going-green.com/teachers-going-green/clean-and-green/5th-grade
    - Hoopin' It Up on the Prairie
    - Fractals, Fractions, and Fun
    - Microbes and Composting
    - Pollinators Migration Madness
    - A Sense of Wonder
    - How Long Does That Trash Last

REFLECTION / GARDEN JOURNAL PROMPT:

1. **Continue reading *Seedfolks*.** What challenges did the gardeners face as they maintained their gardens? What lessons did they learn along the way?

2. **Adopt-a-Plant journal prompt:** Each child will adopt a plant to observe and document weekly throughout the garden season.
    a. Sketch what they see while maintaining the garden.
    b. Include a sketch of the plant you adopted. How does it compare to other plants that received different amounts of water? What evidence have you observed that plants need sunlight, air, and water? Draw a model of the relationship among the sun, water, air, plants, and animals.

Expert advice

To help students remember which plant they "adopted" have students choose a button. Gently tie a loose string and that button around their plant. Their button can remind them which plant to observe and sketch.

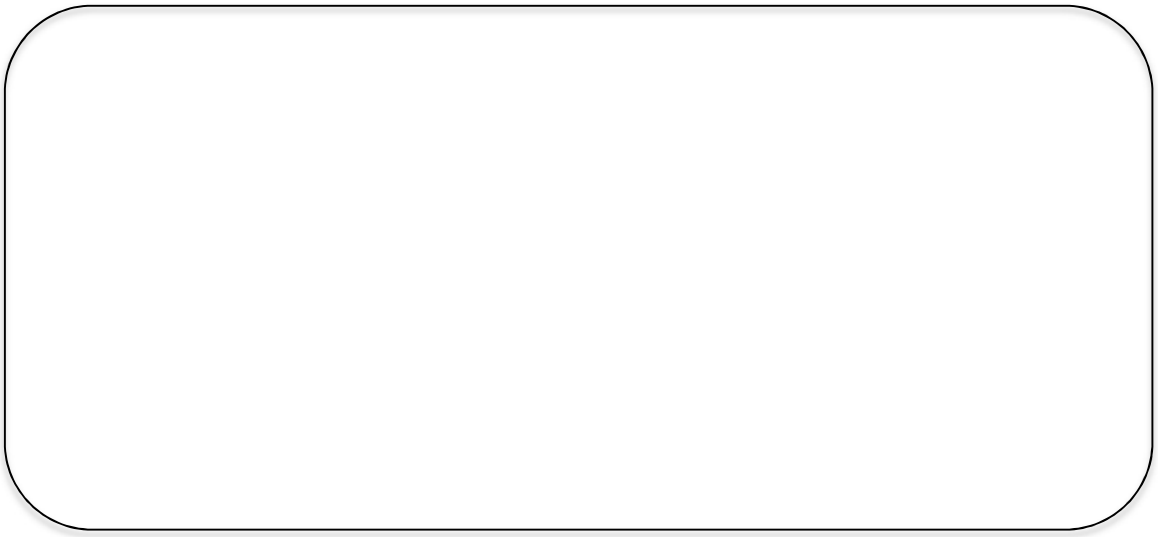
Think Like a Gardener Checklist

Today's date: _____ Type of plant: _____

1. Observe the leaves and stem of your plant. Look at the color, size, and shape. Compare it to other plants. Does it look healthy? Why?

2. How tall is your plant? How much has it grown since your last measurement?

3. Sketch your plant and its habitat.



4. How many creatures can you list who live in this habitat and would like to eat this plant?

5. Describe current weather conditions. When did it last rain?

6. Touch the soil. Is it wet enough to stick in a ball? If not, water it.

7. Do you see weeds in the area? Pull them!

My Daily Garden Scavenger Hunt

7.

Look for…

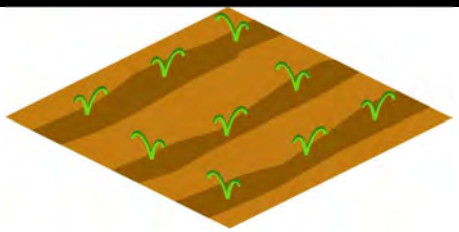
Sun

How tall is the seedling compared to you?

Weeds - Pull these!

Healthy plants

Touch…



Will **soil** stick in a ball? If not, it's too dry. Water the plants!

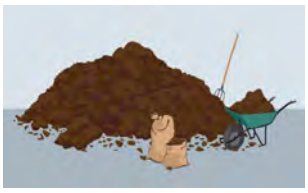
Taste…

Not yet!!
Taste **ripe produce** soon!

Smell…

Flowers

Herbs



Compost

Hear…

Be still and listen. Can you hear a pollinator? A bird?

School Garden Unit
Celebrate Harvest Garden Guide

LESSON: Gardening with Photosynthesis

GRADE: 5th Grade **TIME: 45 minute sessions as needed**

SUMMARY:

Today students will use their senses to observe and identify unripe, ripe, and overripe produce. They will consider how the energy in that produce was once energy from the sun. In the garden, they will learn how to harvest produce, eat it in tasty recipes, and plan a garden party to celebrate their learning. They will explore the relationship of decomposers and plants by composting. Finally, they will reflect on their learning in the garden and make recommendations for next year.

Management tip

Plan to complete all activities outside in or near the school garden. Many materials such as trowels, harvest baskets, and kitchen tools could be stored in a small garden shed. Other materials could be easily transported in backpacks carried by student leaders.

GARDEN TASK*: Celebrate Harvest*

OBJECTIVES: Iowa Core

Science

- **5-LS1-1.** Support an argument that plants get the materials they need for growth chiefly from air and water.
- **5-PS3-1.** Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.
- **5-LS2-2.** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

21st Century Skills

- **21.3-5.ES.3** Practice leadership skills, and demonstrate integrity, ethical behavior, and social responsibility in all activities.
- **21.3-5.ES.5** Demonstrate productivity and accountability by producing quality work.

MATERIALS & RESOURCES:

- *Seedfolks* by Paul Fleischman
- 3 tomatoes – 1 unripe, 1 ripe, and 1 overripe tomatoes (or other fruit) in boxes
- Harvest baskets or bags
- Trowels
- Spray bottles
- Garden gloves (optional)
- Bucket of soapy water or outdoor sink
- Kitchen tools for recipes – bowl, spoon, kitchen scissors or knives, plates and napkins, seasonings, additional ingredients, etc.
- Notecards / pencils
- Garden journal notebooks / colored pencils

Expert advice

Remember that the success of the garden is not measure by how much produce was grown, but by how much the students learned. Even plants that did not produce fruits and vegetables are valuable in the garden as compost that provides nutrients in the soil for next year's garden.

PRESENTATION / INTRODUCTION:

It's almost time to harvest, but how will we know when it is ready? Tell students there are three tomatoes – they will determine which one is unripe, ripe, and overripe. Divide students into three groups:

- Blindfold one group and have them *touch* the tomatoes, noting differences in how they feel.
- Blindfold another group and have them *smell* the tomatoes, noting differences.
- The third group may only *look* at the tomatoes, observing differences.

Based on their observations, each group should determine which tomato is ripe. Then, each student should get together with students from the two other groups and discuss their findings. What differences did you notice? How can we determine if produce is ready to harvest? What indicators should we look for?

As we harvest, we will get to eat lots of delicious fruits and vegetables. Not only are they tasty, but they will give us energy. Where does that chemical energy come from? Refer back to the previous lesson and *Living Sunlight by Molly Bang and Peggy Chisholm.* As we eat our produce, think about the source of the energy – the sun.

DIRECTIONS:

1. **Harvest:** Visit the garden every few days and have students check for ripe produce. Students will work in the garden in small groups to harvest items that are ready. Additional ideas are located at the end of this lesson.

2. **Eat it in the garden!** Many recipes can be found online. Check out this school garden recipe book listing produce alphabetically: http://dcgreens.org/wp-content/uploads/2013/10/Fun-Cook-Book.pdf Other easy ideas:
   - **Lettuce buffet** (fall and spring): Harvest several types of greens and arrange them on a plate as a lettuce salad.
   - **Garden salsa** (summer)**:** Mix chopped tomatoes, peppers, onions, cilantro, garlic, and black beans with salt and pepper. Each student receives a spoonful on a lettuce leaf to fold up and enjoy.
   - **Flavored water:** Add crumpled mint leaves to a glass or bottle of water. Shake and enjoy! Or try slices of strawberries or cucumber.

   Expert advice

   Let them try their produce – even raw green pumpkin! Some students wanted to try it, we did not stop them, and it was a learning experience they will not soon forget.

   - **Garden pasta salad**: Mix precooked whole wheat pasta with chopped broccoli, cucumber, summer squash, and Italian dressing.
   - **Cucumber and tomato salad** (late summer and fall): Mix cucumber, cherry tomatoes, and Italian dressing.

3. **Celebrate**: As a culmination to the kids' hard work in the garden, host a garden party. Facilitate as students plan. Invite administrators, custodians, staff, parents, community volunteers, and other students to taste and see the students' work. Customize to your setting, but ideas include:
   - Eat! Feature some of the students' favorite recipes using their produce.
   - Make art to take home – garden signs, wind chimes, sun prints, or mosaics are a just a few ideas.
   - Plant something – in the garden or to take home.
   - Publicly thank volunteers for their efforts.

- Put them to work – encourage students to show guests how to harvest or pull up plants for a compost pile.

4. **Compost:** When removing dead plants and produce scraps, put them in a compost bin. Discuss that decomposers like microbes, worms, and bugs break down plants in the compost bin and turn them back into soil. For additional teaching activities refer to *Microbes and Composting* http://www.teachers-going-green.com/teachers-going-green/clean-and-green/5th-grade

REFLECTION / GARDEN JOURNAL PROMPT:

1. **Finish reading *Seedfolks.*** How do you think this garden impacted the gardeners? How did it change their community? Do you think similar things are happening with our garden? Would you recommend others read this book? Why or why not?

2. **Adopt-a-Plant journal prompt:** Students will sketch and label their plant and its produce. Ask them to reflect on their investigation drawings throughout the garden season.

   How did sunlight, water, and air influence their plant's growth? Draw a model of the relationship among the sun, water, air, plants, and animals, decomposers, and the environment.

3. **Give advice to future gardeners:** If you could give advice to the students who will care for this garden next year, what would you tell them? What would you recommend? What would you do differently? Write advice on notecards and create a class poster with their words of wisdom.

Tips for Gardening with Kids
School Garden Unit

Tips for Planting a Garden with Kids

- **Where should we plant?** On the class map, have students label areas that provide the things plants need. These would be the best areas for them to plant.
    - Make special note of sunlight in the garden. Why is sunlight important when planning a garden? Visit the garden at different times of a sunny day and have student observe whether the garden beds are sunny or shaded. Most garden plants want at least 6-8 hours of direct sunlight. As students plan their garden, discuss planting a few seeds in the shade so students can see the effect of sunlight on plants. *For more information, check out the chart at the end of the lesson.*
    - Also consider the garden soil. It must have nutrients for plants to grow and should not contain hazardous materials such as lead. Soil tests can be done through the county Extension offices: https://www.extension.iastate.edu/content/county-offices The Extension also has a free publication " Garden Soil Management" https://store.extension.iastate.edu/Product/Garden-Soil-Management Also consider other safety precautions in the garden: http://nfsmi.org/documentlibraryfiles/PDF/20110822025700.pdf

Scattering, rows, square foot?

There are as many methods for planting the garden as there are gardens. When working with children, it can be advantageous to plant in rows. This will make it easier to differentiate plants from weeds later. String can be used as a guide to create straight rows.

Recommended resource

For additional support setting up a new outdoor classroom or garden, check out the U.S. Fish & Wildlife Service planning guide: https://www.fws.gov/cno/pdf/HabitatGuideColor.pdf

- **What should we plant?** Let students make this choice and label the plants on the class garden map, considering the following factors.
    - **Use what you have** – Often seeds or seedlings will be donated or discounted for schools. Work with parents and community partners.
    - **Plant and harvest dates** – If students are not at school during the summer, avoid growing vegetables like tomatoes with large summer

harvests. There are many options that can be planted and harvested before school is out for the summer. Likewise, other produce can be planted after school starts in the fall. See the infographic titled "**What to Plant in Your School Garden"** located at the end of this lesson.

Incorporate fun structures

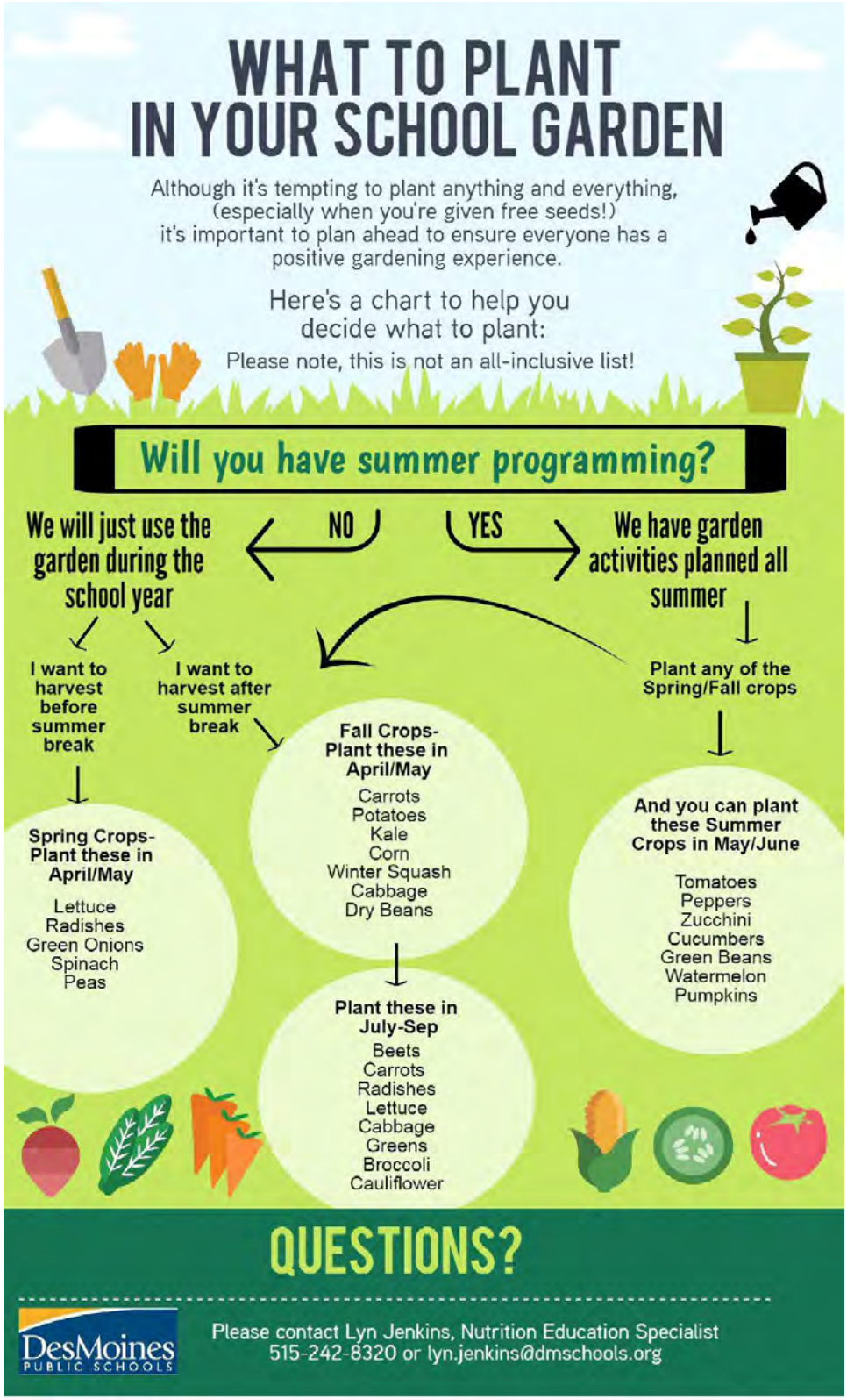
Adding art in the garden is a great way to invest students in the project and keep them engaged. For inspiration, read *In Mary's Garden* about sculptor Mary Nohl transforming her garden with art. Perhaps students could design sculptures or signs to mark different vegetables. They could create reading spots using logs or stones within the garden. Pizza box mosaics or tunnels with vines planted around them are other ideas.

- **Perennials –** When planning, consider any perennial plants already in the garden such as raspberries, strawberries, asparagus, and herbs. If these are not already in the garden, they are a great addition!
- **Fine motor skills** – With young students, keep their developing motor skills in mind when determining types of plant.
- **Let students choose**, given the above perimeters. Brainstorm fruits or vegetables that students would like to plant. Read *Eating the Alphabet* by Lois Ehlert for additional ideas. On a notecard, ask each child to sketch and write about a fruit or vegetable they would like to plant. Gather these notecards in a jar. Pull them out one by one and discuss which plants would be a good fit given our climate, dates, budget, etc. Create a class list. Take a class vote by giving each child three stickers. They may place their sticker next to three items they would like to plant. The plants with the most stickers will be selected. As students decide on plants to include in their garden, add them to the class garden map.
- **Companion plants –** When mapping out the garden, show students the "Companion Planting" chart at the end of the lesson. Plants, like people, influence one another. They may enhance flavor, repel or trap pests, or interfere with growth. Discuss that some types of plants can help others when they are planted next to each other. For additional information view charts at http://chemung.cce.cornell.edu/resources/companion-planting

- **When should we plant?** Planting dates depend on frost dates. Refer to seed packages for information about particular plants. Consult Iowa State

Extension's free publication "Planting and harvesting times for garden vegetables" https://store.extension.iastate.edu/Product/Planting-and-Harvesting-Times-for-Garden-Vegetables

- **Additional teacher resource:** Learn more about managing a school garden with videos from Garden for Every School. http://www.teachers-going-green.com/teachers-going-green/school-gardens/8-manage-your-garden



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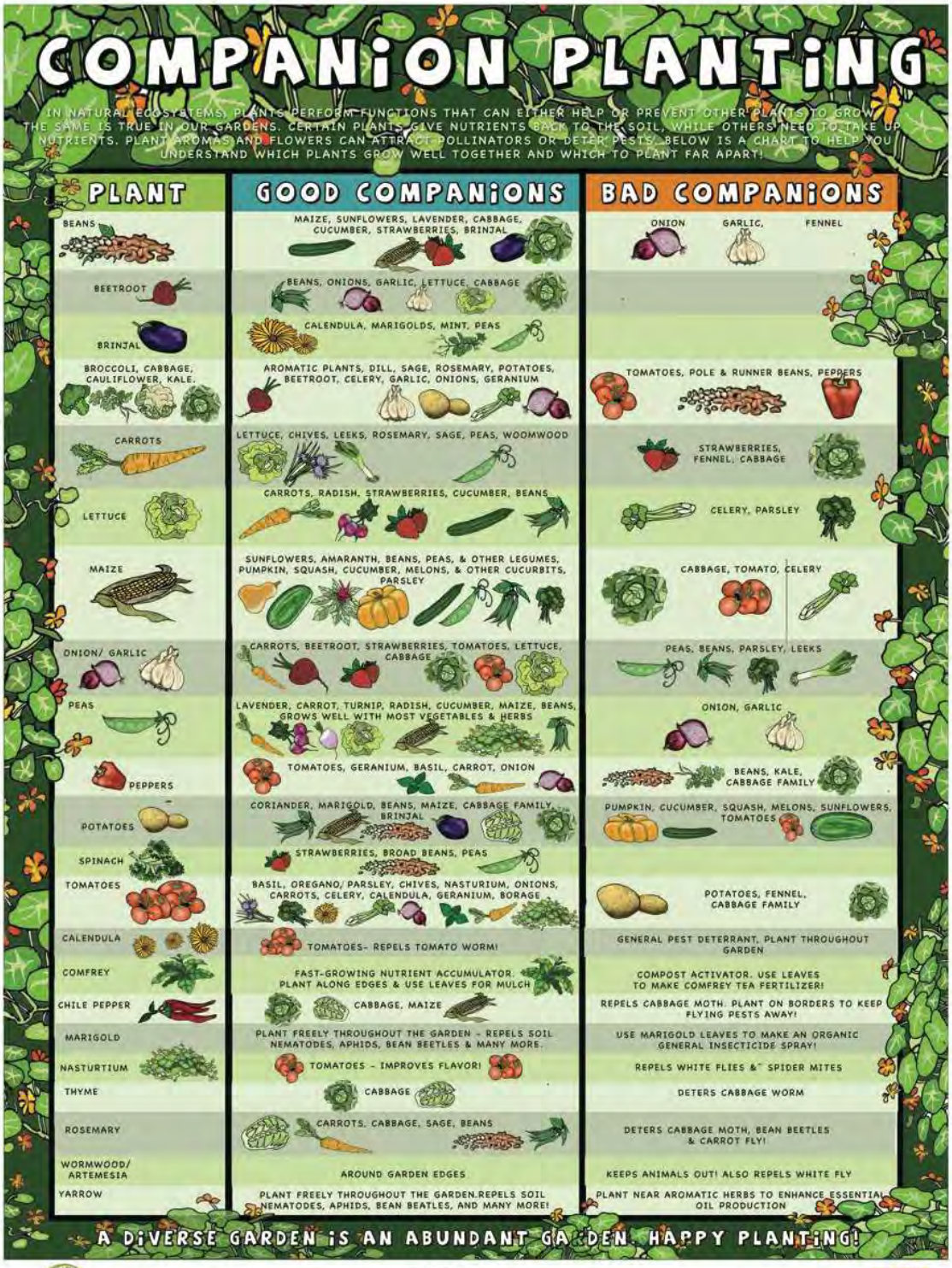

Where should we plant?

Think about sunlight!

For more information: http://thegardeningcook.com/sun-or-shade/

Harvesting Produce with Kids

1. **Is it ripe?** Produce will ripen at different times throughout the growing season. Encourage students to observe produce at different stages of ripeness. They can also compare grocery store produce to garden. What differences did you notice? How can we determine if produce is ready to harvest? Seed packets are another source for harvest information.

2. **Harvest methods:** How will we collect the fruits and vegetables? What tools will we need? Different crops require different harvesting methods. The main three ways to harvest are ***cutting*** (lettuce, herbs, etc.), ***digging*** (potatoes, carrots, etc.), and ***picking at will*** (peas, beans, berries, etc.).
    a. **Leafy greens** such as lettuce and spinach will grow quickly compared to some other plants, and can have many harvests. Students may gently tear off leaves, or snip leaves with child sized scissors to ensure the whole plant is not pulled out.
    b. **Potatoes and root crops** such as carrots and radishes are as fun as finding buried treasure. Use a trowel or digging fork to unearth them. Potatoes can be dug when the flowers or leaves of the plant have faded. Be careful not to slice them when digging. Have a couple of buckets of water available for scrubbing and rinsing.
    c. **"At will" crops** such as peas, beans, tomatoes, and berries can be nibbled on throughout the harvest. Teach students to harvest carefully with two hands: one keeping the vine or branch steady and the other gently pulling the fruit.

How much do we harvest?

The amount to harvest depends on how many students are in the garden and when they will return. Ten leaves of lettuce is a generous salad for young children. On the other hand, finger salsa can be made with one piece of tomato and a snip of green onion piled on a piece of green pepper.

3. **How do we harvest?** Empower students by having them make decisions and do the work. Create procedures so tools are easy to get out and put away. Role play the following procedures for harvesting food, for example:
    - During an introductory class meeting, students make decisions, facilitated by the teacher: What produce should be harvested today? What produce will each group pick? How much should they pick? What tools will they need? What should they do with their produce - wash it and eat it? Or collect it for a class recipe?
    - After reviewing harvest and safety procedures, students wash their hands in the bucket of soapy water.
    - From the tool shed, get the harvest baskets and any tools needed, such as trowels to go on a potato "treasure hunt."
    - Go to the designated area of the garden and harvest the amount decided upon during the class meeting.
    - Use spray bottles or buckets of water to wash produce.
    - Eat it with fingers or use kitchen tools from the shed to make simple garden recipes.

Tool safety
Review procedures for getting out, using, and storing garden tools. For example, pointy ends of trowels and shovels should always be down. Students will only walk while carrying tools. Teachers will pay close attention to students using tools and will give other jobs to students not following procedures.

4. **Food safety**: Proper hygiene is important. Students may view the following videos for potential hazards and precautions:
   http://www.safeproduce.cals.iastate.edu/elementary/
   For additional safety guidelines, view the USDA's "**Food Safety Tips for School Gardens**"
   http://nfsmi.org/documentlibraryfiles/PDF/20110822025700.pdf
   When serving produce to students, review the USDA's "**Best Practices: Handling Fresh Produce in Schools**"
   https://www.fns.usda.gov/sites/default/files/foodsafety_bestpractices.pdf

For more tips and hints, check out *How to Grow a School Garden* by Arden Bucklin-Sporer and Rachel Kathleen Pringle.