Healthy Gardens, Healthy Youth
Educational Toolkit Framework

The Educational Toolkit was developed to provide 19-20 lessons over an 18-month period for interventions schools in Healthy Gardens, Healthy Youth, the People’s Garden School Garden Pilot Project Research Grant (USDA CN-CGP-11-0047). The lessons began in the early spring 2012, and extended through the next school year, ending in Spring 2013.

A team of extension specialists in nutrition, horticulture and youth development reviewed 17 (see references) curricula, numerous garden implementation resources and other materials to select appropriate resources for this project. Criteria used to select curricula for consideration included 1) experiential learning 2) age-appropriate nutrition, food, and gardening content and skills 3) research-based content and standards alignment, 4) Science, Technology, Engineering and Math (STEM) area focus, 5) support for the school garden.

Lessons were selected from ten curricula (detailed below) to meet the necessary topic areas for the two years. Permission from the original authors was sought for reproduction in the Educational Toolkit. Additional activities directly related to the garden were developed to enhance the lesson. Since each state has slightly different educational standards, a compendium of content standards and benchmarks compiled by Mid-continent Research for Education and Learning, a private nonprofit corporation was used as standards. During this grant period, the Common Core Standards were introduced and the USDA introduced MyPlate to replace MyPyramid. Some lessons may contain references to MyPyramid.

The Toolkit provided 10-11 lessons to be taught in 2012 between February and the end of the school year in weekly sessions, and nine lessons to be taught through the month from September 2012 – May/June 2013. Because classes in the Arkansas and Washington could begin gardening earlier in the year than Iowa and New York, it was suggested that they start in 2012 with the garden planning and planting lessons, and then cover the first few lessons later in the spring.

The Toolkit included information and safety guidelines to create, maintain and harvest gardens; store, use and sample garden produce; take the garden through the summer; build community capacity; and sustain and grow the program. In addition it provided tasting and snack suggestions and information on the use of produce in the school cafeterias.

All Toolkit resources were available on a password-protected website. Lessons were introduced through webinars posted to the secure website and videos on our YouTube channel https://www.youtube.com/user/ExtSchoolGarden. Other supplementary materials, such as donated books, were delivered to the schools by the local Extension Educator.
Lesson Sequence

Spring 2012, February – May/June (depended on school end dates)

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<tr>
<th>Lesson</th>
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<th>Grade 4/5</th>
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<tbody>
<tr>
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<td>Plant Parts Become Me</td>
<td>My Lunch Came from Soil</td>
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<td>2</td>
<td>Rock to Ice Cream: Keep Soil Alive</td>
<td>Get the Scoop on Soil &amp; Composting</td>
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<td>3</td>
<td>Our Food Garden Plan</td>
<td>Our Healthy Garden Plan</td>
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<td>4</td>
<td>Seasons through the Year</td>
<td>Our Healthy Garden Plan (continued)</td>
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<td>5</td>
<td>Germination</td>
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<td>6</td>
<td>Planting the Garden &amp; Nutrition Super Hero</td>
<td>Planting our Healthy Garden</td>
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<td>7</td>
<td>Seeds and Sprouts</td>
<td>Photosynthesis</td>
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<td>8</td>
<td>Salad Gardens</td>
<td>Watering in the Garden</td>
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<td>9</td>
<td>Life in the Garden</td>
<td>A Butterfly’s Life</td>
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<td>10</td>
<td>Garden Patrol</td>
<td>WANTED: Out of My Garden</td>
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<td>11</td>
<td>Salad Party</td>
<td>Eating from the Garden</td>
</tr>
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Fall 2012 – Spring 2013

For Grade 2 students who went into Grade 3 | For Grade 4/5 students who went into Grade 5/6

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Grade 3</th>
<th>Grade 5/6</th>
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</thead>
<tbody>
<tr>
<td>September</td>
<td>Harvest</td>
<td>Harvest</td>
</tr>
<tr>
<td>October</td>
<td>Post-Harvest, Garden Clean-up</td>
<td>Post-Harvest, Garden Clean-up</td>
</tr>
<tr>
<td>November</td>
<td>Apples and Squash</td>
<td>Root Vegetables and Pears</td>
</tr>
<tr>
<td>December</td>
<td>MyPlate</td>
<td>Making Healthy Food Choices</td>
</tr>
<tr>
<td>January</td>
<td>My Food Garden Plan</td>
<td>My Food Garden Plan</td>
</tr>
<tr>
<td>February</td>
<td>Winter Vegetables and Mulch</td>
<td>Winter Vegetables and Mulch</td>
</tr>
<tr>
<td>March</td>
<td>Planting Our Garden</td>
<td>Planting Our Garden</td>
</tr>
<tr>
<td>April</td>
<td>Food for Plants and People</td>
<td>Food for Plants and People</td>
</tr>
<tr>
<td>May/June</td>
<td>Celebrate the Harvest</td>
<td>Celebrate the Harvest, Jeopardy</td>
</tr>
<tr>
<td>Optional</td>
<td>Harvest Party</td>
<td>Harvest Party</td>
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<tr>
<td>Grade 3</td>
<td>Objectives</td>
<td>Activities</td>
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</tbody>
</table>
| September: Harvest  
“The Color of Harvest from Got Veggies!”  
Source: from *Got Veggies?*, Wisconsin Department of Health Services – Nutrition, Physical Activity and Obesity Program with support from University of Wisconsin Extension | Students harvest vegetables in the garden.  
Taste and identify a variety of fruits and vegetables.  
Understand that some plants are sources of food.  
Develop descriptive vocabulary for specific characteristics of food.  
Collect and analyze data. | Taste vegetables from the garden, complete tasting chart, vote for favorite, create graph or chart to show results.  
Garden Journal.  
Book: Read *Growing Vegetable Soup* by Lois Ehlert | Students harvest in the garden. |
| October:  
Post-Harvest: What do you do with the garden after the harvest?  
Put Your Garden To Bed, University of Maryland;  
Questions About Composting Iowa State University Extension;  
Tool Safety Game, *Growing in The Garden: Local Foods And Healthy Living*, Iowa State University Extension and Outreach; “Preparing for Next Year” from *Got Dirt?* Wisconsin Department of Public Health | Learn steps to put the garden “to bed” at the end of the season.  
Review compost and tool safety. | Tool safety, garden clean-up, compost spreading, reading  
Books: *Compost!*
*Growing Gardens From Garbage* by Linda Glaser  
*Composting: Nature’s Recyclers* by Robin Koontz | Students play a Tool Safety game, go into the garden for clean-up and composting. |
| November:  
Apples!  
Network for Healthy California’s *Harvest of The Month: Apples* | Identify recommended amounts of fruits and vegetables for ages.  
Describe how plants grow from seed.  
Discuss what nutrients plants need for optimal growth. | Apple tasting, How Much Do I Need activity, How Do Apples Grow, read books about Johnny Appleseed | Grab the Apple! |
<table>
<thead>
<tr>
<th>Grade 3</th>
<th>Objectives</th>
<th>Activities</th>
<th>Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>January: How do you plan a garden? Source: “Our Food Garden Plan,” from <em>Growing in the Garden: Local Foods and Healthy Living</em>, Iowa State University Extension and Outreach</td>
<td>Identify and select locally grown fruits and vegetables to plant, grow, harvest, and eat. Use a variety of mathematical and science concepts and skills to create local garden plans and calendars.</td>
<td>Plan the garden using space taped off on the floor and the Square Foot Garden template. Determine space that vegetables needed and growing calendar</td>
<td>Student move around the classroom for garden planning.</td>
</tr>
<tr>
<td>March: How do you a plant a school garden (second year)?</td>
<td>Identify and implement efficient and productive methods to prepare the garden rules, garden tool checklist, garden matching game, plant</td>
<td></td>
<td>Student s do the Sunflower Seed Cycle activity, garden tool</td>
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<tr>
<td>Grade 3</td>
<td>Objectives</td>
<td>Activities</td>
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<tr>
<td>“Planting Our Food Garden” from <em>Growing in The Garden: Local Foods And Healthy Living</em>, Iowa State University Extension and Outreach</td>
<td>soil for gardening; mark a garden; plant seeds, sets, or transplants; and water the garden for the first time.</td>
<td>and watering</td>
<td>safety game, and work in the garden.</td>
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<tr>
<td></td>
<td></td>
<td>Garden Journal</td>
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<td></td>
<td></td>
<td>Fruit or veggie tasting</td>
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<td>April:</td>
<td>Define photosynthesis, Identify the basic ingredients in photosynthesis and where they come from, Describe the basic photosynthesis process, Give reasons why photosynthesis is important to plants and animals, When to water the garden.</td>
<td>Photosynthesis experiment, diagram; weeding and watering the garden; drip irrigation for garden plants.</td>
<td>Students do a plant and animal search and a skit.</td>
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<tr>
<td></td>
<td></td>
<td>Green Smoothie tasting</td>
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<td></td>
<td></td>
<td>Garden Journal</td>
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<tr>
<td></td>
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<td>Optional: culminating project for garden learning</td>
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<tr>
<td>Optional: Action Project from <em>Garden Mosaics</em>, Cornell University Cooperative Extension Service</td>
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<td>May:</td>
<td>Harvest foods from the garden; demonstrate ability to plan a meal with healthy foods.</td>
<td>Harvesting in the garden, planning a meal using MyPlate guidelines, food adventurer game, salad preparation and tasting</td>
<td>Students harvest in the garden and do the Plant Part Dance.</td>
</tr>
<tr>
<td>Let’s Celebrate our Garden Harvest!</td>
<td></td>
<td>Garden Journal</td>
<td></td>
</tr>
<tr>
<td>“How do you harvest garden produce?”</td>
<td></td>
<td>Plant Part Salad Tasting</td>
<td></td>
</tr>
<tr>
<td><em>Growing in The Garden: Local Foods And Healthy Living</em>, Iowa State University Extension and Outreach; “Healthy Harvest Celebration” from <em>Growing Healthy Kids</em>, Oregon State University Extension</td>
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</tbody>
</table>
Lesson One: Harvesting Your Edible Garden
For September or beginning of school year

“Harvesting Your Edible Garden” is based on lessons from GROWING IN THE GARDEN, LOCAL FOODS AND HEALTHY LIVING, Iowa State University Extension and Outreach and “The Color of Harvest: A Comparative Tasting Lesson” from GOT VEGGIES?, Wisconsin Department of Public Health.

It’s time to harvest summer crops. How do you know when crops are at their peak for flavor and texture? What is the best way to harvest them and keep their flavor? Students compare vegetables based on taste and colors.

Content objectives: Apply harvesting and cleaning processes for garden produce; develop descriptive vocabulary for specific characteristics of food; collect and analyze data.

Life Skill objectives: Healthy living, Critical thinking, Communication, Citizenship, Leadership, Decision making, Problem solving, Cooperation

Core and STEM concepts and skills:
Science: Science as inquiry, Earth and space, Life science
Math: Operations and algebraic thinking, Geometry, Measurement, Data
Language Arts: Speaking, Listening, Writing, Viewing, Vocabulary
Social Studies: Behavioral sciences

Healthy snack: Colorful fruits and vegetables in season (and from your garden) for the comparison taste testing.

Additional and supporting resources: None for this lesson.
LESSON PLANS FOR 2012-13 SCHOOL YEAR, GRADE 3

August/September: Harvest

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Lesson Part One: Harvesting Your Edible Garden (you will develop)

Lesson Part Two: The Color of Harvest from Got Veggies! Wisconsin Dept. of Health 19

NOTES: The bolded items in the following lists can be found in the Educational Toolkit, www.peoplesgarden.wsu.edu Grade 3, August/September: Harvest. The Core standards for this lesson are identified in the Educational Toolkit chart. Master gardeners, local vegetable growers, garden and nutrition experts – including students’ family members, and other classroom partners and volunteers are good resources to help to deliver this harvest lesson.

Documents included in this lesson are printed with permission of their authors.
BEFORE THE LESSON
Do you have produce to harvest? If so, great! All of the following items will help you harvest, clean, store and prepare the garden produce according to university experts.

If your garden has been sleeping through the summer, we recommend that you take a field trip or bring in garden produce from a local farmer’s market, produce stand, or grocery store. Do item 1, skip 2 and 3, and continue through the rest of the items starting with item 4.

1. Grade 3, August/September: Harvest
Continue to view or download the these resources from the www.peoplesgarden.wsu.edu Educational Toolkit.

Food Safety Tips for School Gardens, excerpted from United States Department of Agriculture
Harvesting and Storing Vegetables, Iowa State University Extension and Outreach
Please read and use these resources as guides to tell you when and how to harvest the crops from your school garden. If the students and their families have a garden or would like to start a garden, you may copy these resources to send home with the students.

3. Student Garden Records or Student Garden Journals
Check with the students’ grade 2 teachers or garden helpers and after-school or summer program leaders to continue to use any existing garden journals or records. If none are available, please use the ones that are attached to this lesson.

4. Harvest Sampling Ideas and Recipes
Select a recipe based on what you have harvested in the garden or brought in from a local farmer’s market, produce stand, or grocery store. Be sure to have the students help to wash the produce and prepare it. You may want to host a Harvest Party and invite parents and garden helpers to taste some of the crops from your garden.

5. Growing Vegetable Soup by Lois Ehlert
The lesson includes this book or a similar one about growing and eating vegetables. You can also find these books at the library or purchase them online.

THE LESSONS
1. Harvesting Your Edible Garden is a lesson that you will design, using the resources listed in item 2 - 4 above. In the resources, find the crops that the students will be harvesting. Use the information to organize and guide the students to look for the crops that are ready to be harvested and help them to harvest them using the most appropriate methods described in the resources. Be sure to record information about the crops you harvested on a Student Garden Record or Student Garden Journal.

2. “The Color of Harvest: A Comparative Tasting Lesson” from Got Veggies?, Wisconsin Department of Public Health utilizes the garden produce you harvested and possibly some additional vegetables that will add variety to the color, taste, texture, and nutritional value of the lesson. Please use the Tasting Chart found at the end of the lesson. You can fill out the chart
based on a classroom discussion or the students can fill them out individually. You may want to save some of your produce to have a harvest party. If you have trouble finding the book, you can choose to do that later.

3. Harvest Party is another activity you can customize. Who do you want to invite to your Harvest Party? What recipe or fresh vegetables do you want to prepare and serve? Do you want to read a book, sing a song, share stories, give garden tours to your guests? You may want to refer to some of the activities that the students did when they were in second grade.

AFTER THE LESSON
Consider expanding the lesson throughout the harvest season. One idea is to do the “Run the Rainbow Challenge: Hot Potato” from www.agclassroom.org/rainbow.
Harvesting is one of the nicest chores of the season. If you follow a few important, but easy tips, you will get the most of your crops. Some crops (e.g. carrots) only provide one harvest, while other crops (e.g. lettuce) can provide multiple harvests. If possible, harvest early in the morning, after the dew dries, but before the heat of the day.

**LEAFY GREENS – Lettuce & the Brassica Family**  
(including Spinach, Kale, Chard, Collards, Asian Greens, Mustards)

To harvest at peak flavor and freshness, harvest young greens when they are just a few inches long. At this stage all greens are tender and delicious eaten raw in a salad. These are called “baby greens”. Pick the largest, outside, leaves first while leaving the smaller and younger inside leaves for harvesting in a week or two. If possible, eat your greens the same day you pick them. Larger leaves, 6-12” long, are less tender and are best for cooking. Remember that greens cook down; plan about 6 cups of greens for 4 usual servings. Always wash garden greens carefully before eating or cooking to remove dirt and small insects.

*Tip*: Snip (with scissors or skilled fingers) the greens about ½-1” above the base of the plant to encourage new growth. Harvesting this way will allow you to get 3-5 cuttings of lettuce and spinach and even more from kale, chard and other hardier greens.

*Note on Lettuce*: If you planted head lettuce and prefer to harvest an entire head, wait until the entire lettuce plant is about softball - melon size and looks like the shape of head lettuce, as you know it. Don’t wait too long though - Growing head lettuce rather than harvesting baby greens often allows more time for pests and diseases to attack the crop.

**LEGUMES – Peas, Snow Peas, Beans**

Harvest peas with 2 hands, holding the vine with one hand while snipping the entire pod off the vine with your other hand. Harvest when fully mature, about 2” long for peas and 4” long for beans, depending on the variety planted. Harvesting encourages new growth, so be sure to pick off over-ripe pods you may have missed earlier on. Continue to harvest from the same vines as the legume ripens.

Simple Greens Recipe

- Wash and dry greens and cut larger leaves into pieces about 3 inches long.
- Heat a bit of olive oil in pan with a clove of chopped garlic or a few tablespoons of chopped onion. Cook 2-3 minutes.
- Add greens and a dash of water. You may keep the greens plain or drizzle with a dash of soy sauce or balsamic vinegar.
  - Heat a bit of olive oil in pan with a clove of chopped garlic or a few tablespoons of chopped onion. Cook 2-3 minutes.
- Remove from heat, place into bowl. Sprinkle with slivered almonds, sunflowers seeds and dried cranberries, or chives chopped chives from your garden.
  - Remove from heat, place into bowl. Sprinkle with slivered almonds, sunflowers seeds and dried cranberries, or chives chopped chives from your garden.
- Serve cold or warm.
Peas and young beans can be eaten raw, added to salads, or lightly steamed or sautéed.

**Cucumbers & Squash (Cucurbit Family)**

Harvest cucumbers as they ripen to the desired size. For pickling, fruits should be 4 to 5 inches long, for eating fresh; most varieties grow to 7-8 inches long. Cucumbers will develop a bitter taste if they are allowed to over-ripen. (Note: Some varieties such as European or Dutch cucumbers can grow much longer. This is another reason why clear labeling of the plants in the ground is useful.)

To ensure cucumber vines continue to produce heavily all season long, it’s best to harvest daily to prevent them from becoming overgrown.

Even though huge zucchini squash are impressive, they will be more flavorful if they are picked when they are smaller.

**Tip:** Use a sharp knife or pair of scissors when harvesting, and leave a short length of stem on each fruit.

**Roots—Carrot, Beets, Radish, Potato**

It can be difficult to determine if root crops are full grown and ready to harvest because they grow underneath the soil. You may recall, most seed packets will tell you how many “Days to Harvest”. This is the number of days it takes from planting to harvesting. If you can keep track of when you planted the seeds (maybe you wrote it down in the garden journal or it’s listed on the label that next to the plant in the ground), you’ll know about when they are ready. That said visual clues are always helpful. Roots start to lift themselves up out of the ground a bit as they develop. You’ll see radishes, beets and carrots creep a bit (< 1/4 inch) above the soil giving you a clue about how wide they are getting.

**Tip:** Radishes and beets are easy to pull out of the ground whole. Carrots often break off, leaving half of that sweet orange snack for the worms. To harvest them whole, use a digging fork to loosen the soil around the root and pull it out at the base of the greens. For radishes and beets, grab the plant right at the base of the stem, loosen the root a bit by rocking it back and forth, and then pull. If the whole thing does not come up, gently use a digging fork as you would for carrots.

For potatoes, you can start gently digging for new potatoes once the plants start to bloom. Wash and cook new potatoes immediately, as they do not store well at all. If you are planning to harvest potatoes to store for a while, wait until the tops of the plants start to yellow and die back. Then gently dig around the perimeter of the plant and dig up the tubers. If you are

8/6/2012
planning on storing them, don't wash them! Let them sit out in a cool place for a few days to cure, then gently rub off any dirt, and store in a cool, dark place.

**FRUITS – Strawberries, Tomatoes, Peppers, Eggplant**

Similar to cucurbits, fruits like to be harvested when ripe and harvesting regularly encourages new production. Use a scissors or be very careful to snip eggplant and peppers from the stem without damaging the fruit. Leaving a small stem on the harvested fruit will help keep it ripe and ensure you don’t bruise it when harvested. Carefully pick tomatoes from the plant. For strawberries, grasp the stem just above the berry between the forefinger and the thumbnail and pull with a slight twisting motion. Carefully place the fruit into your containers.

**HERBS – Basil, parsley, mint, cilantro, oregano, rosemary, tarragon, sage, chives, lavender, thyme & more.**

Herbs are grown for their leaves, flower, roots or seed. Most commonly, culinary herbs are grown for their leaves and should be harvested before they flower. Flowering can cause the foliage to develop a bitter flavor. For example, while chives are quite attractive in bloom – and their flowers are edible and delicious – the stems tend to become tough and woody after bloom. Some general guidelines for harvesting herbs:

- Begin harvesting the herb when the plant has steadily been producing new growth. Harvesting generates the plant to continue to produce. Just be sure to leave enough leaves so the plant can continue to photosynthesize. Don’t be afraid to harvest. Up to 75% of the current season's growth can be harvested at one time!
- Harvest herbs before flowering, otherwise, leaf production declines because the plant will put its energy towards flowering and producing seed to reproduce. **Tip:** Pick off flowers buds as you notice them develop.
- ‘Annual’ herbs (basil, cilantro, chives) will have to be planted each year. They have soft stems and can be harvested until frost. Perennial herbs (rosemary, lavender) have somewhat woody stems and can be clipped until about one month before the frost date.
“Healthy Gardens, Healthy Youth”
People’s Garden School Pilot Project

The Extension Partnership including:
Washington State University Extension
Cornell University Cooperative Extension
Iowa State University Extension and Outreach
University of Arkansas Extension

This project has been funded at least in part with Federal funds from the U.S. Department of Agriculture. The contents of this publication do not necessarily reflect the view or policies of the U.S. Department of Agriculture, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government
Growing and Harvesting Produce

A school garden provides an opportunity for children and volunteers to learn about how to handle food safely. The following are some food safety tips to follow when growing and harvesting produce.

- Ensure that all persons, including staff, students, and volunteers receive basic food and gardening safety training instructions according to local health regulations. The following topics are recommended:
  - Handwashing and personal hygiene
  - Cleaning and sanitizing garden equipment and containers used to hold produce
  - Handling produce during harvest, washing, and transportation
  - Glove use
- Ensure that volunteers are covered by the school district insurance policy in the event of accident or injury.
- Require signed permission slips for all student gardeners. Permission slips should list potential hazards of working in a school garden and identify any allergies the child may have.
- Do not allow anyone to work in the garden while sick, or until 24 hours after symptoms, such as vomiting or diarrhea, have subsided.
- Ensure that all harvesters wash hands thoroughly in warm, soapy water for at least 10 to 15 seconds, and then rinse with potable water. Ensure that all open cuts or wounds on hands, arms, or legs are properly covered prior to participating in the harvest.
- Require harvesters to wear closed-toed shoes to prevent cuts, stings, or other injuries.
- Consider using single-use disposable gloves when harvesting, or handling, fresh produce as an extra precaution.
- Harvest the garden regularly and remove any rotten produce.

Excerpted From Food Safety Tips for School Gardens
Food Safety Tips for School Gardens, continued

- Use cleaned and sanitized food grade containers, such as plastic bins or buckets, to hold harvested produce. Do not use garbage bags, garbage cans, and any container that originally held chemicals. These types of containers are made from materials that are not intended for food use.
- Clean harvesting tools, such as knives, scissors, etc., with soap and potable water immediately before and after each gardening session.

Using School Garden Produce in your School Meal Program

- Check with your local health department to ensure that local regulations permit food from gardens to be served as part of school meals.
- If the harvest from the school garden will be used in the school meals program, the school garden coordinator should work cooperatively with the school nutrition director to plan and implement the garden.
- Discuss food safety practices in the garden with school garden coordinators. Consider asking gardeners to document their practices. Use the information in this document as a guide to identify appropriate practices.
- Accept produce harvested from school gardens only when school nutrition staff is present to receive it. All produce dropped off or left when staff is not present should not be used in the school meal programs.
- See Best Practices: Handling Fresh Produce in Schools for guidelines on receiving, storage, preparation, and service of fresh produce in schools.
- Reject produce that does not meet school nutrition program standards.
- Receive and inspect produce harvested from school gardens according to the same procedures used to inspect produce from the district’s distributors.
- Do not use any produce that has been noticeably contaminated by animals or insects.
- Refrigerate garden produce immediately, unless the particular item is normally held at room temperature.
- Store, prepare, and serve school garden produce separately from other sources of produce to maintain traceability.
- Document service of school garden produce on the menu management/food production record. See Ensuring Traceability of Fresh Produce for more information.
- Ensure that liability for a potential foodborne illness caused by produce grown in school gardens is covered by your school district.
### Harvesting and Storing Vegetables

(Adapted from ISU Extension Publication, PM 731 Harvesting and Storing Vegetables)

<table>
<thead>
<tr>
<th>CROP HARVEST GUIDE</th>
<th>HARVEST TIMES</th>
<th>OPTIMUM STORAGE CONDITIONS, °F</th>
<th>APPROX. STORAGE PERIOD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SNAP BEANS</strong> (bush or pole)</td>
<td>Pick often to keep plants producing more beans.</td>
<td>Cool Refrigerate: 40 - 45°</td>
<td>7 – 10 days</td>
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<tr>
<td>Harvest the pods when they are almost full-sized but before the seeds begin to bulge. Hand pick with small stem attached to the pod. Do not break pod.</td>
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<tr>
<td><strong>BEETS</strong></td>
<td>One time harvest. Clean garden area after all beets are harvested.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>4 months</td>
</tr>
<tr>
<td>Pull or dig beets when roots are 1 to 1½ inches in diameter. Cut tops to ½ inch above root.</td>
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<tr>
<td><strong>BROCCOLI</strong></td>
<td>Tender side shoots, 1 to 3 inches across, will develop after the central head is removed. After those are harvested, remove the plants from the garden.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>10 – 14 days</td>
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<tr>
<td>Cut when flower heads are blue-green and about 6 to 7 inches across but before small yellow flower buds start to open. The stems below the flower head and small leaves are also very nutritious.</td>
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<td></td>
</tr>
<tr>
<td><strong>CABBAGE</strong></td>
<td>One time harvest. Clean garden area after harvest.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>1 to 2 months</td>
</tr>
<tr>
<td>Cut when heads become large and solid. Don’t delay because heads are prone to cracking when they get large.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CANTALOUPE</strong> (Muskmelon)</td>
<td>One plant can produce 2 to 5 fruit, not all at once. Check often once they start to mature.</td>
<td>Cool Refrigerate: 40 - 45°</td>
<td>1 to 2 weeks</td>
</tr>
<tr>
<td>The skin between the netting turns from green to orangish-yellow. The fruit will separate easily from the stem.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CARROTS</strong></td>
<td>One time harvest. Clean garden area after harvest.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>3 or more months</td>
</tr>
<tr>
<td>Dig when roots are ¾ inch or more across. Be careful so that you don’t break the roots when digging. Remove tops to ½ inch above the root.</td>
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</tr>
</tbody>
</table>

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Grade 3 September Harvest
### CROP HARVEST GUIDE

<table>
<thead>
<tr>
<th>Crop</th>
<th>Harvest Times</th>
<th>Optimum Storage Conditions, °F</th>
<th>Approx. Storage Period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cucumbers</strong>&lt;br&gt;Pick slicing cucumbers when they are 6 inches long and while they are still bright green and firm. Cut fruit from the vine with pruning shears. Leave about ½ inch of stem attached to the fruit.</td>
<td>Check plants often once they start bearing. Keep fruit harvested for continuous production.</td>
<td>Moderate Refrigerate: 45 - 55°</td>
<td>1 to 2 weeks</td>
</tr>
<tr>
<td><strong>Eggplant</strong>&lt;br&gt;Harvest anytime after the fruits are 2 inches across until they are 4 to 6 inches in diameter (depends on the variety). Light thumb pressure will leave a dent at the proper harvest stage. Cut from plant with pruning shears. Leave about 1 inch of stem on the fruit.</td>
<td>Check plants often once they start bearing. Keep fruit harvested for continuous production.</td>
<td>Moderate Refrigerate: 45 - 55°</td>
<td>1 week</td>
</tr>
<tr>
<td><strong>Garlic</strong>&lt;br&gt;Pull in mid-summer when bottom leaves begin to dry. Cure the bulbs in a warm ventilated area in single layers for 10 days. Remove the tops about 1 inch above the bulb.</td>
<td>One time harvest. Clean garden area after harvest.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>Up to 6 months</td>
</tr>
<tr>
<td><strong>Kohlrabi</strong>&lt;br&gt;pull plants when stems are swollen to 2 to 3 inches in diameter. Remove leaves and roots.</td>
<td>One time harvest. Clean garden area after harvest.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>Up to 2 months</td>
</tr>
<tr>
<td><strong>Lettuce</strong>&lt;br&gt;Leaf lettuce should be cut when the leaves are 4 to 6 inches long. Cut about 1 ½ inches above the ground for re-growth to occur.</td>
<td>Cut and it will come back for one or two more harvests, then remove spent plants.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>1 to 2 weeks</td>
</tr>
<tr>
<td><strong>Onions (green)</strong>&lt;br&gt;Any standard onion can be used as a green onion and harvested young. Harvest when 6 to 8 inches tall.</td>
<td>One time harvest. Clean garden area after harvest.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>2 to 3 weeks</td>
</tr>
<tr>
<td>CROP HARVEST GUIDE</td>
<td>HARVEST TIMES</td>
<td>OPTIMUM STORAGE CONDITIONS, °F</td>
<td>APPROX. STORAGE PERIOD</td>
</tr>
<tr>
<td>-------------------</td>
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<td>------------------------</td>
</tr>
<tr>
<td>ONIONS (dry)</td>
<td>One time harvest. Clean garden area after harvest.</td>
<td>Cold (after curing) Refrigerate: 32 - 40°</td>
<td>3 months (use before they sprout)</td>
</tr>
<tr>
<td>Harvest when the tops fall over and begin to dry. Pull with tops on and dry them in a protected place for 3 to 4 days. Cut tops to 1 inch above the bulb and store in shady area in mesh bags or single layers for further curing until stems tighten up and outer scales are dry.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEAS</td>
<td>Check plants often once they start producing seed pods. Keep pods harvested for extended production.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>1 to 2 weeks</td>
</tr>
<tr>
<td>Pick peas with edible pods such as snow peas when pods are just filled, but before the seeds become hard and starchy. Store peas in the pod. Harvest snap peas when the pods are beginning to plump and while the pods are still glossy and smooth.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PEPPERS</td>
<td>Check plants often once they start bearing. Keep fruit harvested for continuous production.</td>
<td>Moderate Refrigerate: 45 - 55°</td>
<td>2 to 3 weeks</td>
</tr>
<tr>
<td>Harvest when the pepper is large, firm, and crisp. Fully ripe peppers are slightly sweeter and may be red, orange, yellow or other colors.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>POTATOES</td>
<td>One time harvest. Cure potatoes in a cool shady location for two weeks. Clean garden area after harvest.</td>
<td>Cool Refrigerate: 40 - 45°</td>
<td>New potatoes only store for a few weeks. Large, cured potatoes can be stored in a dark location for 3 or more months</td>
</tr>
<tr>
<td>New (small) potatoes can be dug in early summer when the vines are lush and green. Large potatoes are dug as soon as the plants die. Be careful not to cut the potatoes when digging by placing the fork at least 8 inches from the stem of the plant.</td>
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<td></td>
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</tr>
<tr>
<td>RADISHES</td>
<td>One time harvest. Clean garden area after harvest.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>3 weeks</td>
</tr>
<tr>
<td>Pull when the roots are 1 to 1½ inches in diameter, remove tops about ½ inch above the root.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>CROP HARVEST GUIDE</td>
<td>HARVEST TIMES</td>
<td>OPTIMUM STORAGE CONDITIONS, °F</td>
<td>APPROX. STORAGE PERIOD</td>
</tr>
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<td>-------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>SPINACH</td>
<td>Cut and it will come back for one or two more harvests, then remove spent plants</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>1 to 2 weeks</td>
</tr>
<tr>
<td>SUMMER SQUASH (Zucchini)</td>
<td>Check plants often once they start bearing. Keep fruit harvested for continuous production.</td>
<td>Cool Refrigerate: 40 - 45°</td>
<td>1 to 2 weeks</td>
</tr>
<tr>
<td>SWEET CORN</td>
<td>Check frequently when they reach maturity. Harvest all at once or within a few days.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>1 week</td>
</tr>
<tr>
<td>SWEET POTATOES</td>
<td>Harvest all at once. Cure for 1 week in a warm, shady location.</td>
<td>Moderate Refrigerate: 45 - 55°</td>
<td>3 or more months</td>
</tr>
<tr>
<td>TOMATOES</td>
<td>Check plants often once they start bearing.</td>
<td>Cool room 55 - 65°</td>
<td>4 to 7 days</td>
</tr>
<tr>
<td>WATERMELON</td>
<td>Check plants often once they start bearing.</td>
<td>Moderate to cool room 45 - 65°</td>
<td>2 to 3 weeks</td>
</tr>
</tbody>
</table>

Grade 3 September Harvest
Harvest

Sampling Ideas and Recipes

Apply

Expand

Teacher’s Notes: The activities in this section are flexible depending on the harvesting that needs to be done and the food sampling ideas and recipes you choose to do. You may have other sampling ideas or recipes you would like to do. You can use these ideas and recipes throughout your garden and nutrition program.

Harvesting

Use the following guidelines to harvest your garden:

- Harvesting and Storing Vegetables chart
- Harvest Rules
- Garden Journal
SAMPLING IDEAS AND RECIPES

Continue to use the Harvest Rules to prepare food. Select the sampling ideas and recipes that best suit your situation. The students should help to wash and prepare the food. They can use plastic knives and plastic plates.

1. Garden Fresh!
   Sample the garden produce in its raw form as soon after it has been picked and washed as possible. That is when it is at its peak of flavor and texture. The students can wash it, if necessary – cut or slice it using plastic knives and plates, and taste it.

2. Jazz Up Garden Fresh
   Squeeze Ranch dressing in the bottom of a 3 ounce paper cup (one per student) then add sticks or strips of carrots, zucchini, yellow squash, cucumber, sweet peppers, and so on. Or, put samples of fresh garden produce on a small plate (one per student) and have the students make faces out of them before they eat them.

3. Revealing Taste Tests
   In his book, All New Square Foot Gardening Cookbook, Mel Bartholomew (the founder of the square foot gardening method) offers these great taste comparison tests for kids.

   **Taste Test for Green Beans and Snow Peas**
   - Have the students rinse off and eat one of the green beans or snow peas right after they picked it in the garden. Ask the students to describe the taste and texture.
   - Have them put a green bean or snow pea on their clean desk or counter and in an hour, wash it and eat it. Ask the students to describe the taste and texture and compare it to the one they ate right after they picked it.
   - Put enough green beans or peas in the refrigerator for a day or two before having the students wash and eat them. Ask the students to describe the taste and texture and compare it to the other two they ate.
   - Discuss which one tasted the best and possible reasons why. Fruits and vegetables start deteriorating right after they are picked. They may lose some of their flavoring and texture. You will also get a variation of flavor and texture depending on the degree of maturity of each green bean or snow pea. Most vegetables taste the sweetest and have their best texture when they are at just the right stage between unripe and too ripe.
   - Encourage the students to do this taste test with their families.

   **Taste Test for Broccoli, Cauliflower and Other Crispy Vegetables**
   Do a blind taste test with the students tasting a fresh bite of a crispy vegetable straight from their garden and another bite from the same vegetable bought at the grocery store. Ask the students which bite is crisper and tastes more like the “outdoors”, and which would they rather eat? After the discussion, reveal which vegetable was from the garden and which one was from the store.

   **Taste Test for Different Varieties of the Same Vegetable**
   Do a taste test with different types of lettuce, peppers, tomatoes, and so on to see which one you like the best. Record the information for reference when you plan your next garden.
4. Spin and Toss Salad
For fun lettuce and spinach salads, wash the leaves and put them in a clean pillow case. Then spin dry the leaves by holding the closed end of the pillow case and twirling it around. You may want to use a rubber band to secure the open end of the pillow case. You can also add fresh radishes, carrots, onions, snow peas or any other fresh salad ingredient to the pillow case and toss a great salad. Thanks to Cornell University and the Ithica Children’s Garden in New York for this lively idea.

5. Cucumber Water
Flavored water is very popular and refreshing. The commercial waters have vitamins added. You can make your own by washing and thinly slicing cucumbers to put in each glass of cold water. After drinking the water, eat the cucumber. During other sessions, you might want to try lemon or lime slices in your water.

6. Veggie Sandwich
Cut thin slices of garden produce to make radish, cucumber, zucchini, tomato or other garden veggie sandwiches. Use sliced bread, a soft flavored cream cheese spread (usually sold in a tub), and slices of one or multiple kinds of veggies to make open-faced (one slice) or traditional (two slices) sandwiches. Cut the sandwich diagonally into fourths to make “veggie sandwich tips”. This has been a great way to introduce new vegetables to young gardeners.

7. Summer Garden Salsa
This has been a favorite recipe for thousands of youth participating in Iowa State University Extension and Outreach’s Growing in the Garden program. All but the last three ingredients can easily be grown in a summer garden. Tomatillos are fun to grow and have been easy to purchase at the grocery store. They add a fun flavor to the recipe and are unique because they look like a little green tomato growing inside a husk. However, if you can’t find them, you can simply leave them out of the recipe.

<table>
<thead>
<tr>
<th>Summer Garden Salsa</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 to 6 medium tomatoes, seeded and coarsely chopped</td>
</tr>
<tr>
<td>1 small fresh jalapeno chile, seeded and minced (optional)</td>
</tr>
<tr>
<td>1 clove garlic, minced</td>
</tr>
<tr>
<td>¼ cup finely chopped onions</td>
</tr>
<tr>
<td>2 tablespoons finely chopped cilantro</td>
</tr>
<tr>
<td>2 tomatillos, husks removed, finely chopped</td>
</tr>
<tr>
<td>Juice from 1 small lime</td>
</tr>
<tr>
<td>¼ teaspoon salt</td>
</tr>
<tr>
<td>¼ teaspoon freshly ground black pepper</td>
</tr>
</tbody>
</table>

In a large bowl, combine all of the ingredients. Stir together until well blended. Cover and chill for 30 minutes or more before serving. Keeps up to 4 days in the refrigerator. Makes about 2 cups.
8. **RAITA**

*Raita is a popular vegetable dip in schools in the state of Washington. Thanks to Washington State University Extension for sharing this recipe.*

**RAITA**

- 1 cup plain yogurt
- ½ cup cucumber, peeled and grated
- ½ teaspoon salt
- 1 clove of garlic, finely minced

Finely mince the garlic and mix with yogurt and salt. Let it sit as you peel and grate the cucumber. Add cucumber to yogurt mixture. Serves four groups of five students with ¼ cup of dip. Serve with sliced vegetables of your choice.

9. **Sharing Ideas and Recipes**

Maybe the youth and adult gardeners and partners at your site have some great tasting or recipe ideas they would like to share. Or, you can search for fun recipes on the Internet. Offer them the opportunity and cook up something new! Then share the ideas and recipes with other gardeners through the internet, in the newspaper, or through one-on-one communications via email, phone, or letters.

10. **Share the Harvest**

Do you have extra garden vegetables and fruits? Send them home with the young gardeners. It is very helpful to also send washing and storing information and serving tips. Explore other ways to share your garden harvest such as food pantries, summer meal programs, senior centers, other families, etc. The students can come up with the ideas and then check to make sure those places will accept garden produce.
## My Garden Journal

<table>
<thead>
<tr>
<th>Date:</th>
<th>What I planted:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>What I did:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>What I picked:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>What I ate from the garden:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>What I learned:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

Grade 3 September Harvest
Lesson Overview

This comparative harvesting, cooking, and eating activity is a fun way to familiarize students with a variety of fruits and vegetables using color as the distinguishing characteristic. Eating a variety of colors is important as this gives our bodies a wide range of valuable nutrients—like fiber, folate, potassium, and vitamins A and C. For this lesson, you will want to harvest an assortment of seasonal foods from your garden and compare their colors and other characteristics. The lesson is suited for the garden or the classroom and if you don’t have enough food in the garden, you can get a colorful variety of fruits and vegetables at a local farmers’ market, farm stand, or grocery store. Students will learn how eating different colors of foods makes us healthy in different ways. They are encouraged to use specific vocabulary to describe color variations between vegetables and fruits. This lesson can be adapted for students of all ages. See some suggestions for different age groups on page 12.

Objectives

Students will:

1. Taste and identify a variety of fruits and vegetables (Nutrition Ed C.4.2, F.4.2)

2. Understand that some plants are sources of food (Ag Ed D.4.1; Nutrition Ed F.4.3)

3. Develop descriptive vocabulary for specific characteristics of food (Lang Arts D.4.1, D.4.2; Nutrition Ed F.4.2)

4. Collect and analyze data – see Review and Vote (Math €.4.1, €.4.3)
Materials

Food:
• Different varieties of vegetables and fruits that represent a spectrum of colors from your garden or local market (e.g., orange: carrots, sweet potatoes, butternut squash, pumpkin; purple: grapes, eggplant, kohlrabi; red: radishes, tomatoes, red peppers, strawberries, raspberries, apples, watermelon; yellow: carrots, corn, potatoes, summer squash; green: collard greens, asparagus, kale, broccoli, peas, zucchini, celery, spinach, cucumbers; white: cauliflower, white potatoes; blue: blueberries).

Supplies:
• Book: Growing Vegetable Soup by Lois Ehlert or other book to stimulate discussion about growing and eating a variety of vegetables and fruits from your garden. For more book suggestions, consult the Booklists on page 58 in the Resources section.
• Knife
• Cutting board
• Plates
• Word Bank (included at end of lesson)
• Tasting Chart (included at end of lesson)

Preparation

1. Prior to lesson, determine which vegetables and fruits you will need to harvest or purchase to demonstrate the variety of colors we eat. Consult the list of suggested vegetables and fruits under the Food heading in the Materials section above. For more ideas, visit Harvest of the Month at www.harvestofthemonth.com or choosemyplate.gov for lists of different fruits and vegetables.

2. Get Growing Vegetable Soup by Lois Ehlert or similar book to stimulate discussion about growing and eating a variety of vegetables and fruits from your garden. For more book suggestions, consult the Booklists on page 58 in the Resources section.

the garden classroom

A healthy school garden is a critical component of a vibrant nutrition education. Bringing nutrition education from the classroom into the garden setting has a powerful effect on children’s eating habits now and into their future. The Kids’ Garden has provided us at Mendota Elementary School the opportunity to develop our nutritional senses and flourish in the benefits of healthy lifestyle choices. The kids love to eat the vegetables they learn about and are delighted to work hard harvesting, washing and hauling the newly grown treasures.

— Christine Pietruszka,
Teacher at Mendota Elementary School,
Madison Metropolitan School District
3. Rinse vegetables and fruits before slicing. If possible, slice immediately before tasting to preserve freshness. Avoid putting food in the refrigerator, as it dulls the flavor and changes the texture.

4. Write the name of each vegetable or fruit on a display board or poster to record student descriptions (refer to Tasting Chart at end of lesson).

5. Post Word Bank with adjectives to guide students’ sensory observations (included at end of lesson).

Procedure

Introduction: Gather students for a discussion or a read-aloud. Use Growing Vegetable Soup by Lois Ehlert or similar book to stimulate discussion about growing and eating a variety of vegetables and fruits from your garden.

You may choose to use some of the following questions to guide your discussion:

1. Where does food come from?
2. Who has a garden or knows someone with a garden? What do you grow?
3. Who has been to a farm? What did you see there?
4. Can you think of some vegetables that are grown in a garden or on a farm?
5. Can you think of some fruits that are grown in a garden or on a farm?
6. Who has tasted any of these fruits or vegetables before?
7. Which fruits do you like to eat as a snack?
8. Which vegetables do you like to eat as a snack?
9. Do you grow any of these vegetables or fruits with your family?
10. Can you think of a fruit or vegetable that comes in more than one color? For example, tomatoes come in almost every color as well as in many shapes and sizes.
11. What colors and shapes of tomatoes have you seen?
12. How do these different vegetables and fruits help us grow? Why are they good for us to eat? Answer: Fruits and vegetables are good for our bodies, as they are packed with nutrients like vitamins and minerals! For older students, you could explain that fruits and vegetables contain many nutrients including vitamin A and C, potassium, and dietary fiber. There are also some special fruits and vegetables, called the “super green and super orange.” These dark green and orange vegetables are important to eat often because they contain extra amounts of vitamins and minerals. Can you guess which fruits and vegetables growing in your garden are green or orange superheroes? Answer: Super green: bok choy, broccoli, collard greens, mustard greens, romaine lettuce, spinach, kale, watercress, turnip greens, mesclun, and dark green leafy lettuce. Super orange: acorn squash, pumpkin, carrots, sweet potatoes, butternut squash, and hubbard squash.

13. Do you know how many fruits and vegetables you should be eating each day? Answer: The amount we should eat depends on if we are a boy or a girl, how much activity we get each day, and how old we are. Have children try the Fruit and Veggie Calculator at www.fruitsandveggiesmorematters.gov or visit www.fruitsandveggiesmorematters.gov/downloads/Low_Literacy_Brochure.pdf for information on how many fruits and vegetables kids should be eating daily. As their teacher, how many fruits and vegetables should you be eating? Compare the recommended amounts for adults and kids.

Following the introduction, review proper hand washing procedures and discuss why they are important. Have students wash their hands. Prepare selected fruits and vegetables for tasting.

Observation: Write names of selected fruits and vegetables on the display board or poster paper, or for older students, hand out Tasting Charts (see example on page 13). Explain to students that they will be acting as “investigators” and will be using their senses to observe, describe, and compare different fruits and vegetables. Before tasting, pass around each vegetable or fruit so students can observe the appearance, texture, scent, etc.

voices from the Kids’ garden

“How many types of these are there in the world?” a girl asked while planting two varieties of kale in the Kids’ Garden.

After harvesting a broccoli floret and taking a bite, a child exclaimed, “Yum! Wait, I thought broccoli was gross!”

“It’s interesting, salsa has everything in it that I didn’t like, but I like it. I mean, it has onion, tomatoes, peppers … but it tastes good!”
Tasting: Give each student a slice of vegetable or fruit. Encourage them to taste it. Tell students that you don’t expect everyone to like it, but it is important to try new vegetables and fruits because they may develop a taste for them over time. Have them observe and describe it using words from the Word Bank. Encourage students to use their own words, which can be added to the Word Bank for future sensory observation activities. Record student descriptions on the display board or have them write them on their Tasting Chart. Repeat these steps with each different vegetable or fruit. Encourage your students to use specific and descriptive vocabulary.

Review and Vote: Briefly review and compare vegetable and fruit descriptions. Have students vote for their favorite variety. This could be an opportunity for a math connection. Count the votes and create a graph or chart to represent the results. Discuss voting results and reasons why students chose one fruit or vegetable over others.

Clean-up: Have students help with clean-up and wash their hands. If possible, vegetable and fruit scraps can go to a compost pile or worm bin.

Individualized to Age Groups

For Younger Children (K to 2nd grade): During observations have students draw a picture of one of the vegetable or fruit varieties. Or cut vegetable shapes out of paper and write their descriptive words on the vegetable. Another fun activity is to have each student offer one descriptive word and combine them to make a collective poem about a selected vegetable or fruit.

For Older Children (3rd to 5th grade): Use the attached Tasting Chart for students to record their own observations. Students may choose adjectives from the Word Bank or use their own describing words. You may also have students write a paragraph or poem describing their favorite vegetable or fruit. Cut fruit or vegetable shapes out of paper and have students write their poems on them. Glue all the poems to one large piece of paper or poster board.

Lesson Variation: Comparative Heirloom Vegetable or Fruit Tasting: Hone your students’ taste buds and observation skills by repeating this lesson with heirloom varieties of just one vegetable or fruit. For example, harvest or purchase four different heirloom varieties of tomatoes or apples. Heirloom varieties of certain vegetables and fruits—such as tomatoes and apples—vary greatly in appearance, texture, and flavor, making them well suited for comparison.
**Additional Activities**

Give students a list of foods being grown in the garden or found at their local market. Have them work with a parent/caregiver to find a word describing a characteristic of each food on the list. Encourage the parent/caregiver to offer one or more of these foods at meals or snacks.

**Fruit and Vegetable Challenge:** Keep track of how many fruits and vegetables you eat for a week.

**Compare food in different forms.** Make some garden salsa and compare it to raw tomatoes, tomato soup, ketchup, or sun-dried tomatoes. Compare raw apples with unsweetened applesauce and dried apples. Ask students how they think apples are turned into applesauce or dried apples.

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**Word Bank**

- sweet
- sour
- flavorful
- earthy
- yummy
- sharp
- squishy
- zesty
- grand
- healthy
- zippy
- delicious
- ripe
- mealy
- fragrant
- tangy
- firm
- bitter
- juicy
- acidic
- crunchy
- delectable
- tough

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**TASTING CHART**

<table>
<thead>
<tr>
<th>Name of Fruit or Vegetable</th>
<th>Look</th>
<th>Smell</th>
<th>Feel</th>
<th>Taste</th>
<th>Sound</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

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**— V. Ione Machen,**

**Garden Educator,**

**Community GroundWorks**

**at Troy Gardens**
Lesson Plan for 2012-13 School Year

Grade 3

Post-Harvest: Fall Clean-up

Lesson Two: What do you do with the garden after the harvest?
For October

“Preparing for Next Year” from GOT DIRT?, Wisconsin Department of Public Health.
It’s time to put the garden to bed, if you didn’t do that last month. Students learn about tool Safety and composting. Directions for building your own compost bin are included.

Content objectives:
Describe how gardeners and farmers care for the soil so that they can grow healthy, edible crops during the next growing; identify steps to put your garden to bed in a way to prepare the soil for the next harvest.

Life Skill objectives:
Healthy living, Critical thinking, Communication, Cooperation Leadership, Decision making, Problem solving

Core and STEM concepts and skills:
Science
   Science as inquiry, Earth and space, Life science
Math
   Measurement and observation
Language Arts
   Speaking, Listening, Writing, Viewing
Social Studies
   Behavioral sciences

Healthy snack:
Select from Harvest Sampling Ideas and Recipes (Grade 3 Lesson Plan August/September: Harvest)

Additional and supporting resources:
Contact your local Cooperative Extension Master Gardener Program for additional information on putting the garden to bed or composting.
# Lesson Plans for 2012-13 School Year, Grade 3

**October:** Post Harvest: What do you do with the garden after the harvest?

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<thead>
<tr>
<th>Table of Contents</th>
<th>Pages</th>
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Recipe and Tasting Options: Use August/September *Harvest Sampling Ideas and Recipes*
BEFORE THE LESSON
Is it time to put your garden to bed for a while? Do you want to learn how gardeners and farmers care for the soil so that they can grow healthy, edible crops during the next growing season? All of the following items will help you put your garden to bed in a way to prepare the soil for the next harvest. Garden experts say that if you could choose one thing to do to improve your garden for the next growing season, building a compost pile or bin would be your wisest decision. Extension Master Gardeners and other local garden experts can help you to do that.

1. Grade 3, October: Post Harvest
This document contains all the curriculum items and resources you need for this lesson. All lesson downloads are located on the www.peoplesgarden.wsu.edu Educational Toolkit.

2. Put Your Garden To Bed, University of Maryland Extension
Questions About Composting, Iowa State University Extension and Outreach
Tool Safety Game, Iowa State University Extension and Outreach, Growing in the Garden
Please read and use these resources as guides for post-harvest gardening activities. You may copy these resources to send home with the students.

3. Student Garden Journals
Start a page for the garden records or garden journals to describe or draw your post harvest activities. You may want to start the page with the goals you want to accomplish to prepare the garden for next year. Then explain how you think the post harvest activities will help you to reach your goals. If you haven’t started a Student Garden Journal, this would be a good time.

4. Post - Harvest Recipes
Select a recipe from the Harvest Sampling Ideas and Recipes (Grade 3 Lesson Plan August/September: Harvest) that includes garden produce you have harvested or fresh produce that could be from a garden near where you live. Be prepared to have the students help to prepare and eat it.

THE LESSONS
1. Preparing for Next Year is a lesson that is referred to as a step to gardening in the Got Dirt? curriculum from Wisconsin Department of Health (included in these materials). You will have to prepare using the resources listed in items 2 above. Master Gardeners or garden experts could build a compost bin that is appropriate for your site. Be sure to check with your school administration for approval. The students can learn to fill it and turn it. Before using garden tools to clean up your garden, do the tool safety game. In the resources, find the crops that the students will be harvesting. Assign tasks to groups of students before going out to work in the garden. If you do not have a garden to put to bed, you can tour local gardens or even farm fields to observe what is going on and you can start your own composting projects.

2. If possible, have the students help to prepare a recipe or snack from Harvest Sampling Ideas and Recipes (Grade 3 Lesson Plan August/September: Harvest). Talk about how the lesson connects with the snack they are eating.
3. You may want to expand the lesson by choosing a book to read about soil and composting. Here are some suggestions:

*Compost! Growing Gardens From Garbage* by Linda Glaser
*Composting: Nature’s Recyclers* by Robin Koontz

**AFTER THE LESSON**

1. Keep composting!

2. Explore what other local gardeners and farmers are doing with their gardens or fields.
Put Your Garden To Bed

By Pamela B. King
Charles County, Maryland Extension Agent

When Fall crops and flowers have matured, it is time to put your garden to bed. Get started with these tips for cleaning your garden, setting it right for the winter, and laying the groundwork for next year’s garden:

- Plant perennial rhubarb roots October 15 through November 15. Plant Spring flowering bulbs, such as tulips and daffodils, in October. Other perennial flowers, such as peonies, do best when planted in the fall, too.
- Pot up parsley, chives, geraniums and other herbs and flowers. Keep them out of doors for a few weeks in their pots. Then bring them in and place them in a sunny window for production throughout the winter.
- Harvest and preserve fall crops.
- Cover tomatoes and other warm season crops with plastic in the evening to protect them from light frosts. Remove the plastic in the morning so heat does not build up under it and damage the plants.
- Mulch and protect hardy crops, such as greens and root crops, so they will last longer. Pile mulch over and around plants to insulate them.
- Remove old, spent plants from the garden. Any plants that had insects or disease should be put in plastic bags and thrown out with the trash. Others can be composted.
- Make needed structural changes, such as leveling or building raised beds. Turn the soil and leave it rough to expose insects and disease to the cold. It will kill some of them.
- Mow tall grasses around the garden and use them (or other materials) to mulch the ground before it begins to freeze (late November) to prevent erosion.
- Take a soil test and add any needed limestone to the garden so it will break down and do its job by spring.
- Wait until spring to fertilize.
- Make compost from fallen leaves, kitchen vegetable scraps, garden waste, and other organic matter in an enclosed container. Call the Extension Service for directions on making compost.
- Add organic matter (compost, leaves, grass clippings) to improve the condition of the soil.
- Be sure to clean up your garden so it will look neat and clean for the winter.

Now sit back and wait for your seed catalogues to come and start planning for next season.

From: University of Maryland Extension
http://mastergardener.umd.edu/local/charles/Horticulture%20Know_how/Put%20Your%20Garden%20to%20Bed.cfm   Accessed 8/1/2012
**How long does it take to reach a finished product?**

Generally, a compost pile that contains a good mixture of finely chopped materials, is turned regularly and kept moist, will be ready in about 2 to 4 months. A compost pile composed of non-shredded materials that is left unattended may take a year or longer to decompose. Piles prepared in late fall will not be very well decomposed by spring. When the compost is finished, the pile will be about half its original size and have a pleasant, earthy smell.

**Of what value or use is the finished compost product?**

Compost is used as an organic amendment to improve the physical, chemical and biological properties of soils. For example, adding compost to garden soil will increase the moisture holding capacity of sandy soils and improve the drainage and aeration of heavy clay soils. Over time, yearly additions of compost will create desirable soil structure making the soil easier to work.

**Will compost eliminate the need for commercial fertilizers in my garden?**

To a limited extent, compost is a source of nutrients. However, nutrient release from compost is slow and the nutrient content is often too low to supply all the nutrients necessary for plant growth. Compost should not be considered a substitute for fertilizer, but rather a supplement. Compost increases the ability of the soil to hold and release essential plant nutrients, especially in sandy soils. This may reduce the amount of fertilizers needed.

**For more information**

Horticultural information is available from your local Iowa State University Extension office and from these Web sites.

ISU Extension Distribution Center—
[www.extension.iastate.edu/store](http://www.extension.iastate.edu/store)

ISU Horticulture—
[www.yardandgarden.extension.iastate.edu](http://www.yardandgarden.extension.iastate.edu)

Reiman Gardens—
[www.reimangardens.iastate.edu](http://www.reimangardens.iastate.edu)

Prepared by Linda Naevé, former extension horticulturist; Richard Jauron, extension horticulturist; and Diane Nelson, extension communication specialist.
Can wood ashes from the fireplace be used in the compost pile?
Wood ashes act as a lime source and should only be added in small amounts (no more than 1 cup per bushel of compost).

What is the optimum size for a compost pile?
The best size for an enclosed compost pile is between a 3’ x 3’ x 3’ pile and a 5’ x 5’ x 5’ pile. If any smaller, it will dry out too fast; any larger and there will be poor air movement and it will be difficult to turn the pile.

What kinds of materials can be composted?
Yard and garden residues and other organic materials are suitable for composting. This includes leaves, grass clippings, straw and hay, sawdust, and finely chopped or shredded tree and shrub prunings.

What is the optimum size for a compost pile?
The best size for an enclosed compost pile is between a 3’ x 3’ x 3’ pile and a 5’ x 5’ x 5’ pile. If any smaller, it will dry out too fast; any larger and there will be poor air movement and it will be difficult to turn the pile.

Can wood ashes from the fireplace be used in the compost pile?
Wood ashes act as a lime source and should only be added in small amounts (no more than 1 cup per bushel of compost).

If my lawn has been treated with herbicides, can I still use the clippings in my compost pile?
Composting is an accelerated decomposition process that biodegrades many compounds faster than soil degradation. The faster degradation in an active compost pile is due to the more favorable conditions for decomposition of organic products including herbicides. If yard waste has been composted at least one year, pesticide residues should not be a problem when the compost is used.

Can I compost my newspapers?
Yes. Most newspapers today use soybean-based or other non-toxic inks. To promote decomposition, shred newspapers and mix with other materials.

Why doesn’t a pile of leaves readily decompose?
It is best to have a mixture of organic materials together in the compost pile. Dry leaves are a high-carbon organic material. The microbes that do the decomposing require a certain amount of nitrogen for their own metabolism and growth. Without a nitrogen source, the decomposition will be slow. Grass clippings are high in nitrogen. When mixed together, the grass clippings will enhance the decomposition of the leaves.

Are commercially available inoculants or activators needed to have rapid decomposition in a compost pile?
Inoculants are dormant microorganisms. They are rarely needed, since soil, leaves, kitchen scraps, and finished compost already contain ample bacteria that readily work on their own. The only “activator” that may be needed is a nitrogen source since nitrogen is usually the limiting nutrient. Nitrogen accelerates the decomposition process if the materials to be composted are high in carbon, such as dried leaves.

How can I avoid problems with unpleasant odors from the compost pile?
Odors may arise from the addition of excessive amounts of wet plant materials such as fruits or grass clippings, from overwatering the pile, or by not periodically turning an actively decomposing pile. A properly prepared and adequately turned compost pile will generate little, if any, objectionable odor. Good aeration, provided by regularly turning over the materials in the pile, is essential for good, rapid decomposition. Also, keeping the compost damp but not waterlogged will go a long way toward preventing unpleasant odors. Adding lime does not necessarily reduce odors and may result in the loss of nitrogen from the pile.
TOOL SAFETY GAME

I am going to show you some right ways and wrong ways to use and store our tools. If you think I’m showing you the right way, clap. If you think I’m showing you the wrong way, stomp your foot.

- **Lift the hoe so that the blade is over your head like you are swinging a hatchet.**
  - **STOMP.**
  - I have lifted the hoe too high. I am not chopping the soil. I am hoeing it. It doesn’t work very well this way. Also, you may hit someone who is nearby if you swing the hoe this high in the air.

- **Lift the hoe so that it is about 1 foot off the ground and bring it down in a gliding motion through the surface of the soil.**
  - **CLAP.**
  - This is the correct way to use the hoe to cut through crusty soil and remove weeds.

- **Repeat the same motions with the rake.**

- **Lay the rake down, teeth up.**
  - **STOMP.**
  - You should never set a rake or a hoe on the ground like this. What do you think would happen? You may want to demonstrate what would happen if someone stepped on the teeth of the rake or blade of the hoe. Be careful to stand to the side so the handle doesn’t smack you in the face.

- **Stand the rake and hoe, handles up, against a wall or hang them.**
  - **CLAP.**
  - Rakes and hoes should be stood against a wall or in the shed or garage when they are not being used.

- **Walk with the trowel blade up.**
  - **STOMP.**
  - Always carry your tools such as this trowel with the sharp blade facing down.

- **Run a short distance holding a hoe and a trowel.**
  - **STOMP.**
  - Never run with tools in your hands.

- **Pretend to wash dirt from the trowel, hoe, or shovel.**
  - **CLAP.**
  - It is always a good idea to clean the soil off your tools before you put them away. This shows you are responsible for taking care of your tools.

- **Pretend to fight with a student over a trowel or hoe.**
  - **STOMP.**
  - Show respect by taking turns.
Preparing for Next Year

### During the Growing Season

**try composting**

Compost, which is decomposed organic material, can be used in many different ways including as a soil amendment to add nutrients to your soil, as mulch around plants, or as an ingredient in potting soil. Furthermore, it can help fight disease, neutralize the pH of your soil, improve soil, protect against soil erosion, hold moisture, and help moderate soil temperature. To begin composting, find an area of level, bare ground near a water source. After choosing a place or container to store your compost, mix \( \frac{1}{3} \) “green” and \( \frac{2}{3} \) “brown” materials. Examples of “green” materials include grass clippings (from a chemical-free lawn), vegetable/fruit scraps, coffee grounds, weeds and other garden debris, feathers, hair, manure, or egg shells. Examples of “brown” materials include dry leaves, hay or straw, paper, cardboard, or dried grass clippings. Sawdust and small brush or twigs should be stored in a separate pile than the compost pile, as they tend to take longer to decompose. A sawdust or small brush pile can take up to 10 years or longer to fully decompose.

### After the Growing Season

**removing spent vegetable plants**

Once the plants in your garden have stopped producing fruits and vegetables, entirely remove it from your garden. For example, remove all the cucumber, pumpkin, and squash vines in your garden. You can compost these spent plants, if they have not been infected by disease or insects.

**add organic matter**

You can improve soils by adding organic residues. Organic matter helps to create good crumb-like soil structure. This allows for better water and air movement and easier root penetration. The process of decomposition using organic residues is what helps loosen heavy soils. The key to improving “heavy” soils is to add organic matter frequently. Types of organic matter that you can use include rotten manure (aged), leaves, grass clippings (from a non-chemically treated lawn), compost, green manure, crop residues or peat moss. It is best to “dig” the organic matter into your soil at least six to eight inches deep. The best time to add organic matter is in the fall, after the previous growing season. This is when soils are reasonably dry. Plant a cover crop in the fall, such as annual rye, that can be tilled into the garden soil the next spring.
till it up

Tilling can be done mechanically via a rototiller or by hand using a spade or fork. Turning soil over and exposing the lower portion helps bury surface residue so microorganisms can decompose it. If left on the surface, crop residues act as an insulator and will slow the soil warming the next spring. If you take extra time to prepare your soil in the fall, it will make it easier come spring for next year’s garden. Remember to NEVER, EVER TILL or work the soil when it is wet. If you do, the soil will form large clumps and balls and it will take even more time to create workable soil.

saving seeds

In general, it is not advised to save seeds from fruits and vegetables grown in the garden. Home-saved seeds of some crops can carry disease and seeds from hybrids will not grow true again. Some vegetables can be stored over the winter and transplanted outdoors the following spring for seed propagation. These vegetables include: beets, cabbage, carrots, onions, and rutabagas. Some vegetable seeds may be successfully saved. These include bean, lettuce, pea, pepper, and tomato seeds.

additional gardening resources and tips

For additional information on gardening check with your local county UW-Extension office or local garden shops. They can help with all sorts of gardening questions you may have including pests and diseases that you may experience in your garden.

last minute gardening tips

1. Spread Out Your Rewards: Replant beds or rows in the garden when vegetables pass their prime. For example, once the lettuce is done producing, replace the row with green beans.

2. Not Sure About the Difference of Good & Bad Bugs: Collect a sample of insects that you think are doing damage. Take your sample to an Extension agent or a garden center for identification.

3. Don’t spray insecticides when crops are flowering, because it may also kill the pollinating insects.

4. If using floating row covers, be sure to lift them off of the plants occasionally to allow pollinating insects a chance to do their job.
Fall Vegetables

Lesson Three: What do you do with fall harvest crops such as apples and pumpkins?

For November

“Apples” and “Winter Squash” from HARVEST OF THE MONTH: Network for a Healthy California and “Cucurbits Science Page” from GARDEN MOSAICS, American Community Gardening Association and Cornell University Garden-based Learning.

Students learn facts about apples and pumpkin (winter squash) – how they grow, the nutrient content and history.

Content objectives: Identify key nutrients in apples and pumpkins/winter squash;
Recognize reasons to eat apples and pumpkins; Describe how apples and pumpkins grow; Understand how fruits and vegetables ripen;
Describe a cucurbit.

Life Skill objectives: Healthy living, Critical thinking, Communication, Cooperation,
Decision making, Problem solving, Keeping record

Core and STEM concepts and skills:
Science Science as inquiry, Earth and space, Life science
Math Measurement and observation, Data
Language Arts Speaking, Listening, Writing, Viewing
Social Studies Geography, History

Healthy snack: Apple tasting, Apple Oatmeal, Pumpkin Delight

Additional and supporting resources:
Additional resources are listed in each Harvest of the Month section.
LESSON PLANS FOR 2012-13 SCHOOL YEAR, GRADE 3

November: What do you do with fall harvest crops such as apples and pumpkins?

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  Network for a Healthy California
  Cucurbits Science Page, Garden Mosaics, American Community Gardening Association and Cornell Garden-based Learning

Recipe and Taste Testing Options *(found in the lessons)*
BEFORE THE LESSON
What fall harvest crops grow where you live? Most states have access to locally grown apples and pumpkins. Thanks to the Network for a Healthy California Harvest of the Month [www.harvestofthemonth.cdph.ca.gov](http://www.harvestofthemonth.cdph.ca.gov) website, we are sharing educator newsletters that included information, recipes, and activities about these two popular fall crops.

1. Grade 3, October/November: Apples and Pumpkins
This document contains all the curriculum items and resources you need for this lesson. All lesson downloads are located on the [www.peoplesgarden.wsu.edu](http://www.peoplesgarden.wsu.edu) Educational Toolkit.

2. FIGHT BAC: Six Steps to Safer Fruits and Vegetables is a brochure from Partnership for the Food Safety Education that focuses on tips to keep fruits and vegetable safe to eat and to prevent foodborne illness.

   **FIGHT BAC: Four Simple Steps to Food Safety** is a brochure from North Dakota State University Extension Service that lists tips to clean, separate, cook, and chill food, including fruits and vegetables, to prevent foodborne illness.

You might want to make a simple poster to display in the classroom to remind everyone that about these simple steps. Go over the relevant steps before starting the cooking portion of the lesson.

3. Garden Records or Garden Journals
If you are working with a Garden Journal, you may want to have the students prepare two KWL pages about Apples and Pumpkins. Fold or divide the paper into thirds and write **Know**, **Want to Know**, and **Learned** at the top of the columns. Finish the first two columns before the lesson and the third column after the lesson. Have them keep the page in their Garden Journal.

4. Apples and Winter Squash/Pumpkins are two lessons that should be done on two different days. Please read each of the lessons in plenty of time to think through the activities and gather the supplies.

5. Recipes for Apple Oatmeal and Pumpkin Delight are found in their respective lessons which are done on different days. Be sure to have the ingredients and equipment ready to go before class. Think about how to organize the students and assign tasks to make and serve the recipes. Use locally grown apples, if possible. Be prepared to talk about if pumpkins grow in your area and why it is easier to use canned pumpkin for the recipe.

6. **Apples** by Gail Gibbons, **The Pumpkin Book** by Gail Gibbons
Both parts of this lesson include these books or similar ones about growing and eating apples and pumpkins. You can find these books at the library or purchase them online.
THE LESSONS

*Special note:* We recommend doing the Apples and Pumpkins lessons on separate days or over multiple days to fit your schedule.

1. Remember to review the appropriate steps to Fight BAC before you do the cooking activities.

2. **Lesson Part One: Apples** includes the book *Apples* by Gail Gibbons and the Network for Healthy California’s *Harvest of the Month: Apples* activities for educators. A possible lesson outline for the third graders is provided before the Harvest of the Month resource.

2. **Lesson Part Two: Pumpkins** includes the book *Pumpkins* by Gail Gibbons and the Network for Healthy California’s *Harvest of the Month: Pumpkins* activities for educators. The Garden Mosaics Cucurbits Science Page is provided for additional information. A possible lesson outline for the third graders is provided before the Harvest of the Month resource.

3. You may want to expand the lesson by choosing other activities from Harvest of the Month: Apples or Winter Squash.

**AFTER THE LESSON**

You may want to check out the apple and winter squash harvest in your area by taking a field trip to an apple orchard or pumpkin patch, visiting a farmer’s market, or inviting a local grower to talk about the apples or squash he or she grows. You can also visit the local grocery store and identify all the different members of the Cucurbit family in the produce aisle and then different ways they are sold in different parts of the grocery store.
Check
- Check to be sure that the fresh fruits and vegetables you buy are not bruised or damaged.
- Check that fresh cut fruits and vegetables like packaged salads and precut melons are refrigerated at the store before buying. Do not buy fresh cut items that are not refrigerated.

Clean
- Wash hands with warm water and soap for at least 20 seconds before and after handling fresh fruits and vegetables.
- Clean all surfaces and utensils with hot water and soap, including cutting boards, counter tops, peelers and knives that will touch fresh fruits or vegetables before and after food preparation.
- Rinse fresh fruits and vegetables under running tap water, including those with skins and rinds that are not eaten. Packaged fruits and vegetables labeled “ready-to-eat”, “washed” or “triple washed” need not be washed.
- Rub firm-skin fruits and vegetables under running tap water or scrub with a clean vegetable brush while rinsing with running tap water.
- Dry fruits and vegetables with a clean cloth towel or paper towel.
- Never use detergent or bleach to wash fresh fruits or vegetables. These products are not intended for consumption.

Separate
- When shopping, be sure fresh fruits and vegetables are separated from household chemicals and raw foods such as meat, poultry and seafood in your cart and in bags at checkout.
- Keep fresh fruits and vegetables separate from raw meat, poultry or seafood in your refrigerator.

Separate fresh fruits and vegetables from raw meat, poultry and seafood. Do not use the same cutting board without cleaning with hot water and soap before and after preparing fresh fruits and vegetables.

Cook
- Cook or throw away fruits or vegetables that have touched raw meat, poultry, seafood or their juices.

Chill
- Refrigerate all cut, peeled or cooked fresh fruits and vegetables within two hours.

Throw Away
- Throw away fresh fruits and vegetables that have not been refrigerated within two hours of cutting, peeling or cooking.
- Remove and throw away bruised or damaged portions of fruits and vegetables when preparing to cook them or before eating them raw.
- Throw away any fruit or vegetable that will not be cooked if it has touched raw meat, poultry or seafood.
- If in doubt, throw it out!
MAKE FOOD SAFETY A PRIORITY

The US food supply is among the safest in the world, but organisms that you can’t see, smell or taste – bacteria, viruses and tiny parasites – are everywhere in the environment. These microorganisms – called pathogens – can invade food and cause illness, sometimes severe and even life-threatening, especially in young children, older adults, persons with weakened immune systems and pregnant women.

Fresh fruits and vegetables are important to the health and well-being of Americans and we enjoy one of the safest supplies of fresh produce in the world. However, although low, the proportion of food-borne illness associated with fresh fruits and vegetables has increased over the last several years. As health and nutrition experts continue to recommend we add more fruits and vegetables to a healthy daily diet, it becomes increasingly important that consumers know how to handle them properly.

Handling fruits and vegetables safely is easy. Although an invisible enemy may be in your kitchen, by practicing the following recommendations you can Fight BAC!®

These messages were developed by the Partnership for Food Safety Education.

The Partnership for Food Safety Education unites industry associations, consumer and public health groups and the United States Department of Agriculture, the Environmental Protection Agency and from the Department of Health and Human Services, the Centers for Disease Control and Prevention and the Food and Drug Administration, to educate the public about safe food handling and preparation. The Partnership, a non-profit organization, is the creator and steward of the Fight BAC!® campaign, a food safety education program developed using scientifically based recommendations and resulting from an extensive consumer research process. Fight BAC!® materials are fully accessible online at www.fightbac.org and utilized by consumers, teachers, dietitians, public health officials and extension agents across the United States.

Fight BAC!® and BAC! images, © 2004, Partnership for Food Safety Education.

This material made available with support from the Produce Marketing Association. For produce education information and tools, general food safety information and to register to be a BAC!® fighter, visit www.fightbac.org today! For additional food safety information, visit www.foodsafety.gov.
Be a BAC Fighter

Make the meals and snacks from your kitchen as safe as possible. CLEAN: wash hands and surfaces often; SEPARATE: don’t cross-contaminate; COOK: to proper temperatures, and CHILL: refrigerate promptly. Be a BAC Fighter and Fight BAC!

SAFE COOKING TEMPERATURES

<table>
<thead>
<tr>
<th>Ground Meat and Meat Mixtures</th>
<th>Internal temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef, Veal, Lamb, Pork</td>
<td>160°F</td>
</tr>
<tr>
<td>Chicken, Turkey</td>
<td>165°F</td>
</tr>
<tr>
<td>Fresh Beef, Veal, Lamb</td>
<td></td>
</tr>
<tr>
<td>Medium-rare</td>
<td>145°F*</td>
</tr>
<tr>
<td>Medium</td>
<td>160°F</td>
</tr>
<tr>
<td>Well-done</td>
<td>170°F</td>
</tr>
<tr>
<td>Poultry</td>
<td></td>
</tr>
<tr>
<td>Chicken and Turkey, whole</td>
<td>165°F</td>
</tr>
<tr>
<td>Poultry Parts</td>
<td>165°F</td>
</tr>
<tr>
<td>Duck and Goose</td>
<td>165°F</td>
</tr>
<tr>
<td>Stuffing (cooked alone or in bird)</td>
<td>165°F</td>
</tr>
<tr>
<td>Fresh Pork</td>
<td></td>
</tr>
<tr>
<td>Medium-rare</td>
<td>145°F*</td>
</tr>
<tr>
<td>Medium</td>
<td>160°F</td>
</tr>
<tr>
<td>Well-done</td>
<td>170°F</td>
</tr>
<tr>
<td>Ham</td>
<td></td>
</tr>
<tr>
<td>Fresh (raw)</td>
<td>160°F</td>
</tr>
<tr>
<td>Precooked (to reheat)</td>
<td>140°F</td>
</tr>
<tr>
<td>Eggs and Egg Dishes</td>
<td></td>
</tr>
<tr>
<td>Eggs</td>
<td>Cook until yolk and white are firm</td>
</tr>
<tr>
<td>Egg Dishes</td>
<td>160°F</td>
</tr>
<tr>
<td>Seafood</td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td>145°F or flesh is opaque and separates easily with fork</td>
</tr>
<tr>
<td>Shrimp, lox, and crab</td>
<td>flesh pearly and opaque</td>
</tr>
<tr>
<td>Clams, oysters and mussels</td>
<td>shells open during cooking</td>
</tr>
<tr>
<td>Scallops</td>
<td>milky white or opaque and firm</td>
</tr>
<tr>
<td>Leftovers and Casseroles</td>
<td>165°F</td>
</tr>
</tbody>
</table>

*Allow threemminute rest time

For More Information about Safe Food Handling and Preparation

USDA's Meat and Poultry Hotline
1-888-MPHotline (1-888-674-6854); TTY 1-800-256-7072

www.foodsafety.gov

FDA's Food Information and Seafood Hotline
1-800-332-4010

Partnership for Food Safety Education Web Site
www.fightbac.org

NDSU Extension Service
www.ag.ndsu.edu/food

Or contact your local cooperative extension office.

Grade 3 November Lessons

Apply the heat... and Fight BAC!

Cooking food to the proper temperature kills harmful bacteria. So Fight BAC!® by thoroughly cooking your food as follows:
SEPARATE: Don’t cross-contaminate
Cross-contamination is how bacteria can be spread. When handling raw meat, poultry, seafood and eggs, keep these foods and their juices away from ready-to-eat foods. Always start with a clean scene—wash hands with warm water and soap. Wash cutting boards, dishes, countertops and utensils with hot soapy water.

- Separate raw meat, poultry, seafood and eggs from other foods in your grocery shopping cart, grocery bags and in your refrigerator.
- Use one cutting board for fresh produce and a separate one for raw meat, poultry and seafood.
- Never place cooked food on a plate that previously held raw meat, poultry, seafood or eggs.

COOK: Cook to proper temperatures
Food is safely cooked when it reaches a high enough internal temperature to kill the harmful bacteria that cause illness. Refer to the chart on the back of this brochure for the proper internal temperatures.

- Use a food thermometer to measure the internal temperature of cooked foods. Make sure that meat, poultry, egg dishes, casseroles and other foods are cooked to the internal temperature shown in the chart on the back of this brochure.
- Cook ground meat or ground poultry until it reaches a safe internal temperature. Color is not a reliable indicator of doneness.
- Cook eggs until the yolk and white are firm. Only use recipes in which eggs are cooked or heated thoroughly.
- When cooking in a microwave oven, cover food, stir and rotate for even cooking. Food is done when it reaches the internal temperature shown on the back of this brochure.
- Bring sauces, soups and gravy to a boil when reheating.

CHILL: Refrigerate promptly
Refrigerate foods quickly because cold temperatures slow the growth of harmful bacteria. Do not over-stuff the refrigerator. Cold air must circulate to help keep food safe. Keeping a constant refrigerator temperature of 40°F or below is one of the most effective ways to reduce the risk of foodborne illness. Use an appliance thermometer to be sure the temperature is consistently 40°F or below. The freezer temperature should be 0°F or below.

- Refrigerate or freeze meat, poultry, eggs and other perishables as soon as you get them home from the store.
- Never let raw meat, poultry, eggs, cooked food or cut fresh fruits or vegetables sit at room temperature more than two hours before putting them in the refrigerator or freezer (one hour when the temperature is above 90°F).
- Never defrost food at room temperature. Food must be kept at a safe temperature during thawing. There are three safe ways to defrost food: in the refrigerator, in cold water, and in the microwave. Food thawed in cold water or in the microwave should be cooked immediately.
- Always marinate food in the refrigerator.
- Divide large amounts of leftovers into shallow containers for quicker cooling in the refrigerator.
- Use or discard refrigerated food on a regular basis. Check USDA cold storage information at www.fightbac.org for optimum storage times.
Lesson Part One: Apples
This lesson includes the book Apples by Gail Gibbons and the Network for Healthy California’s Harvest of the Month: Apples activities for educators. Here is the sequence and activities that we recommend for the third graders.

A. Read aloud and show the pictures of Apples by Gail Gibbons. The rest of the activities will tie back to the book.

The following activities are from Harvest of the Month: Apples.
B. Page 3, “Just the Facts”: Reveal the three facts after asking the following questions.
   1a.) Red and Golden Delicious, Gala, Granny Smith are examples of varieties of apples. What is your guess on how many varieties of apples are grown in the United States?
   1b.) What state is, by far, the largest apple-growing state? Washington is the largest. New York is a distant second. Most of the apples come to Iowa from Washington state.
   However, during the four-month growing season, Iowa growers supply about one third of the apples consumed in Iowa. Although apples are not a large crop for Arkansas, they have a large number of orchards to supply communities with apples.

   2.) A medium size apple with the skin is a slim 80 calories, provides vitamins and minerals but is best known as a good source of fiber. All those nutritional characteristics of apples make them a healthy choice for us to eat. What part of the apple provides us with the healthiest benefits?

   3a.) How many of the apples consumed are made into other apple products – one-third, one half, or three-fourths? (Stop reading the answer after the words “fresh form”.)
   3b.) What are some things you like to eat that are made from apples?

C. Page 2, “How Do Apples Grow?”: Skip the first paragraph. Ask the students to describe how an apple tree grows and produces apples. Then read the second paragraph. You may want to cut into an apple to find the carpels and the seeds and count the number of seeds as you read the third paragraph. Ask the students how many seeds it takes to grow one apple tree and have them think about the millions of seeds that one seed produces in a tree’s lifetime.

D. Page 1: Ask the students to list why it is good to eat apples and read the “Reasons to Eat Apples.” Make the “Apple Oatmeal” and enjoy eating it!

E. Page 3: Do the “Physical Activity Corner”, Grab the Apple! activity. As a review, have the pairs of students chose what variety or kind of apple they would like their bean bags or balls to represent. The student that grabbed the apple first can tell the other person how he or she would like to eat the apple, for example, as a fresh apple, applesauce, apple pie, etc.
Health and Learning Success Go Hand-In-Hand

Increasing fruit and vegetable consumption tends to increase academic performance in undernourished children. *Harvest of the Month* connects with core curricula to give students the chance to explore, taste, and learn about the importance of eating fruits and vegetables. It links the classroom, cafeteria, home, and community to help students make healthy food choices and be physically active every day.

Exploring California Apples: Taste Testing

**What You Will Need (per group of 6-8 students):**
- 3-5 apples (each in a different variety*), sliced**
- Graph paper and colored pencils

*Refer to *Home Grown Facts* on page 3 for varieties.
**To prevent browning, keep sliced apples in 100% apple juice until start of activity.

**Activity:**
- Observe, touch, smell, and taste each apple variety.
- Develop a color graph using appearance, texture, smell, flavor, and sound.
- Compare and contrast the varieties.

**For more ideas, reference:**

Cooking in Class: Apple Oatmeal

**Makes 36 tastes at ¼ cup each.**

**Ingredients:**
- 3 large apples, cored
- 3 cups quick cooking oats
- ½ tablespoon ground cinnamon
- ¾ teaspoon salt
- 5¼ cups 100% apple juice
- Small cups and spoons

1. Chop apples into bite-sized chunks.
2. Combine apple chunks, oats, cinnamon, salt, and apple juice in a large microwave-safe bowl. Cover bowl with lid or plastic wrap. Leave a little opening for steam to get out.
3. Microwave on high for 3-4 minutes, stirring once after 2 minutes.
4. Stir and let cool 1 minute before serving.

**Nutrition Facts**

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Adapted from: *Kids...Get Cookin’!, Network for a Healthy California—Children’s Power Play! Campaign, 2009.*

Reasons to Eat Apples

- A ½ cup of sliced apples is a source of fiber. Dietary fiber is a complex carbohydrate. There are three main types of carbohydrates: starch, fiber, and sugar.*
- Eating a variety of colorful fruits and vegetables throughout the day will help you meet the recommended daily values of nutrients that your body needs to be healthy.
- Apples can be eaten in a variety of forms — as whole (fresh), unsweetened applesauce, dried apples, or 100% apple juice.

*Learn about sugar on page 2.

**Champion Sources of Fiber**:  
- Beans  
- Blackberries  
- Dates  
- Peas  
- Pumpkin  
- Raspberries  
- Whole wheat cereal  
- Whole wheat bread

*Champion foods provide a good or excellent source of fiber.
**What is Sugar?**
- Carbohydrates are the body’s main source of energy. There are three kinds of carbohydrates: starch, fiber, and sugar.
- Sugar is found only in foods of plant origin. In food, sugar is classified as either naturally occurring or added.
- Naturally occurring sugars include lactose in milk and fructose in fruit, honey, and vegetables.
- Added sugars (white, brown, powdered, and corn syrup) are originally made from sugar beets, sugar cane, corn, and grapes.
- Naturally occurring sugars (except honey) are usually found in foods along with vitamins and minerals, while added sugars provide calories and very few vitamins and minerals. Therefore, added sugars are often called empty calories.

For more information, visit: [http://food.oregonstate.edu/learn/sugar.html](http://food.oregonstate.edu/learn/sugar.html)

**Botanical Facts**

**Pronunciation:** âpel

**Spanish name:** manzana

**Family:** Rosaceae

**Genus:** Malus

**Species:** M. domestica

Apples are the fruit of plants of the genus *Malus* in the family Rosaceae (rose family). Domestic or table apples are of the species *M. domestica* and are one of the most widely cultivated tree fruits.

*Malus sieversii* is the wild ancestor of *M. domestica*, and its trees can still be found in the mountains of Central Asia. In fact, the former capital of Kazakhstan, *Almaty*, means “father of the apple.” Wild apples (common name for *M. sieversii*) resist many diseases and pests that affect domestic apples, and they are often researched and used in the development of new disease-resistant apples.

For more information, visit: [www.urbanext.uiuc.edu/apples/](http://www.urbanext.uiuc.edu/apples/)

**How Much Do I Need?**

A ½ cup of sliced apples is about one cupped handful. This is about the size of half of a small apple. The amount of fruits and vegetables each person needs depends on age, gender, and physical activity level.

**Activity:**
Visit [www.choosemyplate.gov](http://www.choosemyplate.gov) and have students determine how many cups of fruits and vegetables they need to eat every day. Have students write down their goals and make a daily log for tracking how many fruits and vegetables they eat each day.

**Recommended Daily Amount of Fruits and Vegetables**

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<th>Teens and Adults, Ages 13 and up</th>
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<tr>
<td><strong>Males</strong></td>
<td>2 ½ - 5 cups per day</td>
<td>4 ½ - 6 ½ cups per day</td>
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<tr>
<td><strong>Females</strong></td>
<td>2 ½ - 5 cups per day</td>
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</tbody>
</table>

*If you are active, eat the higher number of cups per day. Visit [www.choosemyplate.gov](http://www.choosemyplate.gov) to learn more.

**How Do Apples Grow?**

Apple trees grow in the temperate regions of the world. Apple trees are best adapted to places where the average winter temperature is near freezing for at least two months, though many varieties can withstand winter temperatures as low as -40 F.

Apple trees are deciduous. In late spring, white blossoms appear from the tiny buds on apple tree branches for about nine days and produce pollen and nectar. Bees help to cross-pollinate the blossoms, the first step in forming an apple.

The seeds are distributed among an apple’s five seed chambers, called carpels, found near the core. Seed development stimulates the apple tissue development. Apples continue to grow until late summer when they are ready to harvest and eat.

**A Slice of Apple History**

Apples have existed for the length of recorded history and are believed to have originated in the Caucasus, a mountainous area between what are now the Black and Caspian Seas.

Through the rise of Greece, the fall of Persia and migrations to Rome and Europe, apples were cultivated and — through a process called grafting, which produces new varieties — disseminated throughout various cultures. Apples experienced surges of popularity and, at one point, some varieties were nearly lost, but were saved due to traditional orcharding by the English church.

Apple growing arose again in 15th century Renaissance Italy. Eventually, France and England followed suit, and the fruit remained popular in Europe well into the 1800s, when European settlers brought apples with them to the Americas to share the cultivation and traditions.

**Apple Blossom**

Source: [www.usapple.org/educators/applestore/4-6guide.pdf](http://www.usapple.org/educators/applestore/4-6guide.pdf)
Physical Activity Corner
Healthy nutrition is only one part of the equation to achieving optimal learning in the classroom; physical activity is another important part. Children need at least 60 minutes of physical activity every day to stay fit both mentally and physically. Commit to playing a different game or activity, like Grab the Apple!, each week in or out of the classroom.

Grab the Apple!
Objective: Develops listening and fine motor skills (reflexes)

Equipment:
- One “apple” (foam ball or bean bag) for each pair of students
- Whistle or music

Preparation:
- Pairs sit cross-legged on floor facing each other, hands on knees
- Place box, with apple on top, between pairs
- Use START (whistle/music) cue to lead activity

Activity:
- On START cue, grab the apple before partner
- Variations:
  - Call out a specific hand to grab the apple
  - Start with hands on shoulders
  - Start in sit-up position (on back, knees bent)
  - Start in push-up position (on stomach, face down)

Go Farther:
Ask students to think of different starting positions to try.

Bring It Home:
Encourage students to play Grab the Apple! with family members.

For more ideas, visit: www.sparkpe.org

Student Sleuths
1 Why is fiber important?
2 Apples contain natural fructose.
   What is natural fructose and what are its benefits?
3 Why do apples float in water?
4 What does the color of an apple’s skin tell you about the environment where it was grown?
5 Map the origin of the apple and various geographical regions in California where apples are grown.
6 List the top five varieties of apples commercially produced in California and the counties that grow them.
7 Determine how much of the apples harvested in California go into processed foods/ juices and how much is sold whole/fresh.

For information, visit: www.calapples.org
www.usapple.org
www.fruitsandveggiesmatter.gov/month/apple.html

Cafeteria Connections
- Have students investigate what types of apples are used in the cafeteria. Talk with the school nutrition staff to find out why these varieties are selected. Then, write letters to the school nutrition staff promoting the benefits of locally grown apples (cost, flavor, etc.).

www.nal.usda.gov/kids
www.agclassroom.org

School Garden: Savvy Seeds
If your school has a garden, here is an activity you may want to implement. Look for donations to cover the cost of seeds, tools, irrigation systems, electric pumps, and any salary incurred by garden educators or others.

As fall weather spells an end to some school gardens, encourage students to become seed detectives by identifying, collecting, and saving their own seeds from the garden or in the wild. Some fruits and vegetables to consider: melons, tomatoes, beans, peas, peppers, pumpkins, squash, and corn.

Class Discussion
- How do plants grow from seeds?
- What nutrients do plants need for optimal growth?
- Compare plant nutrients with the nutrients humans need. Explain why it is so important for us to eat plenty of plant foods, especially fruits and vegetables.

For more ideas, visit: www.kidsgardening.com

Home Grown Facts
- The apple industry in California dates back to the 1800s, when two early orchards were cultivated in Watsonville and Sebastopol along the Central and Northern coastal regions. Today there are more than 450 growers.
- California ranks fifth in commercial apple production in the United States — an impressive accomplishment achieved in about 25 years of serious production.
- California is known for its variety of apples and continual production of new varieties. Examples include the Red Delicious, Golden Delicious, Gala, Fuji, Granny Smith, McIntosh, Rome, Jonathon, and Pink Lady.
- California apples are harvested throughout the year and many varieties are available year-round.

For more information, visit: www.calapples.org

Just the Facts
- About 2,500 apple varieties are grown in the United States and more than 7,500 are grown worldwide.
- Apples are best when eaten with the peel, as that is where most of the fiber and antioxidants are found.
- Almost one-half of all apples consumed are not in their fresh form, but rather as applesauce, apple juice, and jellies or jams. Apples can even be used to replace fat and butter in baked goods. (Replace shortening or oils in baking with an equal volume of applesauce plus one-third of the oil called for in the recipe.)
The FITNESSGRAM, a state-required Physical Fitness Test, is administered in spring for students in grades five, seven, and nine. The FITNESSGRAM is a set of tests designed to evaluate health-related fitness, with the goal of helping students establish lifetime habits of regular physical activity. Remind students that the FITNESSGRAM is not pass or fail, but the launching pad to a lifetime of health.

The FITNESSGRAM is designed to assess the three basic components of fitness:

1. aerobic capacity
2. body composition
3. muscle strength

Muscle strength is divided into four areas: abdominal strength and endurance; trunk extensor strength and flexibility; upper body strength and endurance; and overall flexibility.

Discuss with your class the importance of physical activity and encourage students to get more physical activity. Identify two activities you can do as a class regularly.

Examples include:
1. Jogging outside around the track or school
2. Doing jumping jacks in class for one minute
3. Taking stretch breaks after quizzes or exams

For more information, visit:
- www.cde.ca.gov/ta/tg/pf
- www.cde.ca.gov/re/pn/fd/documents/pefrwk.pdf
- www.cdc.gov/nccdphp/dnpa/physical/index.htm

Have students gather their favorite nutritious apple recipes.* Brainstorm ideas on how to incorporate apples into school breakfast and lunch menus. Have them meet with school nutrition staff to share their ideas.

Ask students to note during their next trip to the grocery store where the apple displays are located. Are they in the front, back, or on the side? How many varieties do they have available?

*Visit www.cachampionsforchange.net for a variety of nutritious recipes.
Apples

Primary

- *Apple Fractions* by Jerry Pallotta (Cartwheel, 2003)
- *Autumn is for Apples* by Michelle Knudsen (Random House Books, 2001)
- *Folks Call Me Appleseed John* by Andrew Glass (Doubleday, 1995)
- *Johnny Appleseed: My Story* by David Harrison (Random House, 2001)
- *The Life and Times of the Apple* by Charles Micucci (Scholastic, 1995)
- *The Story of Johnny Appleseed* by Aliki (Aladdin, 1987)
- *Up, Up, Up! It’s Apple-Picking Time* by Jody Fickes-Shapiro (Holiday House, 2008)

Secondary

- *Agricultural History*, University of California Press, Journals Division
- *Fruits and Vegetables for Health* by Brenda Byers and Priscilla Naworski (California Foundation for Agriculture in the Classroom, 2003)

Please note that *Harvest of the Month* book lists are a compilation of books recommended by our partners, including the California Department of Education, California Foundation for Agriculture in the Classroom, and local agencies. These books are neither endorsed nor reviewed by the *Network for a Healthy California*.

Updated: September 2011
Apples

Source: www.usapple.org/EduMaterials.html
## Apples

### Nutrition Facts

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NDB No: 09003
Apple
Rosaceae Malus domestica
(analysis based on unpeeled raw apple)
Pictured from left: Fuji, Yellow Delicious, Red Delicious, Granny Smith apples
Physical Activity Promotion

Grab the Apple

Equipment Needed:
- Boxes (any size)
- Apples, plastic or real, (one apple and box per two students)
- Whistle or music

Step-By-Step:
Pre-Explanation:
- This game is suitable to be played either in the classroom or in a multi-purpose room.
- Have students chose a partner, or chose one for them.
- Have the pairs of students sit cross-legged on the floor, facing each other, hands on knees.
- Place box upside down, place apple on top, between pairs.
- Explain to the students that the object of the game is to grab the apple before their partner does.
- Use a whistle or music as a START to cue to lead activity.

Implementation:
- On START cue both students will reach to grab the apple.
- The student that grabs the apple first is the winner.
- Repeat activity for desired length of time.

Follow Up:
Class discussion:
(to be used to integrate Harvest of the Month along with the physical activity)
- How apples help keep our bodies growing and staying strong and healthy.
- Which nutrients apples provide our bodies.
- What is significant about the different colors of apples.
- Which muscle group(s) were used during this activity.

Expansion Ideas:
Use different variations depending on level of difficulty:
- Call out a specific hand to grab the apple.
- Start out with hands on their shoulders, instead of on their knees.
- Start in sit-up position (on back, knees bent).
- Start in push-up position (on stomach, face down).
- Ask students if they have any starting positions to try.

Adapted from the Network for a Healthy California Harvest of the Month Educator Newsletter (Apples)
www.harvestofthemonth.com

This material was produced by the California Department of Public Health’s Network for a Healthy California, with funding from the USDA Supplemental Nutrition Assistance Program (formerly the Food Stamp Program). These institutions are equal opportunity providers and employers. In California, food stamps provide assistance to low-income households, and can help buy nutritious foods for better health. For food stamp information, call 877-847-3663. For important nutrition information visit www.cachampionsforchange.net.
Lesson Part Two: Pumpkins and Winter Squash
This lesson includes the book *Pumpkins* by Gail Gibbons and the Network for Healthy California’s *Harvest of the Month: Winter Squash* activities for educators. The Garen Mosaics Cucurbits Science Page is provided for additional information. Here is the sequence and activities that we recommend for the third graders.

A. Read aloud and show the pictures of *Pumpkins* by Gail Gibbons. The rest of the activities will tie back to the book.

The following activities are from *Harvest of the Month: Winter Squash*.

B. Pages 1 and 3: Combine and shorten two activities. Read the first three facts under the “A Taste of Squash History” on page 3 and do the “Exploring California Winter Squash: Taste Testing” with the following changes.
   1.) Show three or four members of the Cucurbit family such as a fresh pumpkin, another kind of squash such as zucchini or acorn, and a cucumber.
   2.) Talk about similar and different characteristics of the samples.
   3.) If possible, you may want to try bite-size samples of each.

C. Page 4: Read “Just the Facts” and have the students identify their favorite ways to eat pumpkins such as pumpkin pie, bread, muffins, pancakes, roasted seeds, etc. Ask if anyone has eaten the shoots, leaves, tendrils or blossoms.

D. Page 1: Read the “Reasons to Eat Winter Squash” section and ask them if they think eating pumpkins is healthy. Make the “Pumpkin Delight” and enjoy eating it!

E. Page 4: Do the Physical Activity Corner activity.
Health and Learning Success Go Hand-In-Hand
School breakfast programs increase learning and academic achievement, improve student attention to academic tasks, reduce visits to the school nurse, and decrease behavioral problems. Help promote the school breakfast and meals program to your students. Use Harvest of the Month to encourage students to eat healthfully and be active.

Exploring California Winter Squash: Taste Testing
What You Will Need:
- Three to five different winter squash varieties, whole and sliced*
- One of each variety per every four students
- Nutrition labels for each variety**
- Dry erase board, markers
*See Botanical Facts on page 2 for varieties.

Activity:
- Examine squash noting color (skin and flesh), texture, sound, and smell.*
- Chart observations on board.
- Analyze nutrition information.
- Chart three highest nutrient levels.
- Compare and contrast varieties.
- Discuss differences in nutrient levels and how they may be related to characteristics like flesh color.

*Note: Tasting raw winter squash is not recommended.

For more ideas, reference:

Nutrition Facts
Serving Size: ½ cup cooked acorn squash, cubed (103g)

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Cooking in Class: Pumpkin Delight
Makes 36 tastes at 2 tablespoons each

Ingredients:
- 2 (15-ounce) cans 100% pure pumpkin
- 2 tablespoons of pumpkin pie spice
- 1 sleeve of lowfat graham crackers
- 1 tablespoon of honey*
- Small paper plates
- Small plates and forks

1. Place the pumpkin in a large bowl.
2. Stir pumpkin spice and honey thoroughly into the pumpkin.
3. Crumble all graham crackers into the pumpkin mixture and stir until well blended. Mixture will be chunky.

*Do not give honey to children under the age of one. Lowfat vanilla yogurt may be used in place of honey.

Nutrition information per serving:
Calories 40, Carbohydrate 8 g, Dietary Fiber 0 g, Protein 0 g, Total Fat 0 g, Saturated Fat 0 g, Trans Fat 0 g, Cholesterol 0 mg, Sodium 53 mg

Adapted from: Tasting Trio Team, Network for a Healthy California, 2010.

Reasons to Eat Winter Squash
A ½ cup of cooked winter squash provides:
- An excellent source of vitamin A (butternut, hubbard, and pumpkin).
- A good source of vitamin C (acorn, butternut, hubbard, and pumpkin).
- A good source of fiber (acorn, butternut, and hubbard).
- A good source of potassium (acorn and hubbard).
- A good source of magnesium, thiamin, and vitamin B6 (acorn).
- A source of iron* (acorn).

*Learn about iron on page 2.

Champion Sources of Iron*:
- Beans
- Fortified cereal
- 100% prune juice
- Pumpkin seeds
- Soybeans and soybean nuts

*Champion sources provide a good or excellent source of iron.

For more information, visit:
www.eatright.org/Public/content.aspx?id=3608&terms=winter+squash
www.nal.usda.gov/fnic/foodcomp/search/ (NDB No: 11483)

For more ideas, visit:
www.cachampionsforchange.net

WINTER SQUASH

Nutrition information per serving:
Calories 40, Carbohydrate 8 g, Dietary Fiber 0 g, Protein 0 g, Total Fat 0 g, Saturated Fat 0 g, Trans Fat 0 g, Cholesterol 0 mg, Sodium 53 mg

Adapted from: Tasting Trio Team, Network for a Healthy California, 2010.

For more ideas, visit:
www.cachampionsforchange.net

WINTER SQUASH

Nutrition information per serving:
Calories 40, Carbohydrate 8 g, Dietary Fiber 0 g, Protein 0 g, Total Fat 0 g, Saturated Fat 0 g, Trans Fat 0 g, Cholesterol 0 mg, Sodium 53 mg

Adapted from: Tasting Trio Team, Network for a Healthy California, 2010.

For more ideas, visit:
www.cachampionsforchange.net
**What is Iron?**

- Iron is a mineral that helps move oxygen from the lungs to the rest of the body. It also helps keep red blood cells healthy and helps the body fight infections.
- Even though iron is found in many foods, low iron levels are a common nutrition problem.
- Iron carries oxygen throughout your body so cells can produce energy. When iron levels are low, you may feel fatigued, weak, and have difficulty tolerating extreme temperatures.
- Iron in food exists as two types, heme and non-heme. Animal foods such as meat, fish, and poultry provide heme. Your body uses this type of iron most effectively. Non-heme is found in plant foods like spinach and beans and isn't as well absorbed by the body.
- You can add to your iron intake by choosing a variety of animal and plant foods and by eating foods rich in vitamin C, which helps your body absorb the iron in plant foods (especially important for vegetarians). Eat a variety of foods to be sure you get enough iron.

Source: www.eatright.org

For more information, visit: http://lpi.oregonstate.edu/infocenter/minerals/iron/

---

**Student Sleuths**

1. What are some nutritional benefits of winter squash?
2. How do the nutrients vary between different varieties?
3. What is iron? What does it do for the body? How much iron do you need? Make a list of foods that are good and excellent sources of iron.* Then, develop a daily meal plan that will meet your daily iron needs.
4. Search for recipes with winter squash. List the various ways squash can be prepared.
5. Go to the grocery store and identify all of the different varieties of winter squash. Do a price cost comparison. What are the most and least expensive varieties?
6. What are the top three squash-producing countries in the world? Hypothesize why these countries lead squash crop production.

*Good sources provide 10-19% of the recommended Daily Value (DV). Excellent sources provide 20% or more of DV.

For information, visit:
www.eatright.org
www.ers.usda.gov
www.nal.usda.gov/fnic/foodcomp/search
www.choosemyplate.gov/MenuPlanner/downloads/
RateWhatYouAte.pdf

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**Botanical Facts**

**Pronunciation:** win-tar - skwôsh  
**Spanish name:** calabaza  
**Family:** Cucurbitaceae  
**Genus:** Cucurbita  
**Species:** C. maxima Duchesne

Squash are gourds belonging to the Cucurbita genus. Gourds, along with cucumbers and melons, are vine crops of the Cucurbitaceae family. The word “squash” is derived from the Native American askutasquash meaning “food eaten raw.”

There are two main squash varieties: winter and summer. Winter squash are not grown or harvested in winter, but picked when fully ripe and feature a hard shell (rind) with thick, inedible skin and hollow seed cavity with fully developed seeds. The thick shell allows it to be stored for several months. (Summer squash are picked immature and have a soft shell.)

The most common varieties of winter squash grown in the United States include:
- **Acorn**, a smaller, acorn-shaped squash with dark green skin, deep furrows, and yellow-orange flesh.
- **Butternut**, a long, pear-shaped squash with tan skin and orange, sweet flesh; the most popular variety.
- **Butternut** or **Turban**, named for its “wrapped” layers, usually a dark green shell with orange, mealy flesh.
- **Hubbard**, a golden or green squash notable for its bumpy, thick skin.
- **Pumpkin**, the largest squash variety with bright orange, ribbed skin, and orange flesh.
- **Spaghetti**, a yellow-skinned squash whose flesh forms translucent spaghetti-like strands when cooked.

For more information, visit: www.urbanext.uiuc.edu/veggies/wsquash1.html

**How Much Do I Need?**

A ¼ cup of cooked winter squash is about one cupped handful. The amount of fruits and vegetables that each person needs depends on age, gender, and physical activity level. Fruits and vegetables are an important part of an overall healthy diet.

Have students visit http://teamnutrition.usda.gov/resources/mypyramidclassroom.html to learn about the recommended daily amounts for all food groups. Use the student worksheets to help students write down and track their food group goals.

For more ideas, visit:
www.choosemyplate.gov/MenuPlanner/downloads/
RateWhatYouAte.pdf

**Recommended Daily Amount of Fruits and Vegetables**

<table>
<thead>
<tr>
<th></th>
<th>Kids, Ages 5-12</th>
<th>Teens and Adults, Ages 13 and up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>2½ - 5 cups per day</td>
<td>4½ - 6½ cups per day</td>
</tr>
<tr>
<td>Females</td>
<td>2½ - 5 cups per day</td>
<td>3½ - 5 cups per day</td>
</tr>
</tbody>
</table>

*If you are active, eat the higher number of cups per day. Visit www.choosemyplate.gov to learn more.
How Does Winter Squash Grow?

Winter squash are warm-weather plants requiring pollination for fruit development. Until recently, squash plants were grown exclusively on vines. Today, more growers are using a hybridized, compact “bush” variety that allows for more plants per acre.

### Vine and Bush Squash

<table>
<thead>
<tr>
<th>Temperature</th>
<th>70-90 F (sensitive to frost)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred soil</td>
<td>Rich, sandy loam soil, well drained, heavy fertilization (or added compost)</td>
</tr>
<tr>
<td>Exposure</td>
<td>Full sun with steady water supply</td>
</tr>
<tr>
<td>Planting</td>
<td>Seeds on hills or raised beds (6 to 10 feet apart, 4 to 6 seeds per hill)</td>
</tr>
<tr>
<td>Flowers</td>
<td>Multiple male blossoms on long stems; few females, swollen at base of plant</td>
</tr>
<tr>
<td>Pollination</td>
<td>Bees transfer pollen from male to female blossoms; USDA recommends one hive per acre</td>
</tr>
<tr>
<td>Harvesting</td>
<td>Occurs at mature fruit stage, usually 80 to 100 days after planting (typically in fall months)</td>
</tr>
</tbody>
</table>

For more information, reference:

www.kidsgardening.com  

A Taste of Squash History

- Gourds, cucumbers, and melons are all part of the Cucurbit family, but all have different origins. Squash and pumpkins are native to the Americas, while cucumbers originated in eastern Asia, and melons in Africa or Persia.
- Squash are one of the oldest cultivated crops in the Western Hemisphere. Seeds found in Mexico have been dated as 10,000 years old.
- Squash were originally cultivated for their seeds, as early varieties did not contain much flesh and were very bitter.
- Squash were one of the “Three Sisters” planted by the Iroquois. The Iroquois myth describes three sisters that were inseparable. These plants — squash, maize (corn), and beans — were staples of nearly every Native American tribe.
- Winter squash first migrated to Europe from Peru by Spanish Explorer Francisco Pizarro in the early 16th century. Many Europeans referred to squash as “melons.”
- Winter squash became a staple food of early colonists and eventually traveled West with Americans, producing better crops in warmer states like California.

Adventurous Activities

Celebrate National School Lunch Week by having students write journal entries every day of what they ate for lunch. Have students monitor how they feel (e.g., tired, energetic, etc.). Use the NutritionData© Custom Data Entry tool to complete a nutrient analysis of their lunches (www.nutritiondata.com). Compare journal entries between school lunches and lunches from home.

For more activities, visit:  
www.harvestofthemonth.com

Home Grown Facts

- California leads the nation in total squash production (20%), followed by Florida (18%), Michigan (17%), and Georgia (15%).
- California ranks third behind Michigan and Oregon in production of squash for processing (15% of total squash acreage).
- Squash production takes place mostly in central San Joaquin Valley, with summer squash accounting for more acreage than winter squash.

For more information, visit:  
www.cdfa.ca.gov

Adapted from: Hot as a Pepper, Cool as a Cucumber, Meredith Sayles Hughes, 1999. To download reproducible botanical images, visit the Educators’ Corner at www.harvestofthemonth.com.
Physical Activity Corner
California’s Physical Education Content Standards emphasize educating students on the importance of a healthy lifestyle that includes nutritious foods and regular physical activity. Help reinforce this message in the classroom. Demonstrate how being active is not limited to doing outdoor activities or organized sports.

Discussion:
- Break students into small groups and have them discuss how they can be active for 60 minutes every day doing a variety of indoor and outdoor activities each day. Have each group share at least one answer and demonstrate to the class.
- Discuss ways students can increase their physical activity in everyday activities such as while grocery shopping, doing household chores, etc.

For physical activity ideas, visit: www.ncpe4me.com

Cafeteria Connections
Winter squash are available in many varieties. Butternut, acorn, and spaghetti are most common, but students may not be as familiar with others like banana and kabocha. Help students taste and learn about different varieties.
- Work with your school nutrition staff to set up a “Winter Squash” display in the cafeteria. Label each variety and provide the nutrition information.”
- Invite school nutrition staff to help with the Exploring California Winter Squash activity (page 1).
- Organize a “Squash Naming” contest. Display a number of winter squash and post the variety names above in scrambled order. Ask students to match the name with the correct variety.


Just the Facts
- Referred to as a vegetable in cooking, squash are actually fruits of vines of the Cucurbita genus.
- Native Americans believed squash seeds increased fertility and called squash “the apple of God.”
- In Native American, the word “squash” means “eaten raw” but winter squash are almost never eaten raw.
- Besides the fruit, other edible parts of squash plants include the seeds (eaten whole, toasted, ground into paste, or pressed for oil); shoots, leaves, and tendrils (eaten as greens); and blossoms (used for cooking and decoration).

For more information, visit: www.vegparadise.com

School Garden: Plant Parts We Eat
If your school has a garden, here is an activity you may want to implement. Look for donations to cover the cost of seeds, tools, irrigation systems, electric pumps, and any salary incurred by garden educators or others.

Squash plants have many edible parts including the fruits, leaves, flowers, and seeds. Many other plants have multiple edible parts, like beets, strawberries, and pumpkins. Some plants have edible fruit but poisonous leaves, like tomatoes. Use the CDE Fruit and Vegetable Photo Cards and/or school garden to help students learn the plant parts we eat — roots, stems, leaves, fruits, flowers, and seeds.
- Assign a plant part to groups of students
- Have groups research and report on assigned part, including examples
- Visit school garden and have students identify plants and their edible parts

Adapted from: Nutrition to Grow On, CDE, 2001, pp. 10-17.

Student Champions
- Invite older students to work with younger students to plant a “Three Sisters” garden plot (squash, corn, beans) at school or in a community garden. Enlist help of neighbors, family, and friends.
- Using the knowledge they have gained about nutrition, have students find healthy recipes featuring winter squash. Encourage students to visit local grocery stores and provide them with these recipes to promote as “school specials.” Students can offer to include special artwork to help the store show patrons how they are supporting a local school.

For more ideas, visit: www.schoolnutrition.org

Literature Links
- Elementary: Carlos and the Squash Planet (bilingual) by Jan Romero Stevens, Plant Plumbing: A Book About Roots and Stems by Susan Blackaby, and Pumpkin Soup by Helen Cooper.

For more ideas, visit: www.cfaitc.org/trg/pdf/trg2009.pdf
Winter Squash

Primary

- *Carlos and the Squash Plant* (bilingual) by Jan Romero Stevens (Luna Rising, 1999)
- *Delicious: A Pumpkin Soup Story* by Helen Cooper (Doubleday, 2006)
- *Vegetables (Good for Me)* by Sally Hewitt (Powerkids Press, 2008)

Secondary

- *Squashed* by Joan Bauer (Speak, 2005)
- *The Legend of Sleepy Hollow* by Washington Irving (Filiquarian, 2007)

Please note that *Harvest of the Month* book lists are a compilation of books recommended by our partners, including the California Department of Education, California Foundation for Agriculture in the Classroom, and local agencies. These books are neither endorsed nor reviewed by the *Network for a Healthy California*.

Updated: September 2011
Winter Squash

Adapted from: *Hot as a Pepper, Cool as a Cucumber*, Meredith Sayles Hughes, 1999.
Acorn Squash

Nutrition Facts
Serving Size: ½ cup cooked acorn squash, cubed (103g)
Calories 57
Total Fat 0g 0%
Saturated Fat 0g 0%
Trans Fat 0g
Cholesterol 0mg 0%
Sodium 4mg 0%
Total Carbohydrate 15g 5%
Dietary Fiber 5g 18%
Sugars
Protein 1g
Vitamin A 9%
Vitamin C 19%
Calcium 5%
Iron 5%
Other nutrients: Potassium (13%), Magnesium (11%), Thiamin (11%), Vitamin B6 (10%), Folate (5%), Niacin (5%)
Source: www.nal.usda.gov/fnic/foodcomp/search/
NDB No: 11483
Butternut Squash

**Nutrition Facts**

<table>
<thead>
<tr>
<th>Serving Size: ½ cup cooked butternut squash, cubed (103g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories 41</td>
</tr>
<tr>
<td>% Daily Value</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Total Fat 0g</td>
</tr>
<tr>
<td>Saturated Fat 0g</td>
</tr>
<tr>
<td>Trans Fat 0g</td>
</tr>
<tr>
<td>Cholesterol 0mg</td>
</tr>
<tr>
<td>Sodium 4mg</td>
</tr>
<tr>
<td>Total Carbohydrate 11g</td>
</tr>
<tr>
<td>Dietary Fiber 3g</td>
</tr>
<tr>
<td>Sugars 2g</td>
</tr>
<tr>
<td>Protein 1g</td>
</tr>
<tr>
<td>Vitamin A 229%</td>
</tr>
<tr>
<td>Vitamin C 26%</td>
</tr>
</tbody>
</table>

Other nutrients: Magnesium (8%), Potassium (8%), Vitamin B6 (6%), Folate (5%), Thiamin (5%), Niacin (5%), Beta-carotene (4,684mcg), Alpha-carotene (1,158mcg)


NDB No: 11486
Hubbard Squash

Nutrition Facts

<table>
<thead>
<tr>
<th>Serving Size: ½ cup cooked hubbard squash, cubed (103g)</th>
<th>Calories 51</th>
<th>Calories from Fat 0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% Daily Value</td>
<td></td>
</tr>
<tr>
<td>Total Fat 1g</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Saturated Fat 0g</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Trans Fat 0g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cholesterol 0mg</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Sodium 8mg</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Total Carbohydrate 11g</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Dietary Fiber 3g</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>Sugars</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein 3g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin A 124%</td>
<td>Calcium 2%</td>
<td></td>
</tr>
<tr>
<td>Vitamin C 16%</td>
<td>Iron 3%</td>
<td></td>
</tr>
</tbody>
</table>

Other nutrients: Potassium (10%), Vitamin B6 (9%), Magnesium (6%), Thiamin (5%)

NDB No: 11490
Pumpkin

**Nutrition Facts**

<table>
<thead>
<tr>
<th>Serving Size: ½ cup cooked pumpkin (123g)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>24</td>
</tr>
<tr>
<td>Calories from Fat</td>
<td>0</td>
</tr>
<tr>
<td>% Daily Value</td>
<td></td>
</tr>
<tr>
<td>Total Fat</td>
<td>0g</td>
</tr>
<tr>
<td>Saturated Fat</td>
<td>0g</td>
</tr>
<tr>
<td>Trans Fat</td>
<td>0g</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>0mg</td>
</tr>
<tr>
<td>Sodium</td>
<td>1mg</td>
</tr>
<tr>
<td>Total Carbohydrate</td>
<td>6g</td>
</tr>
<tr>
<td>Dietary Fiber</td>
<td>1g</td>
</tr>
<tr>
<td>Sugars</td>
<td>1g</td>
</tr>
<tr>
<td>Protein</td>
<td>1g</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>122%</td>
</tr>
<tr>
<td>Calcium</td>
<td>2%</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>10%</td>
</tr>
<tr>
<td>Iron</td>
<td>4%</td>
</tr>
</tbody>
</table>

Other nutrients: Potassium (8%), Riboflavin (6%)


NDB No: 11423
## Nutrition Facts

**Serving Size:** ½ cup canned pumpkin (123g)

<table>
<thead>
<tr>
<th>Nutrition</th>
<th>Value</th>
<th>% Daily Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Calories from Fat</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Total Fat</td>
<td>0g</td>
<td>1%</td>
</tr>
<tr>
<td>Saturated Fat</td>
<td>0g</td>
<td>0%</td>
</tr>
<tr>
<td>Trans Fat</td>
<td>0g</td>
<td></td>
</tr>
<tr>
<td>Cholesterol</td>
<td>0mg</td>
<td>0%</td>
</tr>
<tr>
<td>Sodium</td>
<td>6mg</td>
<td>0%</td>
</tr>
<tr>
<td>Total Carbohydrate</td>
<td>10g</td>
<td>3%</td>
</tr>
<tr>
<td>Dietary Fiber</td>
<td>4g</td>
<td>14%</td>
</tr>
<tr>
<td>Sugars</td>
<td>4g</td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td>1g</td>
<td></td>
</tr>
<tr>
<td>Vitamin A</td>
<td>381%</td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Vitamin C</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td>9%</td>
<td></td>
</tr>
</tbody>
</table>

Other nutrients: Vitamin K (25%), Potassium (7%), Magnesium (7%)


NDB No: 11424
# Spaghetti Squash

## Nutrition Facts

<table>
<thead>
<tr>
<th>Serving Size: ½ cup cooked spaghetti squash, cubed (78g)</th>
<th>Calories 21</th>
<th>Calories from Fat 0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% Daily Value</td>
<td></td>
</tr>
<tr>
<td>Total Fat 0g</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Saturated Fat 0g</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Trans Fat 0g</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Cholesterol 0mg</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Sodium 14mg</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Total Carbohydrate 5g</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Dietary Fiber 1g</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Sugars 2g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein 1g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin A 2%</td>
<td></td>
<td>Calcium 2%</td>
</tr>
<tr>
<td>Vitamin C 5%</td>
<td></td>
<td>Iron 1%</td>
</tr>
</tbody>
</table>

NDB No: 11493
Winter Squash
Cucurbitaceae *Cucurbita maxima*
(analysis based on baked *spaghetti* squash)
Pictured from top: spaghetti, butternut, acorn winter squashes

For butternut and acorn squash values, see “Winter Squash Varieties” card.
CUCURBITS: SQUASH, PUMPKINS, AND GOURDS

DID YOU KNOW?
The largest fruits in the plant kingdom are pumpkins. The biggest pumpkin ever grown weighed 606.7 kilograms (about 1,338 lb)!

ORIGINS
Most of the cucurbits are native to the Americas. They were among the first plants to be domesticated in the New World. Squash is one of the three sisters (corn, beans, and squash) in the Native American cropping system.

CLASSIFYING CUCURBITS

FAMILY
Cucurbitaceae
There are about 800 species in this family.

GENUS
Cucurbita
In Latin, this means gourd.

SPECIES
Scientists have grouped cucurbits into different species based on differences in the structure of the flowers and other plant parts. Three species commonly grown in gardens are:

- **Cucurbita maxima**
  - butternut squash
  - squash
- **Cucurbita moschata**
  - spaghetti squash
  - acorn squash
- **Cucurbita pepo**
  - zucchini
  - yellow crookneck

CUCURBIT PLANTS
Summer squash, such as zucchini and yellow squash, grows like a bush. Winter squash and pumpkins have long running vines.

Cucurbit plants have large leaves.

On a single plant, male and female flowers look like large, yellow, flaring funnels.

The female flower has a swelling, which becomes the fruit.

GROWING AND HARVESTING CUCURBITS
Cucurbits are warm-season crops. Plant in full sun at least one week after the last frost date. Summer squash can grow close together, but the vines of pumpkins and winter squash need more space to grow. Add lots of organic matter to the soil. Cucurbits have deep roots and need lots of water, so water deeply and slowly.

I pick summer squashes when their fruits are young, small, and tender. Pumpkins and winter squash won’t be ready until later in the fall when they have a hard shell.

USES
Summer squash can be eaten—rind, seeds, and flesh. Winter squashes must be cooked. They are usually baked or steamed. You can also use them in breads, pies, cakes, cookies, and casseroles.

You can store winter squash and pumpkins in a dry, cool, airy place for winter use.

Garden Mosaics is funded by the National Science Foundation Informal Science Education program, and by the College of Agriculture and Life Sciences at Cornell University.
SUMMER SQUASH PASTA

Yield: 4 servings

Ingredients
* 4 small summer squash, such as zucchini or yellow crookneck*
* 2 tablespoons olive oil
* 1 clove garlic, pressed
* 4 medium tomatoes, diced
* 1 teaspoon dried oregano, or 1 tablespoon fresh oregano, chopped
* salt and pepper
* 1 bunch fresh basil, chopped
* 1/2 cup grated parmesan cheese
* Variation: Substitute spaghetti squash, cut in half and baked for 1 1/2 to 2 hours at 350°F.

crops, including cucurbits, eggplants, peppers, and tomatoes.

The good news is, Dr. Babadoost and his colleagues at the University of Illinois have made great progress in stopping the spread of this disease. Fungicides are effective in the short term, but Dr. Babadoost and his team are also looking for long-term solutions.

One promising solution is red light treatment. The scientists have discovered that if you start pumpkins, peppers, and tomatoes under red light in a greenhouse, the plants become resistant to the disease. The scientists grew seedlings under red light for four weeks. Less than 36% of the red-light treated plants became infected after being exposed to the fungus. Between 78 and 100% of the untreated plants became infected and died.

Why does red light make plants resistant to disease? The scientists do not know all the facts. They have found that leaves treated with red light contain chemicals that can fight off the fungus. Perhaps, plants have the genes for producing these chemicals, but these genes only work if the plants are treated with red light.

So far, scientists have found that red light treatment protects young plants, but the plants’ resistance may not last for the entire growing season. Nevertheless, red light treatment may prove to be effective in preventing disease when used with other treatments.


RIDDLE
What do you get when you drop a pumpkin?

Answer: Squash!
Lesson Four: How do you make your plate look like MyPlate?

For December

“Healthy Hop ‘N Shop” from GROWING IN THE GARDEN: LOCAL FOODS AND HEALTHY LIVING, Iowa State University Extension and Outreach.

Students learn to categorize foods into the correct food group, create a personal MyPlate poster, find out why they should exercise, and eat foods from all five food groups. They tell others about foods that can be raised or grown locally. Students will be grocery shoppers, by hopping through a maze to pick up foods from various food groups.

Content objectives: Categorize foods into food groups; Explain why it’s important to eat foods from each food group and exercise every day; Eat foods from all five food groups; Identify local foods.

Life Skill objectives: Healthy lifestyle choices, Critical thinking, Communication, Cooperation, Decision making, Problem solving,

Core and STEM concepts and skills:
Science        Science as inquiry, Life science
Math           Number and operations, Geometry, Data analysis and probability, Algebra, Reasoning and proof, Connections, Representation
Language Arts  Vocabulary, Reading, Inferring, Interpreting, Listening, Speaking
Social Studies Behavioral science, Geography

Healthy snack: Food Group Wrap

Additional and supporting resources:
Go to www.choosemyplate.gov/kids for games, songs, videos and additional activities.
Lesson Four, December: How do you make your plate look like MyPlate?

Contents

Lesson Plan Outline: Before, The Lesson, and After

Choose MyPlate Graphic and Coloring Sheet
  United States Department of Agriculture

Choose MyPlate for Kids
  Oregon State University

Fight BAC®: Four Simple Steps to Food Safety
  North Dakota State University Extension Service

Lesson: Healthy Hop 'N Shop
  from Growing in the Garden: Local Foods and Healthy Living
  Iowa State University Extension and Outreach

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BEFORE THE LESSON

1. Grade 3, December: Healthy Hop 'N Shop
   This document contains most of the curriculum items and resources you need for this lesson. You will need to download the MyPlate Kids Poster separately. All lesson downloads are located on the www.peoplesgarden.wsu.edu Educational Toolkit.

2. MyPlate, USDA and MyPlate for Kids, Oregon State University
   Fight BAC®: Four Simple Steps to Food Safety, North Dakota State University Extension
   Please make copies (colored, if possible) of the MyPlate mini posters and display them as a reference throughout the lesson. If you haven’t already done so, make a simple mini poster summarizing the four steps that the students will need to remember when preparing food. Upon request, or if you think they will be used at home, you may also make copies to send with the students.

3. Garden Journals
   Make a copy of the MyPlate mini poster or activity sheet found at the back of the lesson and include it as a page in the Garden Journals. On the back of the mini poster, have the students write an individual-sized recipe for a MyPlate Wrap complete with the recipe title, number of servings, supplies, ingredient list, and assembly instruction.

4. Food Group Wrap Recipe
   Collect the supplies and ingredients. Prepare before class and store everything in the refrigerator or a cooler.

THE LESSONS

1. Healthy Hop 'N Shop
   This is a lesson that you can divide into more than one day. The suggested breaks are written into the lesson.

AFTER THE LESSON

1. Complete the Garden Journal page as described in Before the Lesson number 3 above.

2. Challenge the students to use what they learned about MyPlate at home. Check in once in a while to see what they did.
Choose MyPlate.gov
MyPlate
Eat Right. Exercise. Have Fun.

ChooseMyPlate.gov
Be a BAC Fighter

Make the meals and snacks from your kitchen as safe as possible. **CLEAN:** wash hands and surfaces often; **SEPARATE:** don't cross-contaminate; **COOK:** to proper temperatures, and **CHILL:** refrigerate promptly. Be a BAC Fighter and Fight BAC®

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**SAFE COOKING TEMPERATURES**

*as measured with a food thermometer*

<table>
<thead>
<tr>
<th>Ground Meat and Meat Mixtures</th>
<th>Internal temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef, Veal, Lamb, Pork</td>
<td>160°F</td>
</tr>
<tr>
<td>Chicken, Turkey</td>
<td>165°F</td>
</tr>
<tr>
<td><strong>Fresh Beef, Veal, Lamb</strong></td>
<td></td>
</tr>
<tr>
<td>Medium-rare</td>
<td>145°F</td>
</tr>
<tr>
<td>Medium</td>
<td>160°F</td>
</tr>
<tr>
<td>Well-done</td>
<td>170°F</td>
</tr>
<tr>
<td><strong>Poultry</strong></td>
<td></td>
</tr>
<tr>
<td>Chicken and Turkey, whole</td>
<td>165°F</td>
</tr>
<tr>
<td>Poultry Parts</td>
<td>165°F</td>
</tr>
<tr>
<td>Duck and Goose</td>
<td>165°F</td>
</tr>
<tr>
<td>Stuffing (cooked alone or in bird)</td>
<td>165°F</td>
</tr>
<tr>
<td><strong>Fresh Pork</strong></td>
<td></td>
</tr>
<tr>
<td>Medium-rare</td>
<td>145°F</td>
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<tr>
<td>Medium</td>
<td>160°F</td>
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<tr>
<td>Well-done</td>
<td>170°F</td>
</tr>
<tr>
<td><strong>Ham</strong></td>
<td></td>
</tr>
<tr>
<td>fresh (raw)</td>
<td>160°F</td>
</tr>
<tr>
<td>Precooked (to reheat)</td>
<td>140°F</td>
</tr>
<tr>
<td><strong>Eggs and Egg Dishes</strong></td>
<td></td>
</tr>
<tr>
<td>Eggs</td>
<td>Cook until yolk and white are firm</td>
</tr>
<tr>
<td>Egg Dishes</td>
<td>160°F</td>
</tr>
<tr>
<td><strong>Seafood</strong></td>
<td></td>
</tr>
<tr>
<td>Fin fish</td>
<td>145°F or flesh is opaque and separates easily with fork</td>
</tr>
<tr>
<td>Shrimp, loach, and crayfish</td>
<td>flesh pearly and opaque</td>
</tr>
<tr>
<td>Clams, oysters, and mussels</td>
<td>shells open during cooking</td>
</tr>
<tr>
<td>Scallops</td>
<td>milky white or opaque and firm</td>
</tr>
<tr>
<td><strong>Leftovers and Casseroles</strong></td>
<td>165°F</td>
</tr>
</tbody>
</table>

*Allow three-minute rest time

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**For More Information about Safe Food Handling and Preparation**

USDA’s Meat and Poultry Hotline
1-888-MPHotline (1-888-674-6854);
TTY 1-800-256-7072

www.foodsafety.gov

FDA’s Food Information and Seafood Hotline
1-800-332-4010

Partnership for Food Safety Education Web Site
www.fightbac.org

NDSU Extension Service
www.ag.ndsu.edu/food

Or contact your local cooperative extension office.

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Sign up to be a BAC Fighter at www.fightbac.org

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**SEPARATE:** Don’t cross-contaminate

Cross-contamination is how bacteria can be spread. When handling raw meat, poultry, seafood and eggs, keep these foods and their juices away from ready-to-eat foods. Always start with a clean scene—wash hands with warm water and soap. Wash cutting boards, dishes, countertops and utensils with hot soapy water.

- Separate raw meat, poultry, seafood and eggs from other foods in your grocery shopping cart, grocery bags and in your refrigerator.
- Use one cutting board for fresh produce and a separate one for raw meat, poultry and seafood.
- Never place cooked food on a plate that previously held raw meat, poultry, seafood or eggs.

**COOK:** Cook to proper temperatures

Food is safely cooked when it reaches a high enough internal temperature to kill the harmful bacteria that cause illness. Refer to the chart on the back of this brochure for the proper internal temperatures.

- Use a food thermometer to measure the internal temperature of cooked foods. Make sure that meat, poultry, egg dishes, casseroles and other foods are cooked to the internal temperature shown in the chart on the back of this brochure.
- Cook ground meat or ground poultry until it reaches a safe internal temperature. Color is not a reliable indicator of doneness.
- Cook eggs until the yolk and white are firm. Only use recipes in which eggs are cooked or heated thoroughly.
- When cooking in a microwave oven, cover food, stir and rotate for even cooking. Food is done when it reaches the internal temperature shown on the back of this brochure.

**CHILL:** Refrigerate promptly

Refrigerate foods quickly because cold temperatures slow the growth of harmful bacteria. Do not over-stuff the refrigerator. Cold air must circulate to help keep food safe. Keeping a constant refrigerator temperature of 40ºF or below is one of the most effective ways to reduce the risk of foodborne illness. Use an appliance thermometer to be sure the temperature is consistently 40ºF or below. The freezer temperature should be 0ºF or below.

- Refrigerate or freeze meat, poultry, eggs and other perishables as soon as you get them home from the store.
- Never let raw meat, poultry, eggs, cooked food or cut fresh fruits or vegetables sit at room temperature more than two hours before putting them in the refrigerator or freezer (one hour when the temperature is above 90ºF).
- Never defrost food at room temperature. Food must be kept at a safe temperature during thawing. There are three safe ways to defrost food: in the refrigerator, in cold water, and in the microwave. Food thawed in cold water or in the microwave should be cooked immediately.
- Always marinate food in the refrigerator.
- Divide large amounts of leftovers into shallow containers for quicker cooling in the refrigerator.
- Use or discard refrigerated food on a regular basis. Check USDA cold storage information at www.fightbac.org for optimum storage times.
The Healthy Hop ’n Shop

UNIT 1
LESSON 1A

CONTENT OBJECTIVES
Categorize foods into food groups, Explain why it’s important to eat foods from each food group and exercise every day, Eat foods from all five food groups, Identify local foods

LIFE SKILL OBJECTIVES
Healthy living, Learning to learn, Decision making, Communicating, Citizenship

INDICATORS
Categorize foods into the correct food group, Create a personal MyPlate poster, Exercise, Eat foods from all five food groups, Tell others about foods that can be raised or grown locally, Place empty food containers in the correct food group, Complete the activity sheet including foods and exercises that they would eat and do at home, Sort healthy food choices from plants and animals as potential local foods growing or being raised near where they live

EVALUATIONS

SUBJECT STANDARDS

21st Century Skills: Employability skills, Health literacy

SCIENCE: Science as inquiry, Life science

SOCIAL STUDIES: Behavioral sciences, Geography

LITERACY: Vocabulary, Reading, Inferring, Interpreting, Listening, Speaking

MATHEMATICS: Number and operations, Geometry, Data analysis and probability, Algebra, Reasoning and proof, Connections, Communications, Representation

CORE CONCEPTS AND SKILLS

LEARNER TYPES
Linguistic-words, Logical-mathematical, Spatial-visual, Bodily-kinesthetic, Interpersonal, Intrapersonal, Natural

MATERIALS
Choose MyPlate poster (found at chooseMyPlate.gov)
Letter to home (optional, one per person, found at the end of this lesson)
Empty, clean food containers such as boxes, bags, or cans without sharp edges (these can be brought from home; see the letter at the end of the lesson.)
5 paper grocery sacks; one each of orange, green, red, blue, and purple paper or marker (label the sacks as shown on page 5: Grain=orange, Vegetables=green, Fruit=red, Dairy=blue, and Protein= purple)
One roll masking tape, colored electrical tape, or colored chalk to mark the floor
One hula-hoop or circle
Food Group Wrap recipe (one per person, found at the end of this lesson)
Food Group Wrap ingredients kept in a cooler with ice (one wrap per person, see Apply section TEACHER’S NOTES and the recipe at the end of this lesson)
Serving spoons, forks, or tongs for Food Group Wrap ingredients
Paper plates and napkins (one per person)
MyPlate activity sheet (one per person, found at the end of this lesson)
Crayons or colored pencils
TEACHER'S NOTES: One week before the lesson, read the letter found at the end of this lesson to the students. Then show them the MyPlate for Kids poster. Help the students fill in the blanks on the letter. Send the letters home with the students.

On the day of this lesson, select a place with enough open space to make a large MyPlate rectangle on the floor. The students will be making the The Healthy Hop ’n Shop grocery store as illustrated on the next page. Each food group will become a section that the students will hop to. Have the paper grocery sacks labeled and ready to place in the middle of each food group section. Go through the food containers that the students brought and make sure that there is one package for each student and that all of the food groups are represented in The Healthy Hop ’n Shop grocery store. Display the MyPlate for Kids poster in a place where everyone can see it.

How important is food to you?
Have some of the students share their thoughts with the rest of the group.

Let’s do a quick survey to see what you think about the food you eat. If you agree with the statement, pat the top of your head; if you disagree, rub your stomach. Do a practice round of patting your head and rubbing your stomach.

1. I need to drink pop every morning to wake up. If you agree, pat your head. If you disagree, rub your stomach.
2. My parents make me eat, otherwise I don’t eat.
3. I have to eat to stay alive.
4. Candy keeps me going through the day.
5. Eating breakfast gives me energy.
6. Eating the right foods can help me be strong, healthy, and active.
7. I like to eat fruits and vegetables.
8. I don’t think drinking milk is important.
9. I can survive longer without food than I can without water.
10. If I eat right and exercise, I’ll probably have a happier, healthier life.

The United States Department of Agriculture MyPlate is a guide to help us choose what to eat and how to exercise and have fun every day so we can do the best we can to keep our bodies healthy.

What is the shape of the plate?
It could be round or a rectangle like a lunch tray.

How many food groups are there?
Count them together. Emphasize that there are five main food groups. Have them say the name of each food group. Saying the colors may help them to distinguish between the different food groups.

Show the students the MyPlate Garden Poster – project it on a smart board or project it from the link at www.extension.iastate.edu/4h/growinginthegarden.

What are the children doing around MyPlate?
Talk about the activities illustrated on the poster and the importance of exercise and eating right for good health.
What are some of your favorite exercises or physical activities?
Ask them one by one or ask a few to share. You may even want them to demonstrate some of their exercises.

We are going to use MyPlate to make The Healthy Hop ’n Shop grocery store to help us learn to eat right, exercise, and have fun. We’ll start by forming a large rectangle to represent a MyPlate lunch tray. Please count off as one, two, three, or four and remember your number by holding up one, two, three, or four fingers.

Have the “ones” stand side by side to form the base of the rectangle. The “twos,” “threes,” and “fours” will form the other sides. When the students are standing on a side, have them put their hands on their hips and stand elbow to elbow to form a larger rectangle with even sides. Give the end of the masking tape to a student standing in a corner of the rectangle and unroll the tape until it reaches another corner; then tear the tape. Have the students on that side of the rectangle put the tape on the floor in front of their feet. That will form one of the four outside walls of the store. Repeat the procedure until all four walls are formed. Place a hula-hoop or make a tape circle in the upper right of the MyPlate lunch tray “store” for the dairy group. Place the food group grocery sacks in each section as illustrated above. Make each food group section by taping lines around the sacks.

You have just created an a-mazing grocery store! The food groups are going to become the sections of the maze and you will be hopping to the shopping bags to deliver your food.

Have the students remain standing along the four walls of the Hop ’n Shop grocery store.

On the poster, what does it say under MyPlate for Kids?
It says, “Eat right. Exercise. Have fun.” We’re going to do all three at The Healthy Hop ’n Shop.
Let’s start with some exercise to get limbered up for work in our grocery store.

**EXERCISE ONE**

1. **Reach up to the sky with both hands.**
   
   *What do you need from the sky to keep you healthy?*
   
   Sun, air, water (from rain)
   
   With your hands reaching for the sky, say the words “sun, air, water.”

2. **Keep standing straight and touch the ground in front of you with both hands.**
   
   *What do you need from the ground to keep you healthy?*
   
   Food from plants and animals and a place to live and exercise
   
   With your hands touching the ground, say the words “food, shelter, exercise.”

3. **Repeat this exercise three to five times by reaching up to the sky and saying “sun, air, water” and touching the ground and saying “food, shelter, exercise.”**

**EXERCISE TWO**

1. **While marching in place with your knees coming up high, say “One, two, three, four, five. Eat foods from five food groups.”** You can march and clap and say the numbers “one, two” as two long beats and “three, four, five” as three short beats. Once you have the rhythm down, replace the numbers with “grains, veggies, fruit, dairy, protein.”

2. **Repeat this exercise five times.**

**WORKING AT THE HEALTHY HOP ’N SHOP GROCERY STORE**

You are ready to shop in The Healthy Hop’n Shop grocery store.

Have the students sit on the floor around the plate. Distribute the empty food containers. Go around the rectangle and have the students say what food they have and what food group it belongs to. Work together if the student is not able to identify the food and the group it belongs in.

Demonstrate how students are going to become grocery shoppers or consumers buying food at the Healthy Hop’n Shop grocery store. Use a grain product container. Stand up from where you are sitting around the rectangle and say, “I’m buying cereal (or whatever food you have).” Hop along the taped lines of the maze to the grain sack and put your container in it. Then hop back to your seat following the taped lines of the grocery store maze.

Have students take turns hopping through the food maze to the food group sacks.

Repeat this until all students have put their grain, vegetable, fruit, milk, and protein items into the sacks at The Healthy Hop’n Shop grocery store.

**GO, GLOW, GROW**

Have the students turn the sacks around so everyone can see the labels. You may want to the students to stand as you proceed with the following activities.
GRAINS give us power to “go.”

Most of our grains come from big gardens or farm fields; what are some names of grains? Corn, soybeans (grown as a grain but really a legume), wheat, and oats can be grown in many states. Iowa is a leading producer of corn and soybeans. Rice is another popular grain.

What foods have grains in them?
Cereal, bread, rice, pancake mix, popcorn, and so on

Grain foods give us power or energy to “go.”

Show what you look like when you run out of power or energy – like a car that’s running out of gas.
You may feel that way when you don’t eat breakfast, which usually includes a grain product.
Now show what you look like when you have lots of power or energy to “go.”

VEGETABLES and FRUITS give us power to “glow.”

Where do vegetables and fruits come from?
Vegetables and fruits are from plants grown in gardens, orchards, berry patches, or big fields.

What are some popular vegetables and fruits that grow in our state?
Vegetables include lettuce, spinach, peas, beans, tomatoes, peppers, corn, carrots, potatoes, onions, okra, broccoli, cabbage, Brussel sprouts, rutabagas, beets, squash, and so on. Fruits include strawberries, blueberries, raspberries, grapes, apples, pears, peaches, plums, cherries, watermelon, cantaloupe, and so on. Maybe some of you have gardens, berry patches, vineyards, fields, or orchards with these crops.

Vegetables and fruits keep us healthy and glowing.

Show what you look like when you have a stomachache.

Now smile really big to show what you look like when you have healthy gums, skin, eyes, hair, and bodies.

DAIRY and PROTEIN products give us power to “grow.”

Where do dairy and protein products come from?
Mostly animals, except for soy milk from soybean plants and beans from bean plants

What is your favorite dairy product?
Have a few students share their responses.
What is your favorite protein?
Have a few students share their responses.

Dairy products help our bones and teeth to grow strong and healthy.

Everyone smile and show us your teeth.
Raise your hand if you have lost some of your baby teeth and your new permanent teeth are coming in.
You will have these teeth until you are very old. What can you do to make sure they remain in good shape?
Keep them clean, drink milk, and visit the dentist.

Protein products help our bodies to heal, and they help to build strong muscles.

Stand up and show me your muscles.
Athletes, in particular, like to eat lots of meat such as lean beef, pork, turkey, and lamb. Eggs have the highest quality protein. Protein gives athletes what they need for their active muscles.
Remind the students that they were consumers or shoppers in The Healthy Hop ‘n Shop grocery store. Now they are going to work in the store as grocers to stock the shelves. Have the students empty the grocery sacks and arrange the food in the correct sections in the grocery store. You may want to pile the rest of the food containers they brought near the base of the plate so that they can place those items in the correct section. Proceed with the following discussion.

How many food groups are in The Healthy Hop ‘n Shop grocery store?
Let’s count and name the food groups together: one – grain, two – vegetables, three – fruits, four – dairy, five – protein.

Should we eat food from all five food groups every day?
Yes.
Why?
Eating a variety of foods from each of the food groups gives us the nutrients we need to keep us going, glowing, and growing.

How many food items do we have in each section or food group?
(Count the number of packages in each food group and record the numbers on the board.)

Which food group looks like it’s the largest food group in MyPlate?
Grain
Why is it the largest?
We should eat more foods from the grain group to give us power and energy to “go” all day long.

Do we have more food items in our grain section than any other section?
(Compare the number of packages. If we need the most foods from the grain group, it would make sense to have the most food products in the grain section.)

Which food group or groups look like they are the next largest?
Vegetables and dairy look like they are the next largest. We need to eat more vegetables filled with vitamins, minerals, and fiber to keep us glowing or feeling good. We need calcium from dairy products to keep our teeth and bones strong, especially as we grow.

Do we have more food items in our vegetable and dairy groups than our remaining food groups?
(Compare the number of packages. If the vegetable and dairy food groups are larger than the fruit and protein groups, it would make sense to have more food products in the vegetable and dairy sections.)

Other than vegetables, what else do you eat to help you “glow” and stay healthy?
Fruits also contain vitamins, minerals, and fiber. The rule of thumb is that we should eat three servings of vegetables and two servings of fruits every day.

Do we have fewer food items in our fruit aisle then our vegetable aisle?
If so, the number of our food packages represents the recommended number of servings of vegetables and fruits.

What is the smallest food group?
Protein
Why is it the smallest?
It is the smallest because we need fewer servings from the protein food group then the other food groups.
Does that mean that it’s not as important to eat foods from the protein food group?
No.

Why or why not?
Protein helps our muscles grow and repair themselves. Remember that eggs are part of this group, too. They contain the highest quality protein. Athletes and heart surgery patients sometimes drink protein shakes to help their muscles. These protein sources can also give us energy.

We just learned how to eat right by eating a variety of foods from each of the food groups.

What did we do to exercise?
We reached to the sky and touched the ground as we discovered what we needed from the sky and the ground. We marched in place to identify the five food groups. We hopped down the sections of The Healthy Hop ’n Shop grocery store.

Jump up and down if you had fun working and shopping at the grocery store.

What foods in our grocery store can we find growing near where we live?
Go and shop for one food that you think could have been grown or raised near where we live.

If you think it came from a plant that can grow around here, pick up the food container and stand on a side of the rectangle near the grain, vegetable, or fruit food groups.

If you think it came from an animal that you see around here, pick up the food container and stand on a side of the rectangle near the dairy or protein food groups.

If you think your food choice came from both plants and animals, stand on the side with the grocery sacks.

Have the consumers check out each other’s purchases within their groups by asking the following questions one at a time. Give them a few minutes to work on the answers together. As a way of reporting back to the larger group, have each group share some examples.

Look at everyone’s food purchases; does everyone in your group have something from a plant, an animal, or both plants and animals?
Help each other find a matching group.

Look at everyone’s food purchases; do you all agree that all the foods in your group could be grown or raised near where we live?
Discuss what plant or animal it came from and if you have seen it growing or being raised around here. You may have to read the label for clues. If it doesn’t seem like it could be grown or raised near where you live, put the food item back in the grocery store.

When you buy foods that are grown near where you live, they are called local or regional foods.

Why are the local consumers (students) with foods from plants standing near the grains, vegetables, and fruits food groups on MyPlate?
The food in those categories comes from plants. Beans in the protein food group also come from plants.
Why are the local consumers (students) with foods from animals standing near the dairy or protein food groups on MyPlate?
The food in these categories usually comes from animals. Soy milk would come from a soybean plant and beans from a bean plant.

Why are the local consumers (students) with foods from both plants and animals standing at the base of MyPlate?
They have foods that contain ingredients from many of the food groups.

Can eating local foods help you to be healthy?
Yes.
Why?
They come from a variety of food groups on MyPlate that will help us GO, GLOW, and GROW. Some people say that local foods taste better, so people eat more of them. Some say they are fresher, harvested at just the right time for flavor and texture, and are less processed – all aspects that may make them healthier. They are also more environmentally efficient because less energy and less money may be used in transporting the foods to the consumer.

If you had a choice between eating foods grown locally or eating foods grown far away from here, what would you choose?
Hold up your food container if you would rather eat foods grown near where you live. Count the responses.
Now hold up your container if you would rather eat foods grown far away from here? Count the responses.

**TEACHER’S NOTES:** You will be making the Food Group Wrap recipe found at the end of this lesson. Please copy one recipe for each student to follow and take home. Wash and separate the lettuce leaves and wash and slice the apples. Put them in separate food storage bags and store them in a cooler. Using a knife or pizza wheel, cut each eight-inch tortilla shell in half. As students wash their hands, wash a table and your hands. On the clean table, put out one paper plate per student. Then put the rest of the Food Group Wrap ingredients on each plate. The students will assemble their own wraps.

If we started a garden near here that helped us to eat right, exercise, and have fun, what foods could we grow?
You may want to list the crops on the board or a big piece of paper.

What food group includes these garden crops?
They would fit into the vegetable food group.
(FYI: Garden produce containing seeds is referred to as fruit. However, the food groups in MyPlate are categorized by the nutrients they provide. That means things such as peppers and tomatoes are classified as vegetables. You may want to think of vegetables as something you serve as a main or side dish and fruits as a sweet dessert or side dish.)

How can gardening help us to be healthy?
Hint: Think of the words “Eat Right. Exercise. Have fun.” We will exercise to plant, maintain, and harvest the garden. We will eat the vegetables that come from the garden.
Vegetables help us to “glow” and feel good. It will be fun to work together to see our plants grow and then to eat them!

**How can gardening help others to be healthy?**
If we plant enough of the right crops, we will be able to share healthy foods with others. We will also be able to share what we learn with our families and friends.

**Raise both hands if you are hungry enough to eat foods from all the food groups on MyPlate.**

**What foods do you like to eat that have ingredients from more than one food group?**
Examples include pizza, lasagna, stir-fry, casseroles, filled omelets, sandwiches, tacos, etc. Discuss how the ingredients come from different food groups.

We are going to make Food Group Wraps that include ingredients from each of the food groups. *(Distribute Food Group Wrap recipes and the MyPlate activity sheets and use them for the following activities.)*

Please take out your crayons or colored pencils. Write your name at the top of the MyPlate activity sheet. Use your orange crayon or colored pencil and circle the word “grain” on the plate. Use the MyPlate poster and circle the names of the rest of the food groups with the matching color *(green = vegetables, red = fruits, blue = dairy, purple = protein).*

Put your recipes next to your MyPlate activity sheets. Take a look at the recipe ingredient list. Ingredients are the foods that go into the recipe to come up with the final product, in this case, a wrap.

**What is the first ingredient?**
Half of an eight-inch flour tortilla

**Because this is called a wrap, what do you think we are going to do with the tortilla?**
We are going to use it to wrap up the rest of the ingredients into a food package we can eat with our fingers.

**Which food group includes tortillas?**
The grain group includes tortillas because they are made of flour from wheat plants or corn from corn plants.

**Will the tortilla give us energy to GO, good health to GLOW, or strength to GROW?**
The tortilla will give us energy in the form of carbohydrates to GO.

Draw and color a tortilla in the correct food group on your MyPlate activity sheet.

**What is the second ingredient?**
Lettuce leaves

**Which food group includes lettuce leaves?** The color of the leaves might give you a hint.

Vegetables

**Will the lettuce leaves give us energy to GO, good health to GLOW, or strength to GROW?**
The lettuce leaves will give us vitamins and minerals to help us GLOW and be healthy.

Draw and color a lettuce leaf in the correct food group on your MyPlate activity sheet.

**What is the third ingredient?**
Apple slices
Which food group includes apple slices? The traditional color of an apple might give you a hint. Fruits

Will the apple slices give us energy to GO, good health to GLOW, or strength to GROW? The apple slices will give us vitamins and minerals to help us GLOW and be healthy. Draw and color an apple in the correct food group on your MyPlate activity sheet.

What is the fourth ingredient? Cheese

Which food group includes cheese? Dairy

Will the cheese give us energy to GO, good health to GLOW, or strength to GROW? The cheese will give us calcium to GROW strong bones and teeth. Draw and color a slice of cheese in the correct food group on your MyPlate activity sheet.

What is the fifth ingredient? Deli-sliced meat, such as ham, turkey, chicken, and beef; eggs; beans; nuts; or peanut butter

Which food group includes meat, eggs, beans, and nuts? Protein

Will the meat, eggs, beans, and nuts give us energy to GO, good health to GLOW, or strength to GROW? These foods will give us protein to strengthen and GROW our muscles and every cell in our bodies. Draw and color a slice of meat, hard-cooked eggs, beans, or nuts in the correct food group on your MyPlate activity sheet.

Will the Food Group Wraps we are about to make contain foods from all five food groups? Yes.

Which ingredient in the wrap recipe represents each of the food groups? Grain - tortilla, vegetable - lettuce, fruit - apple, dairy - cheese, protein - meat, eggs, beans, nuts

We are almost ready to make Food Group Wraps. First, we need to follow some food safety practices.

You may want to project the recipe on a screen or distribute copies for students to take home and share with their families.

What are some important food safety things we should do to make sure our wraps will be free of germs and harmful bacteria? Wash our hands for 10 to 15 seconds with soap and water and dry them thoroughly. Make sure the table is clean. The ingredients have been stored in a cooler with ice.

Refer back to the instructions in the Teacher’s Notes at the beginning of the Apply section and the Food Group Wrap recipe at the end of this lesson to prepare to make the wraps. Have students wash their hands.
After everyone has a plate of Food Group Wrap ingredients, talk about each ingredient and which food group it belongs to while the students assemble their wraps in the order on the recipe. Have the students roll up or fold their wraps.

After everyone has eaten and cleaned up the area, return to the MyPlate activity sheet and have the students complete it according to the following discussion.

We are going to fill the rest of our plates with foods that you would be willing to try or eat from each food group.

**What is another vegetable other than lettuce that you would like to eat from your plate?**

*Have some of the students share their answers.*

**Have you seen those vegetables growing near where we live?**

*Discuss the evidence that the vegetables are or could be growing near where you live. Maybe the students or their families have grown them, were given them by a local gardener, or saw them at a farmers’ market, produce stand, or local store. Talk about the possibilities of growing them in a school, community, family, or neighborhood garden.*

**Have you eaten those fresh vegetables?**

*Talk about how they ate them such as raw, cooked, in a recipe, etc., and what they thought about them.*

Draw or write the name of the vegetable in the correct section on your plate.

*Repeat a similar discussion for fruits and grains.*

**What is another dairy product other than cheese that you would like to eat from your plate, bowl, or glass?**

**Where do dairy products come from?**

*Milk cows, milk goats, soybean plants, coconuts, almonds, and other animals and plants are any of those animals or plants being raised or grown in your state?*  

**What is another protein product that you would like to eat from your plate?**

**Where does that product come from?**

**Are any of those animals or plants being raised or grown in your state?**

**Is it being raised or grown in your state?**

Draw or write the name of the protein product in the correct section on your plate.
Date

Dear ____________________,

On ____________________, ____________________, ____________________, our class will be learning about eating right, exercising, and having fun with MyPlate.

We will be setting up The Healthy Hop ’n Shop grocery store. We need to gather samples of food products from each of the MyPlate food groups.

By ____________________, ____________________, ____________________, please send one empty, clean container with labels you can read (boxes, bags, cans without sharp edges) from each of the food groups shown on MyPlate.

We will use your food items to make The Healthy Hop ’n Shop grocery store. This lesson is from an Iowa State University Extension and Outreach 4-H Youth Development resource called Growing in the Garden: Local Foods and Healthy Living.

Thank you,

______________________________

Your name

MyPlate for healthier eating!
**FOOD GROUP WRAP**

*Makes one serving.*

½ (8 inch) flour tortilla  
2 lettuce or spinach leaves  
¼ apple, sliced very thin  
2 tablespoons of shredded cheddar cheese  
2 slices of thinly sliced deli meat, or hard-cooked egg, chopped  
1 tablespoon of beans or peanut butter  
1 tablespoon of salad dressing (French, ranch, or Italian)

---

Keep ingredients cold before use except tortillas and peanut butter. To prepare the wrap, make sure hands, counters, utensils, and food are thoroughly washed. Place the tortilla on a paper plate. Have each person put the ingredients on half of the tortilla in the following order: lettuce or spinach leaves; apple slices; meat, eggs, beans, or peanut butter; cheese; and one small squeeze of salad dressing. Roll up or fold wrap.

---

**Nutrition Facts**

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<th>Amount Per Serving</th>
<th>Calories</th>
<th>Calories from Fat</th>
<th>% Daily Value</th>
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<tr>
<td>Cholesterol (mg)</td>
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<tr>
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<td>Total Carbohydrate (g)</td>
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<tr>
<td>Sugars (g)</td>
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**Vitamin A 10% + Vitamin C 10%**

---

4-H Youth Development  
4H-905LFHL | July 2013
GROWING IN THE GARDEN: LOCAL FOODS AND HEALTHY LIVING
THE HEALTHY HOP ’N SHOP

Activity Sheet
THE HEALTHY HOP ’N SHOP

MyPlate
United States Department of Agriculture

Name

Growing in the Garden: Local Foods and Healthy Living
The Healthy Hop ’n Shop

Lesson 1A

www.ChooseMyPlate.gov

Fruits
Vegetables
Grains
Protein

Dairy

www.ChooseMyPlate.gov

IOWA STATE UNIVERSITY
Extension and Outreach
Healthy People. Environments. Economies

4-H Youth Development
4H-905LFHL | July 2013
Great Tasters...

- Try new foods
- Don't say Yuck
- Wait until everyone is served
- Are kind to others
- Do not make faces
- Say "Yes" or "No, thank you"
- May not like a food the first time and are willing to try again

Together, We Grow Healthy Kids.
# Lesson Five: How Do You Plan a Garden and Our Healthy Garden Plan

For January

“Our Healthy Garden Plan” from GROWING IN THE GARDEN: LOCAL FOODS AND HEALTHY LIVING, Iowa State University Extension and Outreach. Students decide what cool season and warm season crops they want to grow by making and eating Lettuce Wraps and Fresh Garden Salsa. Using science and math concepts, they create their own Healthy Garden Plan, markers to go with it, and a calendar.

<table>
<thead>
<tr>
<th>Content objectives:</th>
<th>Identify and select locally grown fruits and vegetables to plant, grow, harvest and eat; use a variety of mathematical and science concepts and skills to create local garden plans and calendars.</th>
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<tbody>
<tr>
<td>Life Skill objectives:</td>
<td>Healthy lifestyle choices, Critical thinking, Communication, Citizenship, Leadership, Decision making, Problem solving,</td>
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<td>Core and STEM concepts and skills:</td>
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<td><strong>Science</strong></td>
<td>Science as inquiry, Earth and space, Life science</td>
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<tr>
<td><strong>Math</strong></td>
<td>Operations and algebraic thinking, Numbers, Measurement and Data, Geometry, Mathematical practices</td>
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<tr>
<td><strong>Language Arts</strong></td>
<td>Reading, Speaking, Listening, Viewing</td>
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<tr>
<td><strong>Social Studies</strong></td>
<td>Economics, Geography</td>
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</tbody>
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**Healthy snack:** Where We Live Fruit and Vegetable Sampler

**Additional and supporting resources:**
Cooperative Extension Master Gardener’s Program can be a resource for developing your garden plan.
LESSON PLANS FOR 2012-13 SCHOOL YEAR, GRADE 3

January: How do you plan a garden the second year?

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<tr>
<td>Recipe: Where We Live Fruits and Vegetables Sampler, See the Do section in the lesson</td>
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BEFORE THE LESSON

1. Grade 3, January: Planning the Garden 2012-2013 School Year
   This document contains all the curriculum items and resources you need for this lesson. All lesson downloads are located on the www.peoplesgarden.wsu.edu Educational Toolkit.

2. Gardening Tips for Working With Kids, Healthy Gardens, Healthy Youth Partnership
   How do you plan a garden? Iowa State University Extension and Outreach
   Master Gardeners and extension educators created the tip list based on their experiences gardening with kids for this project and for related summer programs. You may want to make a copy to keep handy throughout the gardening season. The garden planning document reviews basic information about starting tilled, raised bed or container gardens. You may want to read through it to see what you need to do for this year. You may want to add more soil to the raised beds.

3. Have a planning meeting
   A few weeks before doing the planning lesson, have a meeting with the all the adults that were involved in the second grade gardens and that want to be involved in the third grade gardens. Make copies of the “Gardening Tips for Working with Kids” to distribute at the meeting. You are about to use the same classroom planning lesson as the second grade teachers used, skipping some of the preliminaries and getting right down to the business of planning the third grade gardens. You may want to watch the planning lesson video recorded for the 4th grade lesson on the Healthy Gardens Healthy Youth Youtube Channel. With that in mind, here are the basic topics to discuss at the meeting. Someone should be recording the information to be used for this year’s gardens and planning experiences.

   A. After last year’s experience in preparing the gardens and planning the gardens with the students’ help, are there any experiences, recommendations, changes or suggestions to pass on for the second year of gardening?

   B. Are there some chores to do in the gardens before they are ready for the third graders? List the chores and make a plan to get them done. To assure that the students, teachers, school and community have positive and sustainable gardening experiences, your state probably has some grant money budgeted for the year two gardens.

   C. The students will taste fruits or vegetables that they could plant as cool season and warm season crops. Are there any suggestions on fruits or vegetables that the adults would like to plant with the students? Come up with three or four options for each of the cool and warm season crops so the students have an opportunity to make choices on what they would like to plant. Are there any recommendations regarding purchasing and preparing the samples for this lesson and others? Students have been and will continue to do a lot of the food preparation for these lessons.

   D. The students will be planning their garden first on a floor garden plan and then on a garden grid. They have charts to know how much space certain crops take. It would be helpful if a Master Gardener or a garden expert could help with the planning lesson so that the students can eventually come up with the garden plan that they will actually
use. The students also need help to start a garden calendar that they can follow in your region. Make a plan for a garden expert to work with the teacher and the students during the planning lesson. Share a copy of the lesson and The Lesson section below so that everyone can be ready.

E. We highly suggest trying the square foot gardening method to get the most out of small garden spaces as possible, to make it easier to plant the garden, and to eventually make it harder for weeds to grow. Refer to the lesson to learn more about this method and assign people the task of making square foot garden templates 1 and 2 from the patterns at the end of the lesson. Poster board works the best. It is nice to have at least two of each size. They will be used in the planning lesson.

4. Garden Journals
If they haven’t done so already, this is a good time for each student to start his or her own Garden Journal. Each time you do a lesson or go out in the garden there is an opportunity to add something new to the Garden Journal. Provide 1” vinyl binders or sturdy plastic folders with 3-ring binders so that students can take their journals to the garden and add pages, activity sheets, charts, recipes, etc.. The binders with a window on the front are nice because students can design their front cover on a heavy piece of paper and slip it into the sleeve. The students can also design their own inside cover page. Provide permanent markers so they can at least creatively write the title, using their first and last name such as “Charlie Smith’s Garden Journal”, on the front of the binder or folder. We have found that it works best to collect the journals after each use. See The Lesson section, Garden Journal Page, for more details. Your extension service may have additional suggestions for garden journals.

5. Taste testing
Prepare to make the Where We Live Fruits and Vegetables Sampler according to the Do section of the lesson and the crops that were suggested at the meeting described in number 3 above.

THE LESSONS
1. Our Food Garden Plan is a lesson that you can divide into more than one day. Some of the students may have done at least parts of this lesson. For third graders, we are skipping over some of the activities and concentrating on other parts that might have been missed. Here are the activities that we recommend.

A. Find out who the gardeners are in your classroom and what they planted in their 2nd grade garden by asking the first two questions in the Introduction section. Make a list of the crops that the students planted and talk about their experiences. List the crops that the students might like to plant in their third grade gardens.

B. Skip to the Do section and proceed with the Where We Live Fruits and Vegetables Sampler activity. Instead of adding to the “Our Floor Garden Chart”, just add the fruits and vegetables from the Sampler to the list of crops that the student might like to plant. Circle the cool season crops (lettuce, spinach, snow peas, radishes, green onions) on the list. Based on their taste test and past experiences, give each student the opportunity to vote for the top three cool season crops they would like to plant in their garden. In other words, they can vote three times. Have
students help to count votes and make tally marks next to the fruit or vegetable. Do the same with the warm season crops. Count up the number of votes and discover the top three or more crops that the students want to grow. The number of crops you can grow depends on the size of your garden and the size of the crop.

C. You may want to do these activities on another day. Do the activities in the Reflect section. In the Teacher’s Notes, number 5 refers to “Our Floor Garden to Our Food Garden” chart. Just use the list of crops that the students want to plant. The students will be discovering how much space fruit and vegetable plants take in the garden. First they will use pictures of crops that are provided in the lesson. Then they will be measuring and cutting out newspaper or scrap paper squares representing the plant size and the number of plants they want to plant in their garden. They will use the floor garden to experiment with their garden plan. Leave the floor garden plan in place while you convert the plan to the appropriate garden grid.

D. This is another point where the activity could be done on a different day. Ask the first question in the Apply section. Choose one or two of the suggestions and try to implement it.

AFTER THE LESSON
Add a copy of the class’s Our Food Garden Plan to the Garden Journal. On the back of the page, have the students copy the list of crops that the class chose to grow. If one of their crops did not survive the vote, have them list that crop. If the class discovered that all the crops would not fit in their garden space, have them note that as well. Make a copy of the Garden Calendar so that the students can add information about their garden. Hopefully, they can write “Plant cool season crops” on one of the days.
USDA FNS People’s Garden School Garden Pilot Project:  
Healthy Gardens, Healthy Youth

Tips for Working with Kids and the Garden

The following tips are from HGHY Master Gardeners and site leaders and are based on their experiences gardening with kids. These are tips for both school and the summer programs. A sample in-garden lesson outline can be found at the end of this document.

Be Prepared
- Send home information about the garden program including the details about who is leading the program, what the kids will be doing, where the gardens are located, when the kids will be gardening, what is happening with the garden produce, and expectations of the young gardeners. All gardeners should be wearing close-toed shoes and have sun protection. They will not be allowed to work in the garden or with food if they are sick or have been sick within the last 24 hours.

- Every time you go to the garden, take supplies such as a first aid kit, wet wipes, water jug with cups (or have kids bring their own water) and water for washing the produce.

- Use lesson plans and educational resources to prepare for each session. Play a game, sing a song, act out a play, read a book, or make a garden-based craft each session. Remember to have fun! See the Sample Garden Session outline at the end of these tips.

Working With the Kids
- Make sure the young gardeners know the 3 R’s garden rules: Respect, Responsibility, Readiness.

- Be fully prepared before heading to the garden so there will be little down time for the kids. The tools and any supplies should be easy to access and ready to go. Break large groups into manageable sizes. Have more than one activity and rotate them. Keep every child busy and on task or their attention will shift and they will drift. Have enough adult supervision to make this happen.

- Always demonstrate before letting the kids work on their own. The more adult helpers you have to float around and guide the kids, the better. Do not do things for the kids, show them how and have them show you how back.

- Check their work. Don’t take their word for it when they say they have completed a task. You might find that things were missed.

- Take frequent shade and water breaks. Break times are good times to introduce healthy snacks, books, garden journals, or other hands-on activities.

- Every child will appreciate some one-on-one time with instructors while working in the garden. Let them tell their stories and show you the weeds they found and pulled, etc.
Planning the Garden

- Use the hands-on, deeply aligned classroom lessons to help the students plan their gardens. The kids will have fun learning and taking ownership of the garden. They will get excited about choosing what to plant and how much they need to plant by doing these lessons. A Master Gardener or an experienced gardener is a valuable resource to help kids discover what crops can be grown in the climate and in the amount of space they will have to garden. Start a Garden Journal or Garden Records right away.

- Young students are not able to prepare the site for gardening. Master Gardeners and others can provide leadership for that. FFA students, parents, Ameri-Corps, Food Corps, garden clubs, retired teachers, neighbors and others have been instrumental in preparing the gardens and helping the youth in the planning stages.

- For the young children, have the sections of the garden already measured out and marked according to the garden plan. For the older youth, help them measure and mark the garden sections.

- Kids like to use garden tools, but they LOVE to use child-sized tools such as kid-sized rakes, hoes, shovels, watering cans, and gloves. The type of garden tools they need depend on the type of garden they will be working with and how it is planted – square foot vs. rows. They can share tools. Older students have been using adult-sized tools and even tools that have been loaned by Master Gardener groups.

- Master Gardeners and FFA members are using their green houses to start seeds and grow transplants for the school gardens.

Help the students start a compost bin and get the whole school involved.

Planting

- Go over tool safety rules for hoes, trowels, and rakes. A tool safety game is part of the gardening curriculum.

- Go over ways the plants in your garden are going to be planted: seeds, sets, transplants, seed pieces.

- Plant fast growing (cool season) crops like radishes and spinach for early satisfaction. Try to stagger your crops for constant harvest opportunities. Make sure the students will have something to harvest when they return to school in the fall.

Maintaining

Watering

- Watering is extremely important, especially in raised bed gardens. If you are meeting just once a week, you may have to make plans for additional watering. Families, youth groups, organizations, neighbors can sign up for times. Someone will need to be responsible to make sure the watering plans are carried out.

- Using a watering wand is a good way to water the garden. Show how to water at the base of the plant. Teach the kids to count how long it takes to water a plant.
Weeding
- Help the kids distinguish the difference between weeds and garden plants. Show them how to pull weeds so that the garden plants are not disturbed. Tell them where you want them to put the weeds. Have challenges such as finding the biggest weed, most unusual weed, most weeds, etc. Talk about why some parts of the gardens have more weeds than other parts, etc.

Insects and pests
- Insects intrigue and scare children. They enjoy doing the lessons about pests and going on hunting missions to find and eradicate them. Getting to show everyone the squash bug they found – and sometimes their eggs – is a joy in and of itself!
- Use the lessons from Grades 2 and 4 to identify “good guys” and “bad guys” in the garden and to figure out what to do about them. Then help the kids take the next steps to protect their garden from unwanted pests.

Harvesting, Preparing and Eating the Produce!
- Kids get excited when they see fruits/vegetables growing on the plants. Make sure that they show everyone by pointing and not picking! Describe what to look for to determine when the fruits/vegetables are ready to harvest.
- Show kids HOW to harvest produce gently. For example, gently hold a bean plant before pulling off the bean, cut the lettuce with scissors, etc.
- Kids love to harvest and taste the bounty. Try to include this in every lesson.
- Include in the lesson, ideas for how the food can be eaten. Simple recipes such as cucumber-flavored water, radish or veggie sandwiches, veggies with dip, cucumbers and onions in vinegar, etc. are the best. Get a large bottle of Ranch dressing because the kids will try anything they can dip! There are several ideas in the lessons.
- Show the whole vegetable before cutting it open. Have them find the seeds.
- Plastic plates and knives can be used for cutting and preparing produce.
- Help the kids put their gardens to bed.
Sample Gardening Session

1. Meet in gathering area
   a. Remind everyone about behavior expectations.
   b. Chat a bit – What’s up?
   c. Give garden plan for the day
   d. Split into smaller groups if necessary
   e. Have a planned garden activity for each group with an adult supervisor

2. Garden projects
   a. Planting
   b. Weeding
   c. Pest patrol
   d. Watering
   e. Harvesting
   f. Washing
   g. Cutting (if necessary)

3. Snack time
   a. Make their own snacks
   b. If there is nothing to harvest, consider produce from farmer’s markets
   c. Focus on fruits and vegetables
   d. Send ideas home to the families

4. Activity session – see lessons for ideas for games, songs, stories, plays, crafts

5. Go home!
How do you plan a garden?

UNIT 4 INTRODUCTION

LESSON CONTENTS
General Information
Our Food Garden Plan (Grades K through 4)
Our Healthy Garden Plan (Grades 4 and up)

GENERAL INFORMATION
GETTING STARTED
Gardens may become as prevalent on school grounds as swing sets. In a recent National Gardening Association Survey, What Gardeners Think, 97 percent of 2,500 households surveyed said they thought schools should provide gardens and hands-on gardening activities for kids. Of that total, 39 percent felt that gardening activities should be implemented in schools whenever possible, and 19 percent felt that they should be implemented in every school.

Having at least one advocate for school gardening is a key factor for success. Who might be a school garden advocate where you live? Is it a teacher, food service director, administrator, school nurse, board member, parent, grandparent, PTO, school organization member, student, community garden coordinator, local food producer, or a service organization? You need their energy and inspiration to plan your garden. However, they should not be expected to do everything. It is important to have support from several representatives of the school system and the community.

The more community support you have for your garden, the more likely it will become a permanent part of your community. Many types of support can be found in your neighborhoods. Extension Master Gardeners and Master Conservationists have had extensive training and are expected to contribute volunteer hours back to their communities by sharing their expertise. There are 4-H Club members that are interested in gardening and are developing their healthy living, communication, citizenship, and leadership skills which would contribute positively to your gardening experiences. Contact your local county extension office to identify and invite Master Gardeners and 4-H’ers to participate in your garden project. Your local high school may have Future Farmers of America (FFA) members or student leaders interested in garden-related topics. Many communities have garden clubs, senior groups, service organizations, churches, institutions, agencies and after-school programs that could enhance your gardening program. Invite them into your gardening conversations and planning sessions.

SITE SELECTION
A school garden serves several functions. It can be considered an outdoor classroom where children explore and interact with nature through first hand experiences. It can also be a park-like place for recreation and fresh air. Similar to the swing set or soccer field, a garden is a fairly permanent fixture on the school ground. With that in mind, there are several factors that should be considered when finding the best location for a school garden.

General Information continued on the next page.
GENERAL INFORMATION
CONTINUED

Checklist for locating a school garden

☑ Sun. The site should receive at least eight hours of full sunlight per day.

☑ Drainage. Don’t locate the garden in a low area on the school ground or a spot that doesn’t drain well. Watch the area after a heavy rainfall. Does the water sit in a puddle for an hour or more or does it soak in and drain quickly?

☑ Soil. A loam soil is ideal for a garden, but not always possible. Find the best possibility; if your site has poor soil, consider using raised beds or containers.

☑ Water. Locate the garden within a hose-reach of an outdoor spigot. To be productive, garden crops require at least an inch of water per week.

☑ Away from play areas. Although you don’t want the garden in a remote location where no one sees it or is a long hike to get there, you also don’t want it where children play or walk.

☑ Check underground. Before digging anywhere, be sure that nothing, such as cables or other lines, are buried in that area. Call your local utilities to mark where buried lines are located. In some state, this service is provided free of charge. (If you live in Iowa, see the side column).

☑ Tool storage. Find an indoor area close to the garden where tools can be safely stored when not in use. A large, locked and weather-proof container placed next to the garden will work.

☑ Possible locations. Besides at schools, children’s gardens for after-school programs or summer programs can be located at community garden sites, fair grounds, empty lots, arboretums or parks, or near public buildings such as libraries, churches, extension offices, etc.

For more information on school gardening or after school programs, refer to A Toolkit: How to Start a School Garden by Alliance for a Healthier Generation. A link to this publication can be found at www.extension.iastate.edu/growinginthegarden or go directly to www.HealthierGeneration.org.

SITE PREPARATION FOR TILLED GARDENS

A tilled garden is a traditional garden tilled in existing soil, similar to a field. Gardens come in many sizes and shapes. The size and type of a children’s food garden depends on the soil, available space, and financial resources. Often times it is better to start small. The number of classrooms or children that will be participating in the garden and the number of volunteers available to help maintain it will help determine the size. If the garden is too large, it quickly becomes an overwhelming task. For these reasons, a 20’ x 40’ food garden is recommended. Tilled gardens allow for wide flexibility in the types and quantities of crops that are grown. Long rows of beans, lettuce, tomatoes, and squash can be planted to provide a sizeable harvest.

Prepare the site. If the site you have selected was previously a grassy play area, the sod will need to be removed. Plan ahead. It is best to prepare the garden site the previous fall so that it is ready to till and plant the following spring.

*Don’t forget to have the area checked for underground utility lines before digging!*

1. Measure and stake the designated area and use a string to outline the area. Although plowing or tilling the sod can be done, it is often difficult to destroy all the clumps of sod and they often re-grow, creating weed problems later in the season. A non-selective herbicide, such as Roundup®, can be applied to kill the grass followed by tilling a week or two later.
2. Do not work the soil when it is too wet because dense clods of soil will form which will be difficult to work out and will impede good germination of garden seeds. To determine if the soil has the right amount of moisture, take a handful and squeeze it gently. If it forms a tight clump or "ball", it is too wet. If the "ball" crumbles under pressure, it is ready to be tilled or prepared for planting.

3. Have the soil tested for fertility in the fall or prior to planting in the spring. This will help you determine your fertilizer needs. Many state land grant universities have soil testing laboratories. Contact your local county extension office to find a soil testing lab in your state. For information on taking a soil sample for testing, refer to Soil Sample Information Sheet for Horticulture Crops, available for download at: www.extension.iastate.edu/store/. Use the search box to locate publication number “ST 0011”. This might be an excellent activity for a middle school classroom to perform. The results from the soil test will be returned with fertilizer recommendations. If your garden site is "reclaimed" land within a city, it is important to have the soil on the site tested for potentially hazardous materials.

4. Soil texture can be improved by mixing in some compost, especially if the soil has too much clay or sand. If compost is applied, be sure it is well decomposed and work it thoroughly into the soil. Don’t apply too much - an inch-thick layer will go a long way. Although compost can be purchased, you may find that your city has free compost available for gardeners. It would be good learning experience if you include a compost pile in school garden project.

5. Apply the recommended amount of a complete analysis fertilizer, such as a 10-10-10, just prior to working the garden soil in the spring. A general recommendation is 20 pounds of 10-10-10 per 1,000 square feet of garden space. (Six raised garden beds that are 4 feet by 8 feet would typically require about 4 pounds of this fertilizer.)

Many of these steps are integrated into the student activities in this unit.

PLANNING WHAT TO PLANT IN A TILLED GARDEN
Planning what to plant in your tilled garden involves determining what you want to plant, how much to plant, when to plant it and how to plant it. What to plant depends on how you intend to use the garden produce. Will you prepare it for students to taste in a classroom? Will you give it to the school kitchen staff to prepare as samples or vegetable servings for the students’ lunches? Your answers affect the quantity of each crop you intend to grow. When determining the use, be sure to take into consideration the quantity of each crop the garden has the potential to grow and when it will be in season. The garden schedule and planting plan may include planting quick-maturing crops, such as leaf lettuce, green onions, radishes, and spinach in the spring. In early summer, plant crops that will come into production when the students are back in school, late August and September, such as tomatoes, peppers, green beans, and squash. Information on the labels for transplants and seed packages will tell you approximately how many days are need from planting to maturity for each crop. Count back that many days from the first day of class in the fall to determine the optimum planting day so that crops will be ready when the students return to school.

There are numerous resources available to guide you through planning and planting a garden. Your state’s university extension likely has publications online to help you select the right varieties and planting times for your area. The lessons and additional resources pages in this unit will help you to plan what to plant. Local Master Gardeners, garden experts, and local food producers are also excellent resources.
RAISED BED GARDENS

Raised beds are gardens framed with lumber, bricks, or concrete blocks. They are typically 4 feet wide and any length, depending on the size of the lumber used to construct the bed. Many commercial kits for raised beds are 4 feet wide and 8 feet long. They can be any height, although most are 6 to 12 inches tall. Do not use pressure-treated lumber, such as wolmanized wood for raised beds that will produce food crops. Railroad ties are not recommended for edible gardens. Cedar lumber is durable and has its own natural preservatives. Pine can be used provided all sides are painted with exterior latex paint or treated with a suitable, safe wood preservative. Raised bed frames made of recycled plastic are long lasting and durable. They do not require maintenance and do not splinter.

Raised beds offer a good alternative to traditional tilled gardens. Advantages of raised beds include:

1. You can garden in areas with poor soil conditions.
2. You can control the soil mixture in the raised beds to improve drainage and nutrient content.
3. It is easy to plant, weed, water, and harvest working from outside of the raised beds.
4. The narrow beds enable reaching in to do the work so that no one walks in the garden - resulting in less foot traffic and compaction of the soil and reduces the risk of stepping on plants where the plant roots will be growing.
5. You can plant more crops and increase yields because there are no walkways through the raised beds.
6. The soil in the beds warms up faster in the spring enabling earlier planting.
7. Watering is more efficient because the water is directed to the plant beds and not the walkways. Plants can be planted closer together to shade the soil and reduce the amount of water evaporation from the soil.

In addition to choosing a site that receives full sun, a site for raised beds needs to be level.

You may want to consider watering by using a simple drip irrigation system. These watering systems are readily available and can make watering much more efficient, effective, and tidy. The drip lines emit a small amount of water over a long period of time and the foliage is not wetted, reducing the incidence of foliage diseases. Drip irrigation kits can be found at home improvement stores and garden centers.

Mulching conserves soil moisture and helps to control weeds. Several materials make good mulches. Grass clippings make a good mulch when spread in two inches thick. Avoid clippings from chemically-treated lawns. Newspapers also do a great job preventing weed growth and will decompose by the end of the season. Overlap four to six sheets of black and white newspapers between the plants and rows. Water it well and cover it with a thin layer of grass clippings or soil to hold it in place.

MATERIALS AND SUPPLIES

50’ Tape measure
Stakes for markers
Six raised bed kits or lumber and brackets
Mallets or hammers
Landscape fabric (based on plan below - at least 800 square feet)
Soil mix (½ cubic yard per 4’ x 8’ raised bed, see Step 4, check with your city for access to free compost)
Wood mulch (see Step 5, check with your city for access to free mulch)
1. Stake out the area where each raised bed garden will be located. Include a walkway between each bed. (See an example of a layout in the diagram below). The walkways should be at least four feet wide or wide enough to maneuver a wheelbarrow or wagon down it, and allowing four feet around the entire area. Although the beds will smother grass under them, you may want to destroy the sod in the walkway areas. This can be done with a non-selective herbicide, such as Roundup® a week before installing the raised beds and walkways.

   ![Raised Bed Diagram](image)

   **Raised Bed Diagram**

2. Lay landscape fabric in the walkways between the beds and four feet around the beds to prevent weed growth and allow for easier maintenance. When installing the raised beds, tuck the ends of the landscape fabric under the side walls as they are being placed. This will secure the fabric so that it doesn’t come loose on the edges. Use landscape pins to hold the outer edges and overlapped pieces of fabric in place.

3. Construct the frames for the raised beds, set them in place, and secure them with corner stakes.

4. Fill the beds with soil mix. A good fill for raised beds is a combination of two-thirds topsoil and one-third compost. Check with the city to see if they have free compost available. (If compost is not available, peat moss can be substituted but it is expensive.) Topsoil and compost are often sold and delivered by the cubic yard. Each 4’ x 8’ x .67’ (8’) bed will need approximately .8 cubic yard of soil mix. With that in mind, six beds will require 5 cubic yards of mix, of which 3.5 cubic yards are topsoil and 1.5 cubic yards are compost. Mix it together well. Fill the beds to within one inch of the top; settling will occur.

5. Cover the landscape fabric with wood mulch. To determine the amount of mulch you will need, follow the instructions in the box below.

6. Sprinkle one cup of a complete analysis commercial fertilizer, such as a 10-10-10, over each 4’ x 8’ bed each year, just prior to spring soil preparation. Work it in or till it into the soil.

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**Calculating Volume of Soil for Raised Beds**

Multiply the length (in feet) times the width (in feet) times the depth (in feet) to determine the volume of soil required in cubic feet. Divide this figure by 27 (number of cubic feet in one cubic yard) to determine the volume in cubic yards.

**Example Raised Bed Diagram in #1:**

\[
\frac{(4' \times 8' \times .67')}{27} = .8 \text{ cubic yards soil per bed}
\]

6 beds x .8 cubic yards = 4.8 or about 5 cubic yards

---

**Calculating Volume of Mulch for Walkways**

Mulch can be purchased in bags on a cubic foot basis or in bulk on a cubic yard basis.

Multiply the length (in feet) times the width (in feet) of the outside edge of the walkways around the garden area to get the total number of square feet. Subtract from that number, the total area or square feet of all your raised beds. This will give you the total area or square feet of your walkways.

Take this figure times the depth of your mulch (in feet, 3 inches = .25 feet) to obtain cubic square feet. Twenty-seven cubic feet is the same as one cubic yard.

**Example Raised Bed Diagram in #1:**

\[
\frac{(28' \times 28') - (4' \times 8' \times 6 \text{ beds})}{27} = 784 - 192 = 592 \text{ sq feet.}
\]

This is the total area that needs to be covered by mulch.

At a 3” depth, this is

\[
\frac{0.25 \text{ feet} \times 592 \text{ sq feet}}{27} = 148 \text{ or about 5 cubic yards of mulch}
\]

To convert into cubic yards:

\[
\frac{150 \text{ ft}^3}{27} = 5.5 \text{ or about 6 yds}^3 \text{ of mulch}
\]

This will weigh between 600 to 900 pounds depending on the type of mulch.
PLANNING WHAT TO PLANT IN A RAISED BED GARDEN

Although a 4’ x 8’ raised bed garden offers only 32 square feet of growing space, it can produce a surprisingly large amount of produce. Planning what, when, where, and how you are going to plant is important before you purchase the seeds and plants. Raised bed gardens can often be planted earlier than traditional gardens because the soil in the raised bed warms up and dries out more quickly in the spring. You may want to plant cool season crops in late April so that you can have a salad garden party before school is out in late May or early June.

Raised bed gardens are narrow so that nearly all of the activities in the garden can be done outside the bed by reaching in. This avoids the need for walkways or wide spaces between the rows for walking and allows you to put plants closer together. Another strategy to make the most of the available space is to use the “Square Foot” method of gardening, developed by Mel Bartholomew. There are square foot gardening templates in the back pocket of this curriculum. Lesson 4A provides instructions on the square foot method of gardening. You may want to use the templates as patterns to transfer it to sturdy poster board. Refer to the resources below for additional information.

The lessons in this unit will provide opportunities for students to engage in planning and preparing the gardens in anticipation of planting.

CONTAINER GARDENS

Plants can be grown in containers or pots that can be placed inside, outside, or both. They can be placed on a dolly enabling them to be easily moved. You may want to plant container gardens to start some of your garden crops indoors in late winter or early spring. After the weather warms up and the threat of frost is past, the containers can be moved outside.

A good container for plant growth must meet the following four criteria to successfully grow plants.

1. Sturdy
2. Clean
3. Room for roots
4. Adequate drainage

The following items can be adapted into container gardens.

<table>
<thead>
<tr>
<th>Planter</th>
<th>Bucket</th>
<th>Wheelbarrow</th>
<th>Hanging basket</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clay pot</td>
<td>Wagon</td>
<td>Ceramic pot</td>
<td>Strawberry jar</td>
</tr>
<tr>
<td>Eggshell</td>
<td>Paper cup</td>
<td>Old pan</td>
<td>Old bowl or teacup</td>
</tr>
<tr>
<td>Bathtub</td>
<td>Old shoe or boot</td>
<td>Child’s plastic swimming pool</td>
<td></td>
</tr>
</tbody>
</table>

Fill container gardens with quality potting mix. Do not use soil straight from a field or garden area. It may grow crops well in the field, but when put in a container, this soil will become very heavy and compact with small pore spaces for air and water.

Container gardens can be fed with slow-release fertilizer beads that are added to the soil mix in the container prior to planting. Some slow-release fertilizers feed the plants for three months and others may only require application once every six months. The amount to add is determined by the volume of soil in the container. Slow-release fertilizers are advantageous and easy because they release a small amount of fertilizer every time the soil is watered.
The soil in container gardens should be kept moist but not soggy or saturated. It dries out more quickly as the plants grow because the space in containers becomes more limited and the roots can’t spread out or grow deeper to find water.

The soil in container gardens needs to be checked nearly every day. Clay, or terra cotta, pots dry out more quickly than plastic containers and need water more often because they are porous. Also, be aware that soil in small containers set in sunny locations dries out quickly. When fruit or vegetable plants dry out, they wilt. Flowering and fruiting plants will drop their blossoms and fruits. Leafy vegetables will develop brown or dried leaf edges.

There are unique types of container gardens, such as EarthBox® (www.earthbox.com) and Global Buckets (www.globalbuckets.org) that are somewhat self-watering and feeding gardens. EarthBox® containers are commercially available gardening systems developed to meet the needs of gardeners who lack space and quality soil for successful gardening. Global Buckets are similar in concept, but can be made from materials found at home, school or a hardware store.

These container garden systems provide:
- Good soil (or a “soil-less” potting mix) that is well-drained and provides good air and water movement
- An adequate and regular supply of water
- Fertilizer for good plant growth
- Soil cover (plastic mulch) to reduce evaporation and prevent weed growth

EarthBoxes® and Global Buckets water the plants by wicking water from a reservoir below the soil medium. There is usually enough water for the plants; however, it is a good idea to occasionally check the moisture level in the soil and add some when necessary.

Iowa State University Extension Publications available to download as pdf files: Go to: www.extension.iastate.edu/store

Pm-731, Harvesting and Storing Vegetables
Pm-819, Planting a Home Vegetable Garden
Pm-534, Planting and Harvesting Times for Garden Vegetables
Pm-870A, Small Plot Vegetable Gardening
Pm-607, Suggested Vegetable Varieties for the Home Garden

### Our Food Garden Plan

#### CONTENT OBJECTIVES
Identify and select locally grown fruits and vegetables to plant, grow, harvest, and eat. Use a variety of mathematic and science concepts and skills to create local garden plans and calendars.

#### LIFE SKILL OBJECTIVES
- Critical thinking
- Problem solving
- Decision making
- Healthy living
- Communicating (listening, asking, and responding to questions)
- Citizenship (teamwork)
- Leadership (sharing an idea to improve something)

Students will develop a productive garden plan that will demonstrate how much healthy food can be grown in a limited amount of space.

#### SUBJECT STANDARDS
- **21st Century Skills:** Employability skills, Health literacy
- **Science:** Science as inquiry, Earth and space, Life science
- **Mathematics:** Operations and algebraic thinking, Numbers and operations, Measurement and data, Geometry, Mathematical practices
- **Social Studies:** Economics, Geography
- **Literacy:** Reading, Speaking, Listening, Viewing

#### CORE CONCEPTS AND SKILLS
- Linguistic-words
- Logical-mathematical
- Spatial-visual
- Bodily-kinesthetic
- Interpersonal
- Intrapersonal
- Natural

#### LEARNER TYPES
- White paper (two sheets per student)
- Crayons or colored pencils
- 2 to 4 long tape measures
- Masking tape
- White or black board, or large sheet of paper and markers or chalk (to reproduce the chart found in the Introduction section)
- Where We Live Fruits and Vegetables Sampler (see the TEACHER’S NOTES following this Materials list)
- Small paper plates (one per student)
- Napkins (one per student)
- Food handling gloves (optional, wash hands thoroughly)
- Garden Grid (There are two pages of garden grids. Choose the page that fits your garden space. Make a copy to show the class. The grids are found at the end of this lesson.)
- 3 sheets of plain paper (write Small, Medium, and Large on them)
- Fruit and vegetable squares (copy and cut, one square per person, found at the end of this lesson)

Materials continued on the next page.
Raise your hand if you have ever planted a garden.

What did you grow in your garden and why?

Have a few students share their experiences.

**PLAN YOUR FIRST GARDEN OF FAVORITES ON THE FLOOR**

Hand out white paper and ask the students to use their crayons or colored pencils to draw a picture of one fruit or vegetable they might like to grow and eat. Tell them that they will have five minutes to draw and color their fruit or vegetable. Remind them to choose their own fruit or vegetable and not copy others.

While they are drawing, use tape measures and masking tape to create the outside edges of a floor garden in your classroom. The garden should be almost large enough for the students to “plant” their drawings. A 4’ x 8’ garden is an example of a raised bed garden. Draw and color your own fruit or vegetable.
Have the students bring their drawings and sit around the floor garden space.

The masking tape marks the outside of what we are going to call “Our Floor Garden.” One by one, please stand up and tell us what fruit or vegetable you drew and why you chose it. Then you can plant your picture somewhere in “Our Floor Garden” space. I will start. Don’t be concerned if the fruit really comes from an orchard or vineyard. Plant everything in the garden for now. Once the drawings are in the garden, proceed with the following discussion questions and give the students an opportunity to change where their fruits and vegetables are growing.

Take a good look at our fruit and vegetable garden.

**Have you ever seen a real garden that looks like ours?**

**What makes ours different?**

Possible answers include:

- The floor garden is a non-living thing made up of the floor, masking tape, and paper; real gardens grow living things.
- One garden doesn’t usually have this many kinds of plants and numbers of plants.
- There are too many plants in this garden. The plants are piled on top of each other.
- Some of these plants don’t grow here.
- Some fruits grow on trees. Trees usually grow in orchards or in the yard, not in gardens.
- The same fruit or vegetable is scattered around the garden, and they usually grow together in a row, section or square, or a patch.

Let’s make “Our Floor Garden” look more like a real garden.

1. **Sort the pictures into groups of similar plants.**
2. **Identify the fruits that grow on trees and plant them in an orchard somewhere else in the room.**
3. **Replant the rest of the pictures in similar groups.**
4. **Discuss the amount of space and the variety of plants in your floor garden.**

Gardeners like to record things about their gardens so they know what to plant, how much, when to plant, and so on. Let’s record things about “Our Floor Garden” using a chart.

On the board or a large sheet of paper, make a chart with four columns similar to the illustration on this page. You may need two charts depending on the number of fruits and vegetables you will be working with. The “Tallies” column will be used in the Do section.

Ask the students to name and count each of the fruits and vegetables in “Our Floor Garden.” Record the information in the “Fruits or Vegetables” and “Quantity” columns. Add the number of different fruits and vegetables and the quantities and record the total at the bottom of each column. The quantity total should equal the number of students plus you.

In the Ranking column, have the students rank the fruits and vegetables from most popular, number 1, to least popular. You may want to create a bar chart with this information.

You might want to take a survey and have the students raise their hands if they have tried eating each of the fruits and vegetables. Challenge them to try something new from the list.

We just started to plan a garden. I would love to actually grow this garden, wouldn’t you?
What are some questions we’d have to ask ourselves before we could plant our classroom fruit and vegetable garden?

Examples of questions:
• Can the fruit or vegetable grow where we live?
• How much space does each plant take and how much food does each plant produce?
• Is there enough space to grow all the plants?
• When can we plant it and when can we harvest it?

Now go harvest your fruit and vegetable pictures out of the garden and take them back to your seats. We will reuse the pictures. We are going to take what we learned and plan “Our Food Garden.”

**TEACHER’S NOTES:** See the Where We Live Fruits and Vegetables Sampler described in the TEACHER’S NOTES at the end of the Materials list. Wash and precut samples and store them in bags. Save a whole one to show the students and to demonstrate how to prepare or cut it. Invite a few students to help distribute the samples. You may want them to wear gloves or use tongs to put the samples on one paper plate per student. Students are more likely to try new fruits and vegetables if you add some ranch dressing or a dip on their plates. Additional local fruits and vegetables could be discussed by showing pictures from food packages, cans, models, Internet sources, magazines, or food advertisements. Explain that most of the frozen and canned fruits and vegetables they eat are not grown locally. Fresh fruits and vegetables often come from hundreds or thousands of miles away.

**“WHERE WE LIVE” FRUITS AND VEGETABLES SAMPLER**

Have the student helpers wash their hands first and then have the rest of the students wash their hands. Clean the serving table and your hands. Then set up the table with the fruits and vegetables, cutting boards, knives, gloves, paper towels, paper plates, and napkins. Have the student helpers put the paper plates out on the table so that they can place one sample of each fruit or vegetable on each plate. When the other students are done washing their hands, have them pick up their sample plates and take them back to their seats. Instruct them not to eat anything on their plates until they are told.

We make a lot of our food choices based on how things taste. Fruits and vegetables are healthy food choices. They are called GLOW foods because the vitamins and minerals in them can make shiny hair, sparkling eyes, glowing skin, and healthy or glowing bodies.

We are going to taste fruits and vegetables that can grow near where we live and that we might be able to grow in our garden. I grew/bought these at ______________________. I kept most of these in the refrigerator to keep them fresh until we needed them. Then I washed and cut them into sample sizes. Please don’t eat them until we can talk about each one. Let’s see if you can identify them, and then we’ll taste them one by one.

Show one whole fruit or vegetable at a time. Have the students tell what it is. Then have them describe the outside. Slice it open and have them describe the inside. Have the students find and try that fruit or vegetable from their plate. Have them describe the taste, texture, and smell. Then use the same procedure to move on to the next fruit or vegetable. If you want to introduce more locally grown fruits and vegetables, show pictures of them.
VOTING FOR YOUR GARDN CROPS

Have the students find the fruits and vegetables they just ate or learned about in the first column of the “Our Floor Garden” chart. Circle the fruits or vegetables as the students identify them and add new ones to the bottom of the list.

Think about the vegetables you just ate and which ones would be your first and second choices to plant in our garden. We will take a hand vote and make a tally mark for each vote beside the vegetables on our chart. You will get two votes – one for your first choice and one for your second choice. When we are done, we will count the number of tally marks and determine what we will be growing in our garden. (Ask if there are any questions. You may want to ask students to help count and to make the tally marks. Remind them that they can vote twice. Proceed with the vote.)

As a class, count up the number of tallies for each fruit or vegetable and record the number next to the tally marks. Compare the quantity, ranking, and tally columns and discuss the most popular fruits and vegetables on the chart. Put a star next to the top four to six choices. Make sure that there are two or three cool season crops such as lettuce, spinach, radishes, and green onions. You may be able to plant and harvest those before you plant the warm season crops.

We are getting closer to deciding what we will plant in our garden. What do we need to know about these plants before we include them in our garden?

Examples of questions:
• How many fruits or vegetables does one plant grow?
• How many plants do we need to grow and is there enough space in our garden?
• When will we get to eat the fruits and vegetables that we plant?

There are many decisions to make when you are planning a garden. In order to find the answers to our questions, we will need to gather more information.

TEACHER’S NOTES: Start this section on another day or after students have had a brain break. This section relates to decisions regarding space in the garden. If you haven’t had a lot of gardening experience, you may want to find expert help from the list of partners in the TEACHER’S NOTES following the Materials list. Here are some things you will need to prepare ahead of time.

1. Choose the Garden Grid, found at the end of this lesson, that best fits your garden space and make at least two copies. One should be the grid that you work on with the students; the other will be the final garden plan. Once the final plan is completed, make back-up copies. If you are using the 10’ x 15’ grid, make an outline the size or your actual garden space before you share it with the students.

2. Make a list of the crops that you will probably end up planting from the students’ choices and be sure to include spring and fall harvest crops. We suggest starting a new garden with just vegetable crops, unless you want to try melons. Fruits either grow on trees or take a few years to produce a good crop. You can add those fruits another year.

3. Copy the vegetables and fruits picture squares found at the end of this lesson. Cut apart each square so everyone receives one picture. If the vegetables or fruits you are planting are not pictured, use the blank square to draw and label your own picture. Write “Small,”
“Medium,” and “Large” on separate pieces of paper to use as headers for three columns. Project or make a copy of the Planting Guide chart found at the end of the lesson so that everyone can refer to it. You may want to use poster board to make a sample of Square Foot Garden Templates 1 and 2 found at the end of this lesson.

4. If possible, go outside where you can look at your garden spaces. Otherwise, mark out your garden spaces on the floor. You may want to show pictures of tilled, raised bed, and container gardens from the Internet.

5. Continue to use “Our Floor Garden to Our Food Garden” chart.

ACTION STEPS to explore the relationship between the space in the garden and the food plants you want to grow

1. Work together to find out how much space you will have to grow food in your actual garden. Where everyone can see it, display the Garden Grid that best matches your garden space.

I have started a plan on this Garden Grid that will become “Our Food Garden Plan.” We will use it to plan the garden(s) that we will grow. This will help us to grow the kinds and amounts of fruits and vegetables that we want to eat. **What is/are the basic shape(s) of our garden spaces?**

You may have different shapes depending on the use of containers. Most raised bed and tilled food gardens are rectangle, but they don’t have to be.

We will be planting gardens in (container/raised bed/tilled) gardens. (Explain the differences by showing them the actual garden spaces or showing pictures of each kind of garden space.)

Go outside or somewhere that you can view and measure the garden(s) you will be planting. If that is not possible, use your floor to work with the students and tape out the sizes and shapes of your containers, raised beds, or tilled gardens.

Have the students count off by four vegetables that you are planning to plant in your garden, for example, radishes, lettuce, peppers, and tomatoes. Then have all the radish students stand on one side of the garden space, the lettuce students stand on another side, and so on.

Show them the tape measure and talk about how it works. Give a tape measure to a student at one corner of the garden. Have the student hold the end of the tape to the corner of the garden and pass it down his or her side of the garden until it reaches the other end. Show the last person how to lock the tape measure. Have everyone on the same side lay the tape measure along the edge of the garden to make sure it is flat. Have them read the tape measure and record the measurement on the outside edges of the Garden Grid. If you have four tape measures, it would be good to leave them around the edges of the garden to show everyone how that looks. You may want to introduce the concepts of perimeter and area.

Now that we know how much garden space we have to work with, let’s see how many plants we can grow in “Our Food Garden.”
2. **Work together to find out how big the plants will grow.**

Write “Small,” “Medium,” and “Large” on three pieces of paper and place them like column headers on top of a large table or on your floor garden.

Distribute the vegetable and fruit pictures, at least one per student.

Display the “Plant Sizes” chart where everyone can see it.

*Invite the students to bring their squares with vegetable or fruit pictures to sit or stand around the small, medium, and large column headers. Have someone read the title of the “Plant Sizes” chart and another student read the column headers. Talk about the measurements that determine whether a plant is small, medium, or large. Show what 3 inches, 6 inches, and 12 inches look like on a ruler. Explain that some plants grow even bigger than that.**

**Why do we need to know how big our vegetable and fruit plants are going to grow?**

It helps us to find out how many of our plants can fit into our container, raised bed, or traditional tilled (in the ground) gardens. It also tells us how far apart to plant our seeds or young plants.

You each have a small square with a picture on it.

**Do you think the vegetable or fruit on your square comes from a small, medium, or large plant?**

Let’s find out.

We have “Small,” “Medium,” and “Large” column headers on the table/floor just like you see on the “Plant Sizes” chart. One person at a time, please tell us what vegetable or fruit you have and if you have ever seen it or eaten it before. Then guess if your vegetable or fruit comes from a small, medium, or large plant and put your picture square in the right column. We will use the chart to see if you guessed correctly. *(Everyone can help each other through this activity. Many students may not have heard of their vegetable or fruit.)*

Let’s use “Our Floor Garden to Our Food Garden” chart and compare our pictures to the circled fruits and vegetables on the chart. Remove the vegetable and fruit squares that we didn’t eat or learn about. Those vegetables and fruits may not grow well here, and we will most likely not be planting them in our garden.

Look at the remaining vegetables and fruits in our columns. We could grow these plants here, but we want to take a closer look at the plants we want to plant in our garden. Look at the fruits and vegetables on the chart that have stars in front of them. Remove all the other vegetable and fruit pictures until all that is left in the “Small,” “Medium,” and “Large” columns are the plants that we want to grow in our garden.

**Focus on the characteristics of the plants that remain in the columns.** Medium-sized plants start to look like small shrubs with branches. Large-sized plants may grow tall like vines or tall plants that spread out. Discuss how many fruits or vegetables come from each of the plants and how many plants you would need to grow to produce a...
sample for everyone to eat. For example, you may want to grow one radish per person, one lettuce plant for two or three people, one cherry tomato plant, two hills of sweet potatoes, and so on. Record the number of plants you think you need in the margin next to the fruit or vegetable on the “Our Floor Garden to Our Food Garden” chart. Have the students return to their seats.

3. **Work together to see if the plants fit into our garden.**

Let’s see how our plant choices from “Our Food Garden” chart will fit in the gardens we are going to plant. Take out your rulers, markers or crayons, scissors, and the fruit or vegetable pictures you drew. *(Have your own supplies, plus newspapers.)*

**What large plants do we want to plant in our garden and how many do we think we need?**

*(You should have at least one of these plants because they will provide your students with something to harvest in the fall when they return to school.)*

Distribute individual pages of the newspaper and have students work together to measure and cut 12 to 15-inch squares that will represent the large plants in the garden. Have them write the name of the vegetable or fruit and draw a picture of it on top of the square.

Have the students take the large squares and place them on your actual container, raised bed, or tilled garden spaces or on the floor gardens taped on the floor. If you are outside, you may need to hold the papers down with a rock or stake them down with a small stick.

Repeat this process with the medium and small plants by making 6 to 10-inch squares and 3 to 4-inch squares. Use the paper from their fruit and vegetable pictures, especially for the small plants.

Give the students five minutes to work together to fit all the crops into the actual container, raised bed, or tilled garden spaces or the taped spaces on the floor. If you are outside, use coins, erasers, or rocks to hold the papers in place.

Discuss how the garden turned out.

There is one more thing we need to explore about plants in the garden that may help us grow everything we want to grow. Let’s see if a planting guide will help us grow more things in our garden.

4. **Explore the possibilities of using a planting guide to grow more crops in your garden space.**

Display the “Planting Guide” chart where everyone can see it, found at the end of this lesson. Have a calendar handy to count the days from planting to eating.

This is a “Planting Guide” chart. It shows how many days it takes from the time you plant a seed or young plant to the day you can harvest and eat it. It is arranged in small, medium, and large crops so we can easily use it to think about how we might be able to rearrange the plants in our garden or grow them at different times.
Go through the chart and highlight or circle your garden choices and the days until the vegetable or fruit is most likely to be ready to eat.

Most of the small vegetables can be planted inside in late winter or outside in a raised bed when the ground is workable. Refer to the chart and a calendar to show students when you may be able to plant the small crops and then count the number of days until harvest. Mark the beginning and end dates on the calendar.

Is it possible that we could plant the small plants or crops and be able to eat them before school is out in the summer?
Yes.

If we harvested the small plants, what could we make with them?
Possible answers include: veggies and dip, salads, wraps, sandwiches, egg rolls

Some of the medium and large plants, such as tomatoes, broccoli, eggplant, and peppers, can be started from seed in containers in the classroom, and they can be planted outside once the chance of frost has passed. Use a calendar and show the students when you may be able to plant the medium and large crops. Then have them use the chart and calendar to count the number of days it will take for the fruit or vegetable to grow and be ready to eat.

Is it possible that we could plant the medium and large plants before the end of the school year and come back at the beginning of the next school year to harvest and eat them?
Yes.

What can we do with this information to help us plant and harvest all the fruits and vegetables we want to plant?
We could plant the small plants and harvest them. That would leave a space in the garden to plant the medium and large plants. If we started some of the medium and large plants in our classrooms, we could give them a head start and move them outside when there is space.

5. Plan the garden to make everything work.
An efficient use of garden space that incorporates ease of planting in container and raised bed gardens is Mel Bartholomew’s Square Foot Gardening method. You can combine the square foot method and try row gardening in a tilled garden (traditional, in the ground). The students will be using square foot templates to plant the garden. Therefore, when the students rearrange their plant squares, have them try to work in square plots instead of rows.

One more thing we can do to get the most food from our garden is to use a planting method called square foot gardening. This time when we arrange our small and medium plants in the garden, we can group them in square plots instead of rows.
Let’s go back to the garden and put the puzzle together using our plant squares as the puzzle pieces.

Use the raised bed and tilled garden plans found at the end of this lesson and the container garden illustrations on this page as examples for the students. Have the students compare the illustrations with their garden plans made by squares in the garden. Remind the students that they can use double cropping or use the space to grow spring harvest crops and then replant the garden with late summer and fall harvest crops.

Other adults or high school volunteers and mentors can work with the students to rearrange the plant squares into a spring harvest garden and then a late summer and fall harvest garden. You may need to add or subtract plant squares.

Special note: You may want to tape the squares together and display your garden plan like a mural or quilt on the wall.

IMPORTANT: Draw the spring harvest and late summer or fall harvest garden plans on the “Our Food Garden Plan” worksheet. Write the name of the plants and the number of plants in each of the sections. Record any other notes on the plan.

We now have “Our Food Garden Plan” to help us move closer to planting.

What can we do to have more fruits and vegetables for our school?

Possible answers include:

- Work with local food producers, gardeners, and farmers to share what they grow.
- Work with the community and neighborhood garden site to grow more food.
- Partner with high school students and teachers in horticulture, FFA, or 4-H.
- Expand gardens to nearby empty lots, public spaces, senior centers, health and wellness centers, after-school program sites, etc.
- Explore the possibilities of adding different types of containers to grow food such as kid’s swimming pools, plastic tubs, wagons, wheelbarrows, or decorated oil drums on wheels.

You may choose to actually expand your garden or access to healthy foods in one or more of the ways mentioned above. If so, have the students use what they have learned to plan another garden. If you are new to gardening, starting small is a good idea.

**MY HOME FOOD GARDEN PLAN**

Distribute plain sheets of paper or blank copies of one of the Garden Grids found at the end of this lesson. The students will need their pencils and rulers.

At the top of your paper write “My Home Food Garden Plan” and put your name below the title. This is an opportunity for you to draw a food garden plan that you can share and do at home. If you don’t have a yard, you can plant some plants in different containers or in a windowsill garden, or you can have a space in a community or neighborhood garden.
Think of the type of garden spaces you can create at home and the plants that you might be able to help your family grow. Use “Our Food Garden Plan” and the charts as a guide. Start small to keep things manageable; you won’t have all your classmates to help you. If you already have a garden, draw a section of it where you might be able to make your own plans.

*Ask students to share their plans with the rest of the class. Have them stand where everyone can see and speak loudly so everyone can hear.*

*Collect their garden plans and see what they learned. Give them suggestions so that they can actually use the plan or part of the plan at their homes.*

*Make copies of the family letter found at the end of this lesson on the back of the students’ “Home Food Garden Plans.” Have the students write the date at the top and sign their own names after “Thanks!” Send the students home with their letters and their garden plans. Have them describe their garden plans to their families. A few days later, give them an opportunity to share their families’ reactions to their plans.*
Garden Grid

Name

= 1 square foot

GROWING IN THE GARDEN: LOCAL FOODS AND HEALTHY LIVING
OUR FOOD GARDEN PLAN

LESSON 4A
Garden Grid

4' x 8' RAISED GARDEN

15" x 30" EARTHBOX™ CONTAINER GARDENS

Name
# Plant Sizes

## How big will plants grow?

<table>
<thead>
<tr>
<th>SMALL</th>
<th>MEDIUM</th>
<th>LARGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 to 5 inches</td>
<td>6 to 24 inches</td>
<td>24 inches or more tall or long</td>
</tr>
</tbody>
</table>

### Vegetables

<table>
<thead>
<tr>
<th>SMALL</th>
<th>MEDIUM</th>
<th>LARGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 to 5 inches</td>
<td>6 to 24 inches</td>
<td>24 inches or more tall or long</td>
</tr>
</tbody>
</table>

#### Beets
- Asparagus
- Brussel sprouts

#### Carrots
- Beans
- Cucumbers

#### Kohlrabi
- Broccoli
- Okra

#### Onions
- Cabbage
- Potatoes

#### Radishes
- Cauliflower
- Pumpkins

#### Garlic
- Collards
- Summer squash

#### Kale
- Eggplant
- Sweet corn

#### Lettuce
- Peas
- Sweet potatoes

#### Mustard greens
- Peppers
- Tomatoes

#### Spinach
- Tomatillos
- Winter squash
- Zucchini

### Fruits

<table>
<thead>
<tr>
<th>FRUIT</th>
<th>FRUIT</th>
<th>FRUIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strawberries</td>
<td>Blueberries</td>
<td>Muskmelon (cantaloupe)</td>
</tr>
<tr>
<td>Blueberries</td>
<td>Grapes</td>
<td>Watermelon</td>
</tr>
<tr>
<td>Grapes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SQUARE-FOOT GARDENING TEMPLATE 1

1. Make a copy of this page.
2. Cut around the 4-inch squares and cut out the circles.
3. Place one template on one corner of a poster board.
   Draw around the outside of the square and around the circles.
4. Use the same template four times to make a square-foot gardening guide.
5. Cut around the square foot and cut out the circles.
6. Write the names of the crops in the center of the guide.
7. It is best to laminate these guides to keep them in good shape from year to year.
SQUARE-FOOT GARDENING TEMPLATE 2

peas, bush beans
## PLANTING GUIDE

<table>
<thead>
<tr>
<th>VEGETABLES OR FRUITS</th>
<th>DAYS UNTIL HARVEST*</th>
<th>PLANTING DATE</th>
<th>HARVESTING DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SMALL PLANTS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beets</td>
<td>60 - 80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carrots</td>
<td>60 - 80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kohlrabi</td>
<td>50 - 60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onions</td>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radishes</td>
<td>30 - 35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kale</td>
<td>60 - 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lettuce</td>
<td>30 - 40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mustard greens</td>
<td>40 - 60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spinach</td>
<td>35 - 40</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MEDIUM PLANTS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asparagus</td>
<td>3 yrs after first planting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beans</td>
<td>50 - 60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broccoli</td>
<td>60 - 80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cabbage</td>
<td>60 - 80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cauliflower</td>
<td>60 - 80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collards</td>
<td>50 - 55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eggplant</td>
<td>75 - 80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Okra</td>
<td>70 - 90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peas</td>
<td>50 - 75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peppers</td>
<td>70 - 75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strawberries</td>
<td>1 yr after first planting</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LARGE PLANTS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brussel sprouts</td>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cucumbers</td>
<td>50 - 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potatoes</td>
<td>70 - 110</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pumpkins</td>
<td>90 - 120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer squash</td>
<td>60 - 75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweet corn</td>
<td>65 - 90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>100 - 110</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tomatoes</td>
<td>70 - 80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tomatillos</td>
<td>70 - 80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter squash</td>
<td>90 - 120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zucchini</td>
<td>60 – 75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muskmelon (cantaloupe)</td>
<td>70 – 85</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* varies with variety
<table>
<thead>
<tr>
<th>JANUARY</th>
<th>FEBRUARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUN MON TUE WED THU FRI SAT</td>
<td>SUN MON TUE WED THU FRI SAT</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>MARCH</td>
<td>APRIL</td>
</tr>
<tr>
<td>SUN MON TUE WED THU FRI SAT</td>
<td>SUN MON TUE WED THU FRI SAT</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>MAY</td>
<td>JUNE</td>
</tr>
<tr>
<td>SUN MON TUE WED THU FRI SAT</td>
<td>SUN MON TUE WED THU FRI SAT</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# RAISED BED GARDEN PLAN

## SQUARE-FOOT METHOD FOR 4' x 8' RAISED BED

### SPRING

Plant as soon as soil can be worked.

<table>
<thead>
<tr>
<th>Plant</th>
<th>Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>leaf lettuce</td>
<td>![Image]</td>
</tr>
<tr>
<td>onions</td>
<td>![Image]</td>
</tr>
<tr>
<td>beets</td>
<td>![Image]</td>
</tr>
<tr>
<td>radishes</td>
<td>![Image]</td>
</tr>
<tr>
<td>broccoli</td>
<td>![Image]</td>
</tr>
<tr>
<td>spinach</td>
<td>![Image]</td>
</tr>
<tr>
<td>snap peas</td>
<td>![Image]</td>
</tr>
</tbody>
</table>

### FALL

Plant near the end of May.

<table>
<thead>
<tr>
<th>Plant</th>
<th>Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>butternut squash</td>
<td>![Image]</td>
</tr>
<tr>
<td>tomatoes</td>
<td>![Image]</td>
</tr>
<tr>
<td>grape or cherry tomatoes</td>
<td>![Image]</td>
</tr>
<tr>
<td>peppers</td>
<td>![Image]</td>
</tr>
<tr>
<td>sweet potatoes</td>
<td>![Image]</td>
</tr>
</tbody>
</table>
TILLED GARDEN PLAN

SQUARE-FOOT AND ROW METHOD FOR 10’ x 15’ GARDEN

cucumber
cucumber
tomato

pepper
pepper
pepper
tomato

beans

WALKWAY

broccoli
broccoli
broccoli
broccoli
broccoli
broccoli

cabbage

zucchini


carrots
onions

lettuce

flowers

peas


trellis
Dear Family,

Our class is planting a garden. We are excited to grow food to eat at school. Did you know that I tried some new fruits and vegetables today?

We made up plans for home food gardens. Do you think my garden plan would work in our yard or in some containers? Please help me make changes.

My teacher would like me to bring my plan back to school so I can share it with the class.

Thanks!
Lesson Six: Mulching for Water Conservation and Cabbage
For February

“Magic of Mulch” and “Mulch More” activities from GROWING IN THE GARDEN: OUTDOOR CLASSROOM, Iowa State University Extension and Outreach; and “Cabbage” from HARVEST OF THE MONTH: Network for a Healthy California.

Students learn about the benefits of different types of mulches and the difference between organic and inorganic materials. They learn about how much mulch to use in the garden. They have a chance to go out to the garden and apply mulch. This multi-part lesson also includes many activities about cabbage. They learn about acid-base properties, cruciferous vegetables, nutrients in cabbage, growing cabbage, and conduct experiments.

---

**Content objectives:** Describe the role of mulch in conserving waters; determine how to mulch the garden; describe how cabbage grows; discuss nutrients in cruciferous vegetables; investigate acid-base properties of cabbage.

**Life Skill objectives:** Healthy lifestyle choices, Critical thinking, Communication, Citizenship, Leadership, Decision making, Problem solving,

**Core and STEM concepts and skills:**
- **Science**
  - Science as inquiry, Earth and space, Life science

- **Math**
  - Operations and algebraic thinking, Numbers, Measurement and Data, Geometry, Mathematical practices

- **Language Arts**
  - Reading, Speaking, Listening, Viewing

- **Social Studies**
  - Economics, Geography

**Healthy snack:** Cabbage Confetti

**Additional and supporting resources:**
Cooperative Extension Master Gardener’s Program can be a resource for developing your garden plan.
LESSON PLANS FOR 2012-13 SCHOOL YEAR, GRADE 3

February: The Magic of Mulch and Cabbage

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  Healthy Gardens, Healthy Youth
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  Growing in the Garden: Elementary Curriculum
  Iowa State University Extension and Outreach

Nutrition Lesson:
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  Harvest of the Month 15
  Cabbage Nutrient Facts Labels 19
  Harvest of the Month Cabbage Workbook Pages 23
  KWL Chart Template 27
  Network for a Healthy California

Recipe: Cabbage tasting and/or Cabbage Confetti (included in Harvest of the Month)
BEFORE THE LESSON

Cabbage is a popular winter vegetable. Thanks to the Network for a Healthy California Harvest of the Month www.harvestofthemonth.cdph.ca.gov website, we are sharing educator newsletters that included information, recipes, and activities about cabbage.

1. **Grade 3, February: Mulching and Cabbage 2012-2013 School Year**
   This document contains all the curriculum items and resources you need for this lesson. All lesson downloads are located on the www.peoplesgarden.wsu.edu Educational Toolkit.

2. **Mulch Activities**

3. **Food Safety**
   The **FIGHT BAC: Six Steps to Safer Fruits and Vegetables** brochure from Partnership for the Food Safety Education is included here. This information was also provided in the November lesson. The brochure focuses on tips to keep fruits and vegetables safe to eat and to prevent foodborne illness.
   **FIGHT BAC: Four Simple Steps to Food Safety** is a brochure from North Dakota State University Extension Service that lists tips to clean, separate, cook, and chill food, including fruits and vegetables, to prevent foodborne illness.

   Did you make a poster for the November lesson? If so, be sure to post it. If not, you might want to make a simple poster to display in the classroom to remind everyone about these simple food safety steps. Go over the relevant steps before starting any food preparation or tasting in the lesson.

4. **Harvest of the Month: Cabbage**
   Review Harvest of the Month: Cabbage and related documents to prepare for the nutrition lesson.

5. **Garden Journals**
   Continue your garden journals or records. Have students make a three-column KWL Chart (chart to track what a student knows (K), wants to know (W) and has learned (L) about the topic) and complete it for the journal. Each time you do a lesson or go out in the garden, there is an opportunity to add something new to the Garden Journal.

6. **Taste testing**
   Prepare to do the Cabbage Tasting and/or make the Cabbage Confetti for tasting.
THE LESSONS

*Special note:* We recommend doing the Magic of Mulch and Cabbage lessons on separate days or multiple days according to your schedule.

1. **Garden Lesson: The Magic of Mulch** Use the Educator’s Guide, do The Magic of Mulch activity, and refer to the ‘Mulch’ More activity to develop a plan about mulching the students’ gardens. This is a combination of STEM activities.

2. **Nutrition Lesson: Cabbage**
A suggested lesson design is included just before the lesson resources from *Harvest of the Month: Cabbage*. You may want to expand the lesson by choosing other activities from Harvest of the Month: Cabbage.

**AFTER THE LESSON**
Do the ‘Mulch’ More activity in and around the students’ gardens.
Safe Handling of Fresh Fruits and Vegetables

PROVIDED BY THE PARTNERSHIP FOR FOOD SAFETY EDUCATION

Check
- Check to be sure that the fresh fruits and vegetables you buy are not bruised or damaged.
- Check that fresh cut fruits and vegetables like packaged salads and precut melons are refrigerated at the store before buying. Do not buy fresh cut items that are not refrigerated.

Clean
- Wash hands with warm water and soap for at least 20 seconds before and after handling fresh fruits and vegetables.
- Clean all surfaces and utensils with hot water and soap, including cutting boards, countertop, peelers and knives that will touch fresh fruits or vegetables before and after food preparation.
- Rinse fresh fruits and vegetables under running tap water, including those with skins and rinds that are not eaten. Packaged fruits and vegetables labeled “ready-to-eat”, “washed” or “triple washed” need not be washed.
- Rub firm-skin fruits and vegetables under running tap water or scrub with a clean vegetable brush while rinsing with running tap water.
- Dry fruits and vegetables with a clean cloth towel or paper towel.
- Never use detergent or bleach to wash fresh fruits or vegetables. These products are not intended for consumption.

Separate
- When shopping, be sure fresh fruits and vegetables are separated from household chemicals and raw foods such as meat, poultry and seafood in your cart and in bags at checkout.
- Keep fresh fruits and vegetables separate from raw meat, poultry or seafood in your refrigerator.
- Separate fresh fruits and vegetables from raw meat, poultry and seafood. Do not use the same cutting board without cleaning with hot water and soap before and after preparing fresh fruits and vegetables.

Cook
- Cook or throw away fruits or vegetables that have touched raw meat, poultry, seafood or their juices.

Chill
- Refrigerate all cut, peeled or cooked fresh fruits and vegetables within two hours.

Throw Away
- Throw away fresh fruits and vegetables that have not been refrigerated within two hours of cutting, peeling or cooking.
- Remove and throw away bruised or damaged portions of fruits and vegetables when preparing to cook them or before eating them raw.
- Throw away any fruit or vegetable that will not be cooked if it has touched raw meat, poultry or seafood.
- If in doubt, throw it out!

©2004 Partnership for Food Safety Education, www.fightbac.org
The US food supply is among the safest in the world, but organisms that you can’t see, smell or taste – bacteria, viruses and tiny parasites – are everywhere in the environment. These microorganisms – called pathogens – can invade food and cause illness, sometimes severe and even life-threatening, especially in young children, older adults, persons with weakened immune systems and pregnant women.

Fresh fruits and vegetables are important to the health and well-being of Americans and we enjoy one of the safest supplies of fresh produce in the world. However, although low, the proportion of food-borne illness associated with fresh fruits and vegetables has increased over the last several years. As health and nutrition experts continue to recommend we add more fruits and vegetables to a healthy daily diet, it becomes increasingly important that consumers know how to handle them properly.

Handling fruits and vegetables safely is easy. Although an invisible enemy may be in your kitchen, by practicing the following recommendations you can Fight BAC!®

These messages were developed by the Partnership for Food Safety Education. The Partnership for Food Safety Education unites industry associations, consumer and public health groups and the United States Department of Agriculture, the Environmental Protection Agency and from the Department of Health and Human Services, the Centers for Disease Control and Prevention and the Food and Drug Administration, to educate the public about safe food handling and preparation. The Partnership, a non-profit organization, is the creator and steward of the Fight BAC!® campaign, a food safety education program developed using scientifically based recommendations and resulting from an extensive consumer research process. Fight BAC!® materials are fully accessible online at www.fightbac.org and utilized by consumers, teachers, dietitians, public health officials and extension agents across the United States. Fight BAC!® and BAC! images, © 2004, Partnership for Food Safety Education.

This material made available with support from the Produce Marketing Association. For produce education information and tools, general food safety information and to register to be a BAC!® fighter, visit www.fightbac.org today! For additional food safety information, visit www.foodsafety.gov.
Be a BAC Fighter
Make the meals and snacks from your kitchen as safe as possible. CLEAN: wash hands and surfaces often; SEPARATE: don’t cross-contaminate; COOK: to proper temperatures, and CHILL: refrigerate promptly. Be a BAC Fighter and Fight BAC!®

For More Information about Safe Food Handling and Preparation
USDA’s Meat and Poultry Hotline
1-888-MPHotline (1-888-674-6854);
TTY 1-800-256-7072
www.foodsafety.gov

FDA’s Food Information and Seafood Hotline
1-800-332-4010

Partnership for Food Safety Education Web Site
www.fightbac.org

NDSU Extension Service
www.ag.ndsu.edu/food

Or contact your local cooperative extension office.

Grade 3 February Mulch/Cabbage Lesson
Apply the heat... and Fight BAC!®

Cooking food to the proper temperature kills harmful bacteria. So Fight BAC® by thoroughly cooking your food as follows:

SAFE COOKING TEMPERATURES
as measured with a food thermometer

<table>
<thead>
<tr>
<th>Internal temperature</th>
<th>Ground Meat and Meat Mixtures</th>
<th>Poultry</th>
<th>Fresh Beef, Veal, Lamb</th>
<th>Fresh Pork</th>
<th>Eggs and Egg Dishes</th>
<th>Seafood</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beef, Veal, Lamb, Pork</td>
<td>Chicken and Turkey, whole</td>
<td>Medium-rare, Lamb</td>
<td>Medium-rare</td>
<td>Eggs</td>
<td>Fin fish</td>
</tr>
<tr>
<td></td>
<td>160°F</td>
<td>165°F</td>
<td>145°F</td>
<td>160°F</td>
<td>Cook until yolk and white are firm</td>
<td>145°F</td>
</tr>
<tr>
<td></td>
<td>Chicken, Turkey</td>
<td>Poultry Parts</td>
<td>Medium</td>
<td>Medium</td>
<td>Egg Dishes</td>
<td>or flesh is opaque and separates easily with fork</td>
</tr>
<tr>
<td></td>
<td>165°F</td>
<td>Duck and Goose</td>
<td>160°F</td>
<td>160°F</td>
<td>160°F</td>
<td>Shrimp, looper and crab</td>
</tr>
<tr>
<td></td>
<td>Fresh Beef, Veal, Lamb</td>
<td>Stuffing (cooked alone or in bird)</td>
<td>Well-done</td>
<td>170°F</td>
<td></td>
<td>flesh pearly and opaque</td>
</tr>
<tr>
<td></td>
<td>Medium-rare</td>
<td>165°F</td>
<td></td>
<td></td>
<td></td>
<td>Clams, oysters and mussels</td>
</tr>
<tr>
<td></td>
<td>160°F</td>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
<td>shells open during cooking</td>
</tr>
<tr>
<td></td>
<td>Well-done</td>
<td>170°F</td>
<td></td>
<td></td>
<td></td>
<td>Scallops</td>
</tr>
<tr>
<td></td>
<td>165°F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>milky white or opaque and firm</td>
</tr>
<tr>
<td></td>
<td>Poultry Parts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Leftovers and Casseroles 165°F</td>
</tr>
</tbody>
</table>

*Allow three-minute rest time

Sign up to be a BACFighter at www.fightbac.org
SEPARATE: Don’t cross-contaminate
Cross-contamination is how bacteria can be spread. When handling raw meat, poultry, seafood and eggs, keep these foods and their juices away from ready-to-eat foods. Always start with a clean scene—wash hands with warm water and soap. Wash cutting boards, dishes, countertops and utensils with hot soapy water.

Separate raw meat, poultry, seafood and eggs from other foods in your grocery shopping cart, grocery bags and in your refrigerator.

Use one cutting board for fresh produce and a separate one for raw meat, poultry and seafood.

Never place cooked food on a plate that previously held raw meat, poultry, seafood or eggs.

CHILL: Refrigerate promptly
Refrigerate foods quickly because cold temperatures slow the growth of harmful bacteria. Do not over-stuff the refrigerator. Cold air must circulate to help keep food safe. Keeping a constant refrigerator temperature of 40°F or below is one of the most effective ways to reduce the risk of foodborne illness. Use an appliance thermometer to be sure the temperature is consistently 40°F or below. The freezer temperature should be 0°F or below.

Refrigerate or freeze meat, poultry, eggs and other perishables as soon as you get them home from the store.

Never let raw meat, poultry, eggs, cooked food or cut fresh fruits or vegetables sit at room temperature more than two hours before putting them in the refrigerator or freezer (one hour when the temperature is above 90°F).

Never defrost food at room temperature. Food must be kept at a safe temperature during thawing. There are three safe ways to defrost food: in the refrigerator, in cold water, and in the microwave. Food thawed in cold water or in the microwave should be cooked immediately.

Always marinate food in the refrigerator.

Divide large amounts of leftovers into shallow containers for quicker cooling in the refrigerator.

Use or discard refrigerated food on a regular basis. Check USDA cold storage information at www.fightbac.org for optimum storage times.
Educator’s Guide
The Magic of Mulch and ‘Mulch’ More
Healthy Gardens, Healthy Youth

Here are some recommendations for doing the activities identified above. The question responses in normal font can be read to the students, the responses in italics are guidelines for the teacher.

1. Ask the students if they know the difference between “organic” and “inorganic” materials. They may remember this from the composting lessons. Use the following simplified descriptions and garden questions as your reference.

a. Organic substances or materials come from living things such as plants, fruits, vegetables, and animals. In chemistry, organic compounds contain carbon.

b. What organic things are found in a garden? Fruits, vegetables, plants, animal droppings, insects, compost, and some types of mulch.

c. Now that we know about organic things; how would you describe something that is inorganic? Inorganic substances and materials do not come from fruits, vegetables, plants, or animals and do not contain carbon.

d. What do you think inorganic things come from? Inorganic things come from anything other than organic matter, most start with mineral sources.

e. What is an example of a mineral source? Rocks are mineral sources and rocks break down into soil. So rocks and soil in your garden are examples of inorganic materials.

2. Proceed with The Magic of Mulch activity.

3. Please use the following questions to apply the activity to the students’ gardens.

a. Should we mulch our gardens or garden walkways? Why?
You may want to refer back to the question in the activity, “What is it (mulch) used for?”

If you are using the square foot gardening method, think about reasons why mulch is not necessary.

If you are using raised bed gardens, ask the students to think about reasons why mulch is good for the walkways around the gardens. Their answers may include: the mulch will hold the water in the soil and hold the soil in place, mulch is easier to maintain than mowing grass and trimming close to the frames of the raised beds, the grass may get trampled and the walkways could turn to mud puddles, and mulch will help to prevent weeds – especially if there is landscape fabric underneath it.
b. What kind of mulch should we use? Do you want to experiment with different kinds of mulch? Where should we put the mulch?

4. Read the ‘Mulch’ More activity and work with the students to figure out how much mulch you will need and how you can acquire the mulch. Decide when would be a good date to mulch your garden and why. The date will give everyone a goal to work towards.
MATERIALS - Sandwich-sized zipper lock bags that individually contain the following: bark mulch, grass clippings, gravel, river rock mulch, sawdust, pine needles, leaves, carpet samples, black plastic (from a garbage bag), newspaper, and other mulching materials
- Permanent marker to label contents of bags
- 2 signs (one labeled "organic" and the other "inorganic")

What is mulch and where have you seen it?
Mulch can be wood and leaf pieces, grass clippings, rubber tire pieces, or any other small pieces used to cover the ground around plants and objects or to make walkways.

What is it used for?
To conserve soil moisture, to prevent weed growth, to make a garden look nice, to cover a pathway, etc.

We are going to learn more about the benefits and different types of mulches. Some mulches are made of natural, formerly living materials. We call those “organic” materials. Some mulches are made of “inorganic” materials, which are from nonliving things.

The day of the lesson, make two signs – organic and inorganic. Set all the bags, label side up, on the floor. Select one student to be the sorter and two students to be recorders. The sorter will hold up each sample and will be instructed by the other students which pile each sample should go to. You may want to add a little information about each sample if there is some disagreement about whether it is organic or inorganic. One recorder will write a list of the organic mulches in one column on the board, and the other recorder will make a column of the inorganic mulches.

Count the number of samples in each column.
Which column has the greater number of mulches?

Select a couple of organic and inorganic mulches from the samples. Ask the class how each of them is used as a mulch, i.e., vegetable garden, around trees, in the playground, etc.
Are these mulches more decorative or functional?

If layers of these mulches were placed on the soil surface, what would they have in common?
They would all help conserve soil moisture, prevent weed growth, and prevent erosion.

How does mulch keep weeds from growing?
It prevents sunlight from reaching the soil, making it difficult for weed seedlings to grow.
How does mulch conserve soil moisture?
It reduces the amount of water evaporation from the surface of the soil.

What are some advantages of organic mulches?
They look more natural, they will decompose, etc.
What are some disadvantages of organic mulches?
They decompose quickly and need to be replaced frequently.

What are some advantages of inorganic mulches such as river rock?
They are permanent and don’t need to be replaced.

What are some disadvantages of inorganic mulches?
They are heavy to haul. The soil can’t be worked up after they are in place, more expensive, etc.

Have two students hold up each mulch bag and have students discuss how they have seen them used in a landscape or garden or how they could be used.

Would the depth of the mulching material make a difference in how well it works?
Yes.

What would happen if you covered your vegetable plants or flowers with mulch?
They wouldn’t get any light, and they would die.

What and how is mulch building, recycling, and conserving?
Mulch is building the soil if it is organic and will decompose. It is recycling materials such as bark, grass clippings, etc. Mulch conserves soil moisture and reduces soil loss caused by wind and water erosion.

How would mulching be good for our garden?
Mulches conserve water in the soil by reducing evaporation. They also cover the soil and keep weeds from growing.

What mulching materials do you think we could easily find and use in our garden?
Grass clippings, pine needles, newspapers, etc.

“Mulch” More
Activity 5

Materials
- Mulching materials such as grass clippings, pine needles, sawdust, straw, black plastic mulch or garbage bags, etc. (Save grass clippings from mowing; however, do not store for more than a day in plastic garbage bags or they become a packed, smelly mess.)
- Garden gloves (several pairs – students can bring from home)
- Shovel
- Small buckets for spreading mulch

Contact your school maintenance workers to see if they can have a load of mulch dropped off at your school for this activity.

If your class is growing a garden, such as the sunflower house, butterfly garden, or salad garden, you may want to mulch around the plants. Collect grass clippings and other
mulching materials. Use the table below to determine the depth to apply the mulch. Black plastic garbage bags can be cut and laid around tomato, pepper, squash, pumpkin, or cucumber plants. Secure the edges of the plastic with soil to prevent it from blowing up with the wind.

Discuss the different types of mulches and the depth to apply them.

**Why are mulches applied at different depths?**
Because of the differences in thickness and the way they pack down over time – some become denser and more compact.

**As the season progresses, compare the effectiveness of the different mulches.**

**Is it still in place?**
**Did it prevent weed growth?**
**Did it have to be replenished?**
When looking at the number of weeds and water needs of the plants, how did the mulches compare to bare soil?

<table>
<thead>
<tr>
<th>Mulch</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dried grass clippings</td>
<td>3&quot;-4&quot;</td>
</tr>
<tr>
<td>Sawdust</td>
<td>1&quot;-2&quot; (available from lumber yards)</td>
</tr>
<tr>
<td>Straw</td>
<td>4&quot;-6&quot;</td>
</tr>
<tr>
<td>Black/white newspaper</td>
<td>6-8 sheets</td>
</tr>
<tr>
<td>Carpet samples</td>
<td></td>
</tr>
<tr>
<td>Black plastic</td>
<td></td>
</tr>
</tbody>
</table>

**RESOURCES**


Garden Mosaics, American Community Gardening Association and Cornell University, New York City [www.gardenmosaics.org](http://www.gardenmosaics.org)
Iowa State University Extension and Outreach, Growing in the Garden. [http://www.extension.iastate.edu/growinginthegarden](http://www.extension.iastate.edu/growinginthegarden)
Go to the Resource, Lessons and Activity Ideas
USDA FNS People’s Garden School Pilot Program: Healthy Gardens, Healthy Youth [www.peoplesgarden.wsu.edu](http://www.peoplesgarden.wsu.edu)

*Compost supply sources:
Planet Natural. [http://www.planetnatural.com/site/compost-thermometer.html](http://www.planetnatural.com/site/compost-thermometer.html)
Johnny’s Selected Seeds. [http://www.johnnyseeds.com](http://www.johnnyseeds.com)
Seeds of Change. [http://www.seedsofchange.com](http://www.seedsofchange.com)

*Inclusion does not imply endorsement.*
Nutrition Lesson: Cabbage
The following activities are from Harvest of the Month: Cabbage.

A. Page 2: Find fresh examples (if not available, find pictures) of the different types of cabbage in the chart under “Botanical Facts”. Then use the following steps to learn about cabbage.
   1.) Read “How does a cabbage grow” and start a similar chart where everyone can see it. Using your samples, look at the characteristics of each of the cabbage to see if you can visually see the differences between them. You may want to wash and taste each of the types (see tasting sheet).
   2.) If students grew cabbage in last year’s garden, discuss what you grew. If students did not grow cabbage, consider if you might grow it this year. Talk about the growing process for cabbage. Do you start with seeds or small plants? How deep do you plant them? How long does it take for them to produce the vegetable that you eat? How do you harvest them? Review the parts of the cabbage.

   1.) Rinse and slice a cabbage lengthwise so the “tree” inside can be seen. (Hint: This is easier to see in red varieties.)
   2.) Have each group look at their half and take turns peeling the layers off.
   3.) Compare the textures and colors of inner and outer leaves.
   4.) Consider tasting the different layers and compare intensity of taste (if you have not already tasted cabbage).
   5.) Compare Nutrition Facts labels.

C. Page 2: Read the “what are cruciferous vegetables” and “Reasons to Eat Cabbage” page 1.
   1.) Have students make a list of cruciferous vegetables that they eat and those that they would like to try.
   2.) Review Reasons to Eat Cabbage and Fruit and Vegetable Nutrients from the student worksheets. What other nutrients to cruciferous vegetables contain?
   3.) What health benefits do cruciferous vegetables provide for our body?
   4.) Have students develop a list of snack suggestions that include cruciferous vegetables and share with classmates.

C. Page 4, “Science Investigation”: follow the steps listed to determine whether a substance is an acid.

D. Page 4, “Physical Activity Corner”: Teach students how to do Chinese jump rope, an activity that can improve kinesthetic movement and endurance. This is a great group activity, and may take some time to perfect. Set aside time each week to practice.

E. (optional). Consider reading a book with the students. Check with your librarian or the local library for a copy. The Cabbage Solution by Erika Oller (Penguin Group, 2004) Overview: Elsie lives a simple life on a small farm, growing things that she sells to the green grocer, but one night half of her cabbages disappear and her cats, Fluff and Gordo, find the culprits and make them set things right.
Tiny Green Thumbs by C.Z. Guest (Hyperion Book, 2000)
In this how-to book in the guise of a story, Ganny Bun tutors her grandson, Tiny Bun, on the "six things you need to grow a garden." Brief horticultural discussions between them provide a background for gardening. The half dozen essentials, explained in accessible terms, are: preparing the soil; planting the seeds (e.g., place cucumber seeds in four mounds, "at least two feet from one another and about the size of home plate on a baseball field"); watering the seeds; sunshine; time (during which aspiring gardeners can cultivate the garden by weeding, etc.); and lastly, love. "If you [care for your garden] right, by the end of July, you'll be able to play hide-and-seek among the cornstalks," conclude the instructions.

What is a Plant? by Bobby Kalman (Crabtree Publishing, 2006) Overview: One in the "Science of Living Things" series, this book is filled with colorful drawings and photographs. Biology comes alive as the various aspects of plant life are discussed and illustrated. Defining plants, their importance on this earth, parts of plants, their systems of survival and the great variety are discussed sufficiently enough to inform and inspire, but not overwhelm an elementary age student.

These book offers the opportunity to review/discuss plants, gardens, growing foods on a farm and dealing with garden pest and predators.
Health and Learning Success Go Hand-In-Hand

Do more. Watch less. Test scores improve when students limit TV time and are more physically active. Encourage students to turn off the TV and video games and get at least 60 minutes of physical activity each day to help keep them healthy, strong, and focused. Harvest of the Month connects with core curricula to introduce students to fruits and vegetables and ways to be more active.

Exploring California Cabbages: Taste Testing

What You Will Need (per group of 4 students):
- Green, red (or purple), savoy and Chinese cabbage varieties; two heads of each variety for entire class
- Small sample cups (four cups each per group)
- Printed Nutrition Facts labels for each cabbage variety*
- White board and markers
- Cutting board and knife

Optional: Paper and pencils or other art supplies for students.


Activity:
- Wash and drain one head of each cabbage variety.
- Chop and fill sample cups, keeping varieties separate; label cups, cover, and set aside.
- Display four unwashed cabbage heads (one of each variety) in front of room.
- Compare different types of cabbages’ nutrient values using the labels.
- Distribute sample cups to groups, one variety at a time.
- Observe tastes, colors, and textures; record student observations on board.
- Discuss similarities and differences between varieties; vote on class favorite.

For more ideas, reference:
Kids Cook Farm-Fresh Food, CDE, 2002.

Cabbage Confetti

Makes 36 tastes at ¼ cup per serving
Prep time: 5 minutes
Chill time: 30 minutes

Ingredients:
- 1 (10-ounce) package shredded raw green cabbage
- 1 (10-ounce) package shredded raw red cabbage
- 1 (20-ounce) can crushed pineapple in 100% juice, drained (reserve ¼ cup juice)
- ⅛ teaspoon salt
- ⅛ teaspoon black pepper
- Small plates and forks

1. In large bowl, mix green and red cabbage with pineapple and juice.
2. Add salt and pepper and gently toss until well coated. Refrigerate for at least 30 minutes.
3. Place ¼ cup of salad on small plates and serve.

Nutrition information per serving:
Calories 15, Carbohydrate 4 g, Dietary Fiber 1 g, Protein 0 g, Total Fat 0 g, Saturated Fat 0 g, Cholesterol 0 mg, Sodium 4 mg

Adapted from: Tasting Trio Team, Network for a Healthy California, 2010.

Reasons to Eat Cabbage

A ½ cup of shredded cabbage provides:
- An excellent source of vitamin C and vitamin K (red, green, and savoy varieties).
- A source of vitamin A (red and savoy varieties).
- A source of folate (savoy variety).
- Phytochemicals in the form of indoles and isothiocyanates*.

*Learn about phytochemicals and cruciferous vegetables on page 2.

Phytochemical Champions*:
- Blueberries
- Citrus fruits
- Cruciferous vegetables (broccoli, cabbage)
- Soy foods
- Tomatoes

*Champion foods are rich sources of phytochemicals.

For more information, visit: www.nal.usda.gov/fnic/foodcomp/search/
What Are Cruciferous Vegetables?

- Cruciferous vegetables are plants that contain indoles and isothiocyanates, which are phytochemicals with possible anti-cancer properties.
- The Brassicaceae (also called Cruciferae) family takes its name cruciferous (meaning “cross-bearing”) from the shape of the plants’ flowers, which have four petals resembling a cross.
- Cabbage is a cruciferous vegetable. Other vegetables in this family include bok choy, broccoli, Brussels sprouts, cauliflower, collard greens, kale, Swiss chard, turnips, and turnip greens.
- Phytochemicals appear to work together with nutrients and fiber to provide health benefits.
- Isothiocyanates (in form of sulforaphane and indoles) act as an antioxidant, neutralizing free radicals that may damage cells.
- Phytochemicals may aid in detoxification of undesirable compounds and strengthen antioxidant defenses in cells.
- They are rich sources of glucosinolates, sulfur-containing compounds that give them their pungent aromas and spicy (some say bitter) taste.
- Like other dark green vegetables, many cruciferous vegetables are rich in folate and chlorophyll.


How Does Cabbage Grow?

Cabbage is the most easily grown vegetable of the Mustard family. It is a cool-season crop that matures prior to extreme heat. Cool-season crops are grown for vegetative parts, including the roots (carrots), leaves (cabbages), stems (celery), and immature flowers (broccoli). Due to smaller plant size and shallow roots, cabbages are often started from seeds indoors.

**Growing Cabbage Heads**

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Grows best at 50 to 75 F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>Sandy loam or raised clay soil beds; requires added compost and moisture</td>
</tr>
<tr>
<td>Exposure</td>
<td>Full sun or partial shade</td>
</tr>
<tr>
<td>Planting</td>
<td>Seedlings spaced 1 to 2 feet apart; rows spaced 2 to 3 feet apart</td>
</tr>
<tr>
<td>Days to maturity</td>
<td>50 to 90 days</td>
</tr>
<tr>
<td>Harvest period</td>
<td>Average two crops per year (winter and spring)</td>
</tr>
<tr>
<td>Harvesting</td>
<td>Hand-harvested and field packed</td>
</tr>
</tbody>
</table>


**Botanical Facts**

Pronunciation: käbˈij
Spanish name: cole
Family: Brassicaceae
Genus: Brassica
Species: Brassica oleracea
Group: Capitata

Cabbage is a cole crop of the Mustard family (Brassicaceae) and its varietal name, *B. oleracea Capitata*, distinguishes this cruciferous vegetable as being “in the form of a head.” (The Brassicaceae family was formerly called Cruciferae.) The word cabbage derives from the French word caboche meaning “head.”

The species *B. oleracea*, or wild cabbage, is grouped into seven major cultivars based on development. (See chart below for cultivars.) Within the Capitata Group, there are more than 400 cabbage varieties but most common are the green, red, purple, and savoy varieties. Most Asian cabbage varieties belong to another species, *B. rapa*. This includes Chinese cabbage, which is also known as Napa or celery cabbage.

<table>
<thead>
<tr>
<th><em>B. oleracea</em> Cultivar Group</th>
<th>Includes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acephala</td>
<td>Kale, collard greens</td>
</tr>
<tr>
<td>Alboglabra</td>
<td>Kai-ian (Chinese broccoli)</td>
</tr>
<tr>
<td>Botrytis</td>
<td>Cauliflower</td>
</tr>
<tr>
<td>Capitata</td>
<td>Cabbage</td>
</tr>
<tr>
<td>Gemmifera</td>
<td>Brussels sprouts</td>
</tr>
<tr>
<td>Gongylodes</td>
<td>Kohlrabi</td>
</tr>
<tr>
<td>Italica</td>
<td>Broccoli</td>
</tr>
</tbody>
</table>

For more information, visit: http://plants.usda.gov

Image adapted from: www.inspection.gc.ca
To download reproducible botanical images, visit www.harvestofthemonth.com.
How Much Do I Need?
A ½ cup of shredded cabbage is about one cupped handful. The amount of fruits and vegetables that each person needs depends on age, gender, and physical activity level. Children need at least 60 minutes of moderate to vigorous activity every day. Remind students that eating a variety of colorful fruits and vegetables throughout the day – in all forms (fresh, frozen, canned, dried) – will help them reach their recommended amount. Have students track their goals daily by recording their fruit and vegetable consumption in the MyPyramid worksheet.*


Recommended Daily Amount of Fruits and Vegetables*

<table>
<thead>
<tr>
<th></th>
<th>Kids, Ages 5-12</th>
<th>Teens and Adults, Ages 13 and up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>2½ - 5 cups per day</td>
<td>4½ - 6½ cups per day</td>
</tr>
<tr>
<td>Females</td>
<td>2½ - 5 cups per day</td>
<td>3½ - 5 cups per day</td>
</tr>
</tbody>
</table>

*If you are active, eat the higher number of cups per day. Visit www.mypyramid.gov to learn more.

A Head of Cabbage History
- Nearly 3,000 years ago, wild cabbage indigenous to Asia and the Mediterranean slowly spread into Northern Europe by the Celts and later the Romans.
- Able to store for long periods, cabbage was a staple item of Europeans in the Middle Ages. Its juice was commonly used to heal wounds and as a cough remedy.
- In 1541, French explorer Jacques Cartier introduced cabbage to North America.
- Since cabbage contains lots of vitamin C, other explorers, including Captain Cook, traveled with it in order to prevent scurvy. Cabbage rapidly spread across the continent.

For more information, reference: http://aggie-horticulture.tamu.edu

Home Grown Facts
- With over 13,000 acres harvested for cabbages, California leads the nation in commercial cabbage production.
- Monterey, Ventura, Santa Barbara, Imperial, and San Luis Obispo are the leading cabbage-producing counties.
- Cabbage is shipped year-round in California reaching its peak in March for traditional St. Patrick’s Day fare of corned beef and cabbage.

For more information, visit: www.nass.usda.gov/About_NASS/index.asp
www.cdfa.ca.gov

Student Sleuths
1. Make a list of cruciferous vegetables that you eat and those you would like to try. What phytochemicals do they contain? What health benefits do these provide to your body? Develop a list of snack suggestions that include cruciferous vegetables and share with your classmates.
2. Fruits and vegetables provide different nutrients and phytochemicals based on what color they are. Research nutrients in different cruciferous vegetables. How do the nutrients differ based on what color the produce is? Look for recipes you can prepare at home that include these fruits and vegetables.
3. Purple and red cabbages contain anthocyanins. What are anthocyanins and what do they appear to do for the mind and body? Identify other fruits and vegetables that contain anthocyanins and develop a plan to try at least one in the next week.
4. What effect does cooking have on phytochemicals in cruciferous vegetables? What is the best way to consume cabbage to get the most phytochemicals?

For information, visit:
www.ers.usda.gov
www.leafy-greens.org/cabbage_family.html

Cafeteria Connections
Promote students’ health by incorporating more cabbage into school meals. Gradually replace items that typically use shredded lettuce or lettuce pieces with shredded cabbage. Start with one-quarter of the cabbage mixture and work up to one-half.


Student Champions
California is the nation’s top food and agricultural producer. More than half of the nation’s fruits, vegetables, and nuts come from California. Encourage students to participate in community activities and show their appreciation for California’s farmers.

For example:
- Interview a local farmer. Ask details about daily schedule, work duties, and why he/she likes it. Submit article for school newsletter.
- Send letter of appreciation to a farmer.
- Contact a local farmer and ask him/her to be a guest visitor at your school for the day.
- Write a children’s book (with illustrations) about the life of a farmer. Imagine what life would be like without farms.
- Participate in National Future Farmers of America Week (in February).

For more information, visit:
http://www.ffa.org
Physical Activity Corner
Pairing students with “workout buddies” can promote cooperation and increased participation. Teach students how to do Chinese jump rope, an activity that can improve kinesthetic movement and endurance. Set aside time each week for students to practice in a group.

Materials:
- Chinese jump rope (extra long, thick elastic band).

Activity:
- Two students place elastic band around ankles and stand a few feet apart.
- Third student completes a series of jumps/tricks between rope without touching the rope.
- Each time student completes jump series, the rope moves up (ankles, calves, knees, etc.); students should not stop between jump series (to promote endurance).
- If student misses jump or touches rope, move to next student.

For more information, visit: www.kidnetic.com

School Garden: Heads of Cabbage
If your school has a garden, here is an activity you may want to implement. Look for donations to cover the cost of seeds, tools, irrigation systems, electric pumps, and any salary incurred by garden educators or others.

Cabbage needs cool weather to grow. Whether cabbage is grown in the garden or purchased from the store, it is an important vegetable that can be eaten raw or cooked. The cabbage family tends to be high in vitamins C and K and has many other ingredients that help the body fight disease. The outer leaves of the green and red cabbages tend to be a darker color than the newer, inside leaves where the light does not reach them.

Fresh cabbage heads from the garden have many open leaves that can be eaten. These are the first leaves that appear as the cabbage head develops. When cabbage is purchased at the store; the darker outer leaves that are not tight against the head have generally been removed so just the compact head is seen.

Activity: Investigating Cabbage
- Rinse and slice a cabbage lengthwise so the “tree” inside can be seen. (Hint: This is easier to see in red varieties.)
- Have each group look at their half and take turns peeling the layers off.
- Compare the textures and colors of inner and outer leaves.
- Taste the different layers and compare intensity of taste.
- Compare Nutrition Facts labels.

Adventurous Activities
Science Investigation:
Use cabbage juice to determine whether a substance is an acid or base.

Materials:
- Can opener, 1 can red cabbage (not sauerkraut), colander, small bowl, measuring spoons, 3 glass jars, 1 tablespoon vinegar, 1 tablespoon baking soda, 1 tablespoon distilled water

Procedure:
- Open can of cabbage.
- Use colander to drain cabbage juice into bowl*.
- Put two tablespoons (30ml) of juice into each glass jar.
- Add vinegar to first jar. Record color of juice.
- Add baking soda to second jar. Record juice color.
- Add distilled water to third jar. Record juice color.
- Discuss results.

*Allow kids to taste the canned cabbage.

For sample discussion, visit www.harvestofthemonth.com


Just the Facts
- Many vegetables evolved from the original wild cabbage including broccoli, Brussels sprouts, cauliflower, collard greens, kale, and kohlrabi.
- All cole crops can be cross-bred, making it easy and economical to develop new cabbage varieties*.
- Primary uses of cabbages include processed coleslaw (40-45%), fresh head (35%), sauerkraut (12%), various fresh-cut products (5-10%), and dried (less than 5%).
- Technological advancements in packaging have increased the number of cabbage heads for market about 30% since 1996.

*For more information about cole crops, refer to Broccoli newsletter.
Download from www.harvestofthemonth.com

Sources:
www.fruitsandveggiesmatter.gov/month/cabbage.html
www.ers.usda.gov/Briefing/Vegetables/readings.htm

Literature Links
- Elementary: Tiny Green Thumbs by C.Z. Guest and What is a Plant? by Bobby Kalman.
- Secondary: Green Power: Leaf and Flower Vegetables by Meredith Sayles Hughes and 100 Vegetables and Where They Came From by William Woys Weaver.

For more ideas, visit: www.cfaitc.org/books
Green Cabbage

**Nutrition Facts**

Serving Size: ½ cup cooked green cabbage, shredded (75g)

<table>
<thead>
<tr>
<th></th>
<th>Calories</th>
<th>Calories from Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>0g</td>
<td>0%</td>
</tr>
<tr>
<td>Saturated</td>
<td>0g</td>
<td>0%</td>
</tr>
<tr>
<td>Trans</td>
<td>0g</td>
<td></td>
</tr>
<tr>
<td>Cholesterol</td>
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<td>0%</td>
</tr>
<tr>
<td>Sodium</td>
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<tr>
<td>Total Carbohydrate</td>
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</tr>
<tr>
<td>Dietary Fiber</td>
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<td>6%</td>
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<tr>
<td>Sugars</td>
<td>2g</td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td>1g</td>
<td></td>
</tr>
</tbody>
</table>

Vitamin A 1%  Calcium 4%
Vitamin C 47%  Iron 1%

Other nutrients: Vitamin K (102%), Folate (6%)

Source: [www.nal.usda.gov/fnic/foodcomp/search/](www.nal.usda.gov/fnic/foodcomp/search/)
NDB No: 11110
# Green Cabbage

## Nutrition Facts

<table>
<thead>
<tr>
<th>Serving Size: ½ cup green cabbage, shredded (35g)</th>
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<tbody>
<tr>
<td>Calories 9</td>
<td>Calories from Fat 0</td>
</tr>
<tr>
<td>% Daily Value</td>
<td></td>
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<tr>
<td>Total Fat 0g</td>
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<tr>
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<td>0%</td>
</tr>
<tr>
<td>Trans Fat 0g</td>
<td></td>
</tr>
<tr>
<td>Cholesterol 0mg</td>
<td>0%</td>
</tr>
<tr>
<td>Sodium 6mg</td>
<td>0%</td>
</tr>
<tr>
<td>Total Carbohydrate 2g</td>
<td>1%</td>
</tr>
<tr>
<td>Dietary Fiber 1g</td>
<td>4%</td>
</tr>
<tr>
<td>Sugars 1g</td>
<td></td>
</tr>
<tr>
<td>Protein 1g</td>
<td></td>
</tr>
<tr>
<td>Vitamin A 1%</td>
<td>Calcium 1%</td>
</tr>
<tr>
<td>Vitamin C 21%</td>
<td>Iron 1%</td>
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</table>

Other nutrients: Vitamin K (33%)


NDB No: 11109
## Red Cabbage

### Nutrition Facts

<table>
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<tr>
<th>Nutrient</th>
<th>Amount</th>
<th>% Daily Value</th>
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<tbody>
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<td>Calories</td>
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<tr>
<td>Fat</td>
<td>0g</td>
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<tr>
<td>Saturated Fat</td>
<td>0g</td>
<td>0%</td>
</tr>
<tr>
<td>Trans Fat</td>
<td>0g</td>
<td></td>
</tr>
<tr>
<td>Cholesterol</td>
<td>0mg</td>
<td>0%</td>
</tr>
<tr>
<td>Sodium</td>
<td>21mg</td>
<td>1%</td>
</tr>
<tr>
<td>Total Carbohydrate</td>
<td>5g</td>
<td>2%</td>
</tr>
<tr>
<td>Dietary Fiber</td>
<td>2g</td>
<td>8%</td>
</tr>
<tr>
<td>Sugars</td>
<td>2g</td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td>1g</td>
<td></td>
</tr>
<tr>
<td>Vitamin A</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td>3%</td>
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<tr>
<td>Vitamin C</td>
<td>43%</td>
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<tr>
<td>Iron</td>
<td>3%</td>
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</tbody>
</table>

Other nutrients: Vitamin K (45%), Vitamin B6 (8%), Potassium (6%), Folate (5%)


NDB No: 11113
Red Cabbage

### Nutrition Facts

<table>
<thead>
<tr>
<th>Serving Size: ½ cup red cabbage, shredded (35g)</th>
<th>Calories 11</th>
<th>Calories from Fat 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Daily Value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Fat 0g</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Saturated Fat 0g</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Trans Fat 0g</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Cholesterol 0mg</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Sodium 9mg</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Total Carbohydrate 3g</td>
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<td></td>
</tr>
<tr>
<td>Dietary Fiber 1g</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Sugars 1g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein 1g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin A 8%</td>
<td></td>
<td>Calcium 2%</td>
</tr>
<tr>
<td>Vitamin C 33%</td>
<td></td>
<td>Iron 2%</td>
</tr>
</tbody>
</table>

Other nutrients: Vitamin K (17%)

NDB No: 11112
What do cabbage, broccoli, bok choy, and cauliflower have in common?

They are all members of the **cruciferous** family of vegetables. Cruciferous vegetables have flowers that form the shape of a cross. The word “cruciferous” comes from the word *cross*, or *crucifer*.

Other cruciferous vegetables include:

- cabbage
- broccoli
- bok choy
- cauliflower
- rutabagas
- kale
- radish
- turnips
- watercress
- collared greens
- mustard greens
- arugula

Look at the list on the left. Which of these cruciferous vegetables have you eaten?

Which of these cruciferous vegetables would you like to try?

---

**Phytochemicals**

One of the most important reasons to eat cruciferous vegetables is for the **phytochemicals** they contain. **Phytochemicals are found in fruits, vegetables, and other plants.** Phytochemicals are the natural parts of fruits and vegetables that give them deep, dark colors, and in some cases, strong odors.

An easy way to remember how to say phytochemicals is “fight-o-chemicals”. Phytochemicals help protect plants from bugs or insects and sun damage. They also protect our body and may be strong disease fighters—or “phyters”—by helping to **fight cancer, heart disease, and diabetes**. There are over 4,000 different phytochemicals!
Fruits and vegetables come in many different colors. Colorful fruits and vegetables contain different nutrients. Nutrients are all of the good things inside of food that our body needs to be healthy and strong. Eating a variety of colorful produce helps us get all the nutrients our bodies need.

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>What it does</th>
<th>Where it’s found</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A</td>
<td>helps keep your skin healthy</td>
<td>cantaloupe, carrots, sweet potatoes, spinach, and broccoli</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>important for keeping your gums and skin in good shape</td>
<td>cabbage, kiwi, oranges, red bell peppers, and strawberries</td>
</tr>
<tr>
<td>Calcium</td>
<td>most important mineral for bone health</td>
<td>green leafy vegetables, such as broccoli</td>
</tr>
<tr>
<td>Iron</td>
<td>helps to carry oxygen from your lungs to the rest of your body</td>
<td>potatoes, spinach, and broccoli</td>
</tr>
<tr>
<td>Fiber</td>
<td>helps keep your digestive system healthy</td>
<td>all fruits and vegetables</td>
</tr>
</tbody>
</table>

Test your knowledge!

Why is it important to eat a variety of fruits and vegetables? ____________________________

What does fiber do for your body? ____________________________
Vegetables are fun and easy to eat! Check out these tasty ideas. It’s simple to add vegetables to your meal!

- Add different colored veggies to your pizza like purple onions, bell peppers, and tomatoes!
- Eat a salad with your pizza. You can add colorful veggies and fruits to add taste and color!
- Sprinkle some low-fat cheese on your favorite veggies (like broccoli, carrot sticks, or cauliflower), then melt it in the microwave for a quick, healthy snack!
- Add some broccoli, zucchini, and bell peppers to your pasta. They are yummy and colorful!

Make a list of meal ideas that you would like to make at home. Include at least one of your favorite vegetables.

### Setting SMART goals

Write down one thing you will do to try to eat more fruits and vegetables (e.g. “I will add extra lettuce and tomato to my burger at lunch tomorrow.”)

For important nutrition information visit [www.cachampionsforchange.net](http://www.cachampionsforchange.net). For food stamp information, call 877-847-3663. Funded by the USDA Supplemental Nutrition Assistance Program, an equal opportunity provider and employer.
# February Cabbage Taste Test

Directions: Write in an adjective that describes the taste, smell, color, and texture.

<table>
<thead>
<tr>
<th></th>
<th>Taste</th>
<th>Smell</th>
<th>Color</th>
<th>Texture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Cabbage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purple Cabbage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For important nutrition information visit [www.cachampionsforchange.net](http://www.cachampionsforchange.net). For food stamp information, call 877-847-3663. Funded by the USDA Supplemental Nutrition Assistance Program, an equal opportunity provider and employer.
<table>
<thead>
<tr>
<th>What do I already know about Cabbage?</th>
<th>What do I want to learn about Cabbage?</th>
<th>What did I learn about Cabbage?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

This material was funded by USDA’s Food Stamp Program through the California Department of Public Health’s Network for a Healthy California. These institutions are equal opportunity providers and employers. The Food Stamp Program provides nutrition assistance to people with low income. It can help buy nutritious foods for a better diet. For information on the Food Stamp Program in Tulare County, call 1-800-834-7121. This material was created and approved as an extension to the Harvest of the Month developed by the Network for a Healthy California.

Grade 3 February Mulch/Cabbage Lesson
### Planting a Garden – for a second year

**Lesson Seven:** How do you plant a garden the second year?

*For March*

“Planting Our Healthy Garden” from GROWING IN THE GARDEN: LOCAL FOODS AND HEALTHY LIVING, Iowa State University Extension and Outreach. It’s time to plant the garden you’ve been planning. Depending on your location, you may need to wait another month before planting. Students learn about creating a seed to seed cycle model and learn about the the food system by planting, watering, maintaining and eating goods grown in the garden.

<table>
<thead>
<tr>
<th>Content objectives:</th>
<th>Mark a garden; Plant seeds, sets, or transplants; and water the garden for the first time.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Skill objectives:</td>
<td>Healthy lifestyle choices, Critical thinking, Communication, Citizenship, Leadership, Decision making,</td>
</tr>
</tbody>
</table>

**Core and STEM concepts and skills:**

- **Science**  
  Science as inquiry, Earth and space, Life science
- **Math**  
  Operations and algebraic thinking, Numbers, Measurement and data, Geometry, Mathematical practices
- **Language Arts**  
  Reading for information, Vocabulary, Speaking, Listening, Viewing

**Healthy snack:** Water and a simple fresh fruit or vegetable snack with or without dip

**Additional and supporting resources:**

Cooperative Extension Master Gardener’s Program can be a resource for planting your garden.
LESSON PLANS FOR 2012-13 SCHOOL YEAR, GRADE 3

March: How do you plant a garden the second year?

Table of Contents                                Pages
Lesson Plan Outline: Before, The Lesson, and After  2
Gardening Tips for Working With Kids              4
    Healthy Gardens, Healthy Youth Partnership
How do you plant a garden?                        8
    Iowa State University Extension and Outreach
Lesson: Planting Our Food Garden                  13
    Growing in the Garden: Local Foods and Healthy Living
    Iowa State University Extension and Outreach
Garden Journal: See the Before section of the Lesson Plan  2, 31
Recipe: Healthy Snacks (See Before, #7)           2, 3
BEFORE THE LESSON

1. Grade 3, March: Planting the Garden, 2012-13 School Year
This document contains all the curriculum items and resources you need for this lesson. All lesson downloads are located on the www.peoplesgarden.wsu.edu Educational Toolkit. Please read through everything well in advance of delivering this lesson.

2. Gardening Tips for Working With Kids, Healthy Gardens, Healthy Youth Partnership
How do you plant a garden? Iowa State University Extension and Outreach
Master Gardeners and extension educators created the tip list based on their experiences gardening with kids for this project and for related summer programs. You may want to make a copy to keep handy throughout the gardening season. The garden planting document provides information about garden seeds and plants, tools, planting times, and a garden plant shopping list. You may want to read through it to do an inventory of garden supplies and fill in the gaps.

3. Check with Extension or gardening experts to find out when you can plant cool season and then warm season crops in your region. If you can’t plant in late March or early April, please do a lesson you missed in the fall or trade this lesson with the April lesson.

4. Please follow-through with the notes from your January garden planning session.
What changes are you incorporating into your garden?
What did the students decide to plant and why?
Is it a cool or warm season crop?
Where are you planting and what method are you using? (Square foot gardening or row gardens)
Who are your garden helpers and how can you prepare them?
Are the planting supplies ready to go?

5. Make sure you have all the supplies you will need to do the lesson, plant the garden, drink water, and eat a healthy snack.

6. Garden Journal
If they haven’t done so already, this is a good time for each student to start his or her own Garden Journal. Each time you do a lesson or go out in the garden there is an opportunity to add something new to the Garden Journal. Provide 1” vinyl binders or sturdy plastic folders with 3-ring binders so that students can take their journals to the garden and add pages, activity sheets, charts, recipes, etc. The binders with a clear sleeve on the front are nice because students can design their front cover on a heavy piece of paper and slide it into the sleeve. The students can also design their own inside cover page. Provide permanent markers so they can at least creatively write the title, using their first and last name such as “Charlie Smith’s Garden Journal”, on the front of the binder or folder. We have found that it works best to collect the journals after each use. See The Lesson Section, Garden Journal Page, for more details. Your Extension organization may have additional suggestions for garden journals.

7. Recipe:
Since planting the garden takes quite a bit of time and clean up, we are suggesting water and a simple fresh fruit or vegetable snack with or without dip. Students can help prepare the snacks before planting the garden. The snacks and dips can be chilling and ready when the students are done gardening. Here are some simple dip recipes or you can buy dip – try to keep it low fat.
Quick Fruit Dip
In a small bowl, mix 1 cup of plain yogurt with 2 tablespoons of brown sugar.

Zippy Vegetable Dip
1. Combine 1 cup of low fat cottage cheese, 1 cup of plain yogurt, and a 1-ounce package of dry ranch dressing in a blender. If you don’t have a blender, use a mixer.
2. Blend on medium speed approximately 30 seconds or until the mixture is smooth. Stop the blender a few times to scrape the mixture down the sides. If it is too thick, thin it with 1 or 2 tablespoons of skim milk or buttermilk.

THE LESSON
1. You may want to work on the Planting Our Food Garden lesson over a period of days. The outline below provides ideas so that you can determine how and when you want to complete the lesson. The activities in this lesson help students to understand how their food grows, what they need to plant food, and how to work together in the garden. There are sections that you may skip because of the type of garden you are planting and whether you are planting your own transplants. Here is a basic outline of the lesson.

Introduction: Make Sunflower Seed to Seed Cycles
(There are several books about sunflowers that you can read.)

Do: Seeds, Sets, Seed Pieces, and Transplants; Garden Matching Game (What are you planting in your garden and how should you plant it?)
Start Your Own Transplants (optional)

Reflect: Garden Tools and the Tool Safety Game
Making Garden Labels
Making Dibbles

Apply: Establishing Garden Rules
Planting your garden (choose the type you are working in)
We Need Water and Energy, Too! (water and fruit or vegetable snack)
Garden Journal Page

AFTER THE LESSON
You may want to add more pages to the Garden Journals so they can use their journals to do gardening at home. Here are some page ideas:

a. Draw or right down how each plant was started (as seeds, sets, seed pieces or transplants) and how deep they planted them.

b. Make predictions, with or without reading the seed packet, about when they will see the sprouts coming up out of the soil.

c. Write the dip recipes down so that they can make the dips at home.
USDA FNS People’s Garden School Garden Pilot Project:  
Healthy Gardens, Healthy Youth  

Tips for Working with Kids and the Garden

The following tips are from HGHY Master Gardeners and site leaders and are based on their experiences gardening with kids. These are tips for both school and the summer programs. A sample in-garden lesson outline can be found at the end of this document.

Be Prepared

- Send home information about the garden program including the details about who is leading the program, what the kids will be doing, where the gardens are located, when the kids will be gardening, what is happening with the garden produce, and expectations of the young gardeners. All gardeners should be wearing close-toed shoes and have sun protection. They will not be allowed to work in the garden or with food if they are sick or have been sick within the last 24 hours.

- Every time you go to the garden, take supplies such as a first aid kit, wet wipes, water jug with cups (or have kids bring their own water) and water for washing the produce.

- Use lesson plans and educational resources to prepare for each session. Play a game, sing a song, act out a play, read a book, or make a garden-based craft each session. Remember to have fun! See the Sample Garden Session outline at the end of these tips.

Working With the Kids

- Make sure the young gardeners know the 3 R’s garden rules: Respect, Responsibility, Readiness.

- Be fully prepared before heading to the garden so there will be little down time for the kids. The tools and any supplies should be easy to access and ready to go. Break large groups into manageable sizes. Have more than one activity and rotate them. Keep every child busy and on task or their attention will shift and they will drift. Have enough adult supervision to make this happen.

- Always demonstrate before letting the kids work on their own. The more adult helpers you have to float around and guide the kids, the better. Do not do things for the kids, show them how and have them show you how back.

- Check their work. Don’t take their word for it when they say they have completed a task. You might find that things were missed.

- Take frequent shade and water breaks. Break times are good times to introduce healthy snacks, books, garden journals, or other hands-on activities.

- Every child will appreciate some one-on-one time with instructors while working in the garden. Let them tell their stories and show you the weeds they found and pulled, etc.
Planning the Garden

- Use the hands-on, deeply aligned classroom lessons to help the students plan their gardens. The kids will have fun learning and taking ownership of the garden. They will get excited about choosing what to plant and how much they need to plant by doing these lessons. A Master Gardener or an experienced gardener is a valuable resource to help kids discover what crops can be grown in the climate and in the amount of space they will have to garden. Start a Garden Journal or Garden Records right away.

- Young students are not able to prepare the site for gardening. Master Gardeners and others can provide leadership for that. FFA students, parents, Ameri-Corps, Food Corps, garden clubs, retired teachers, neighbors and others have been instrumental in preparing the gardens and helping the youth in the planning stages.

- For the young children, have the sections of the garden already measured out and marked according to the garden plan. For the older youth, help them measure and mark the garden sections.

- Kids like to use garden tools, but they LOVE to use child-sized tools such as kid-sized rakes, hoes, shovels, watering cans, and gloves. The type of garden tools they need depend on the type of garden they will be working with and how it is planted – square foot vs. rows. They can share tools. Older students have been using adult-sized tools and even tools that have been loaned by Master Gardener groups.

- Master Gardeners and FFA members are using their green houses to start seeds and grow transplants for the school gardens.

Help the students start a compost bin and get the whole school involved.

Planting

- Go over tool safety rules for hoes, trowels, and rakes. A tool safety game is part of the gardening curriculum.

- Go over ways the plants in your garden are going to be planted: seeds, sets, transplants, seed pieces.

- Plant fast growing (cool season) crops like radishes and spinach for early satisfaction. Try to stagger your crops for constant harvest opportunities. Make sure the students will have something to harvest when they return to school in the fall.

Maintaining

Watering

- Watering is extremely important, especially in raised bed gardens. If you are meeting just once a week, you may have to make plans for additional watering. Families, youth groups, organizations, neighbors can sign up for times. Someone will need to be responsible to make sure the watering plans are carried out.

- Using a watering wand is a good way to water the garden. Show how to water at the base of the plant. Teach the kids to count how long it takes to water a plant.
Weeding
- Help the kids distinguish the difference between weeds and garden plants. Show them how to pull weeds so that the garden plants are not disturbed. Tell them where you want them to put the weeds. Have challenges such as finding the biggest weed, most unusual weed, most weeds, etc. Talk about why some parts of the gardens have more weeds than other parts, etc.

Insects and pests
- Insects intrigue and scare children. They enjoy doing the lessons about pests and going on hunting missions to find and eradicate them. Getting to show everyone the squash bug they found – and sometimes their eggs – is a joy in and of itself!
- Use the lessons from Grades 2 and 4 to identify “good guys” and “bad guys” in the garden and to figure out what to do about them. Then help the kids take the next steps to protect their garden from unwanted pests.

Harvesting, Preparing and Eating the Produce!
- Kids get excited when they see fruits/vegetables growing on the plants. Make sure that they show everyone by pointing and not picking! Describe what to look for to determine when the fruits/vegetables are ready to harvest.
- Show kids HOW to harvest produce gently. For example, gently hold a bean plant before pulling off the bean, cut the lettuce with scissors, etc.
- Kids love to harvest and taste the bounty. Try to include this in every lesson.
- Include in the lesson, ideas for how the food can be eaten. Simple recipes such as cucumber-flavored water, radish or veggie sandwiches, veggies with dip, cucumbers and onions in vinegar, etc. are the best. Get a large bottle of Ranch dressing because the kids will try anything they can dip! There are several ideas in the lessons.
- Show the whole vegetable before cutting it open. Have them find the seeds.
- Plastic plates and knives can be used for cutting and preparing produce.
- Help the kids put their gardens to bed.
Sample Gardening Session

1. Meet in gathering area
   a. Remind everyone about behavior expectations.
   b. Chat a bit – What’s up?
   c. Give garden plan for the day
   d. Split into smaller groups if necessary
   e. Have a planned garden activity for each group with an adult supervisor

2. Garden projects
   a. Planting
   b. Weeding
   c. Pest patrol
   d. Watering
   e. Harvesting
   f. Washing
   g. Cutting (if necessary)

3. Snack time
   a. Make their own snacks
   b. If there is nothing to harvest, consider produce from farmer’s markets
   c. Focus on fruits and vegetables
   d. Send ideas home to the families

4. Activity session – see lessons for ideas for games, songs, stories, plays, crafts

5. Go home!
How do you plant a garden?

UNIT 5
INTRODUCTION

LEsson CONTENTS
Planting Our Food Garden (Grades K through 4)
Planting Our Healthy Garden (Grades 4 and up)

GENERAL INFORMATION
Planting is one of the most exciting aspects of gardening. It is the beginning of an adventure and the next step toward producing a crop to harvest. The lessons in this unit will guide youth to implement the garden plans they created during the Planning Our Food/Healthy Gardens lessons. Together, you will look at seeds, sets, transplants, seed pieces, garden tools, tool safety, planting methods, and watering. This Introduction will help you to prepare for a successful gardening experience. Extension Master Gardeners, local foods producers, and avid gardeners would be good partners throughout this unit and can provide their expertise throughout the rest of the gardening season.

GARDEN SEEDS AND PLANTS
Every year you will need to prepare a “shopping list” for the seeds and plants that you are going to need for your garden. The “Garden Plant Shopping List”, found at the end of this Introduction, is a worksheet that will help to determine how much to buy. You may want to work through the columns with the older youth, but it is too complicated for the younger ones.

Seeds can be purchased early in the season, weeks before they are actually planted. Seeds should be stored in an airtight plastic container and kept in a cool, dry location until planting time. Although most left over garden seed can be saved until the following season, some may not germinate well if it isn’t stored properly. If you have left over seed, seal the open end of the packet with tape and store it in an airtight container in the refrigerator or location with a consistent temperature, not a garage or storage shed.

At planting time, keep the seeds dry prior to planting. Carefully tear or cut off the top edge of the packet to leave the plant descriptions and planting instructions intact. For ease in planting, you may want to pour your small seeds in a clean and dry recycled shaker such as a spice or cheese container. Be sure to label the shaker and keep the seed packet with the shaker. For slightly larger seeds, you may want to use the pinch cup method. Right before planting, pour the seeds in a labeled 3 to 5 oz. plastic cup so that the students can pinch out a few seeds for planting. Larger seeds can be poured into small labeled plastic containers such as labeled butter tubs. For any of these methods, keep the seed packets near the matching containers so that everyone can read the descriptions and planting instructions. Return extra seeds back to their original packet.

General Information continued on the next page.
GENERAL INFORMATION CONTINUED

Some crops, such as tomatoes, peppers, eggplant, broccoli, and cabbage are planted as transplants to get a jump start on the growing season. The seeds are planted indoors in small containers or cell packs 5 to 8 weeks before being planted in the garden. For information and activities to grow your own transplants, please refer to the Starting Seeds Indoors activities found in the Apply section of lesson 5B. Be sure that you have the right amount of sunlight, heat, protected space, and time before starting your own transplants.

Before transplants are planted in the garden, set them outside in a shady location for a few days and keep them watered. Gradually move them into the sun. After five to seven days they should be ready to plant in the garden. This is called “hardening off” and prepares the plants for the outdoor environment and reduces the shock associated with transplanting.

When it comes to planting, remind the students that transplants are “baby plants” and should be handled gently and carefully like other babies. Transplants in cell packs can be removed from the packs by pushing up from the bottom. Use care when handling the plants because the plants will not survive if the stems are broken. If tomato transplants are tall and leggy, they can be planted a few inches deeper in the soil. However, most other plants should not be planted more than an inch deeper than what they were growing in the cell pack. Immediately after planting, generously water the soil around the transplants.

Potatoes are planted using seed pieces that are actually potatoes that have been grown specifically for planting. You can purchase them at local garden centers early in the spring. Select potatoes that are firm and just beginning to sprout. Avoid those that are soft, show signs of rotting, or have sprouts more than a quarter of an inch long. Do not use potatoes from home that have sprouted.

Cut the potatoes into sections with one or more “eyes” or sprouts on each piece. Each eye, or bud, has the potential to sprout a stem. One potato can be cut into 2 to 4 pieces. The potatoes can be cut into seed pieces the day before planting and stored in a paper bag. Plant them a foot apart, about 4 inches deep with the sprout side up (cut side down).

Onions are often planted as small, dry onion bulbs called sets. These are easier for children to handle and plant as compared to the small onion transplants that are sold banded together in bunches. Onion sets are sold in bulk or in mesh bags. Purchase sets that are firm and not yet sprouted. Plant them about 3 or 4 inches apart and about 1 inch deep with the pointed end up.

TOOLS

Tools are an important part of gardening. Having the right tools on hand makes the planting more efficient and successful. Lessons 5A and 5B include tool identification, handling, and safety activities. The following tool list is a guide to the types and amounts of tools you may want to acquire for gardening with a group of youth. How many of each tool depends on the number of young gardeners working in the garden at the same time and the size of the garden space. If there are several gardeners, the best way to manage tools and students is to assign different tasks to different groups of students and then switch tasks so everyone can try everything. When multiple groups or classrooms are gardening at the same location, they can alternate the times they are in the gardens so that they can share tools.
GENERAL PLANTING TOOLS
(These can be used with all types of gardens.)

Measuring tape: To mark the garden according to the plan

String and stakes: To mark the rows or the sections of the garden

Garden markers or labels: The students should make their own garden markers or labels using suggestions from the lessons such as craft sticks, wooden spoons, laminated note cards, vinyl blind slats, or other creative ideas. However, if you are pre-marking their garden spaces, you may want to use your own garden markers to help the youth and adults figure out where to plant things. Mark each end of a row or corner of a square foot garden space designated for a particular crop. Your markers can be replaced by the youths’ markers and you can use your markers again somewhere else or as back-ups.

Square foot garden templates: These can be made from poster boards using the templates found at the back of each of the lessons. You may want to make two or three of each template for small and medium-size plants. The students can put the template in the appropriate space in the garden, plant seeds in the hole spaces on the template, pick up the template and move it to another space, and start over again. Or, you can make a one or two of each template to place in the garden, sprinkle sand in the hole, move the template and repeat the process. The students can plant the seeds in the spaces marked with sand. Or, you can make several templates out of newspaper that you can leave in the garden as mulch. You will need to hold down the newspaper squares with twigs, garden markers or a thin layer of soil or mulch. The students plant their seeds in poked or cut holes and the newspaper is left to decompose.

Choose a method to plant seeds using the square foot garden templates: Most youth use their fingers. You can use craft sticks, spoons, dibbles, etc.

Seed shakers and pinch cups: See the Seed description in this Introduction.

Rulers or Dibbles: Dibbles are rulers made out of craft sticks. The instructions are found in Lesson 5B. Dibbles can be used to measure the depth of each hole and the distance between plants. They are also good digging tools to plant seeds in loose soil close to the surface.

Watering can: A can that has a spray head that can be removed so that you can use a spout offers the most versatility. Even if a hose is used in the outdoor garden, it is handy to also have at least one watering can that the students can use.

Seeds, transplants, sets, seed pieces: Purchase according to the garden plan and the Garden Plant Shopping List found at the end of this lesson.

Scissors: To cut open the seed packages, to cut the string or twine marking the rows, etc.

Sign(s): You may want to create a sign or signs to tell the public about your garden. Other signs may remind the young gardeners and their families about the rules for the garden. You may also want to consider posting “Do Not Spray” signs near your garden area to remind caretakers and neighbors that you want to protect your garden and gardeners from chemical sprays.
GENERAL INFORMATION CONTINUED

Hand washing stations: You will want to make sure the gardeners have a place to wash and dry their hands.

First Aid Kit: Cleaning supplies, band aids, first aid cream, sun screen, insect repellent, anti-itch cream, and tweezers are handy emergency supplies.

Safety clothing: This is what the students should be wearing to protect them from injury and sunburn. Shoes must cover the entire foot. The right hat can protect your face and neck. Sleeves, pant legs, or sun screen can also protect the skin. Garden gloves are optional. They can protect your hands and keep them cleaner, but they are sometimes awkward and cumbersome.

EARTHBOX OR CONTAINER TOOLS
1. One or two trowels

RAISED BED TOOLS
(Based on one 4' x 8' bed)
1. One or two hoes to work the soil before planting
2. One or two rakes to smooth out the soil before planting
3. Two to four trowels
4. Garden hose with a spray wand

TILLED GARDEN TOOLS
(Based on a 10' x 20' space)
1. Two to four hoes
2. Two rakes
3. Four trowels
4. Garden hose with a spray wand

It is a good habit to teach and practice tool maintenance after every use. Remove soil residue from trowels, hoe blades, and rakes before putting them away. It will keep the storage area clean and the tools will be ready for the next use. It is best to store tools in an indoor or enclosed location to extend their life and prevent damage such as rusting and weathered handles.

OUTDOOR PLANTING TIME
When can you start planting outdoors? Cool season plants, such as carrots, radishes, onions, peas, lettuce, spinach, and potatoes can be planted as soon as the soil thaws in the spring. Warm season crops can be planted once the threat of frost has passed.

Always be sure your garden soil is ready to be worked before you till or turn the soil over. Do not work the soil when it is too wet - that will result in large clods that are difficult to break apart and rake smooth. To determine if and when the soil is ready to be worked, take a handful and form it into a ball. If it forms a tight ball that doesn’t crumble with a little pressure, it is too wet to work. If it has moisture in it but crumbles apart under slight pressure, it can be tilled or turned over.

At planting time, have everything ready to go – tools, plants, volunteers, water, etc. Detailed instructions for guiding groups of students to plant are found in lessons 5A and 5B.
### GARDEN PLANT SHOPPING LIST

**Instructions.** While looking at your garden plan, put an “X” next in the column to the right of all the crops that you will grow in your garden. In Columns 1 or 2, put an “X” to the right of the amount of seeds, sets, transplants or seed pieces according to whether you are planting in rows or square foot sections. In Column 3, figure out the portion of a 10 ft. row or the number of square foot sections you will be using for that particular crop. In Column 4, multiply either Column 1 or 2 times Column 3 and record the amount of seeds, sets, transplants, or seed pieces you will need. You will always need to purchase entire packets of seeds; but this will tell you how many packets to buy according to the total number of ounces needed.

<table>
<thead>
<tr>
<th>CROP</th>
<th>COLUMN 1 Seeds or plants for each 10 ft of row</th>
<th>COLUMN 2 Seeds or plants for 1 square foot section</th>
<th>COLUMN 3 Total number of 10 ft. rows or sq. ft. sections</th>
<th>COLUMN 4 Amount to purchase (COLUMN 1 or 2 x COLUMN 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bush beans</td>
<td>.5 ounce</td>
<td>.25 ounce</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pole beans</td>
<td>1 ounce</td>
<td>.5 ounce</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beets</td>
<td>½ packet</td>
<td>¼ packet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broccoli</td>
<td>7 plants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cabbage</td>
<td>7 plants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carrots</td>
<td>1 packet</td>
<td>½ packet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cauliflower</td>
<td>7 plants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweet corn</td>
<td>1 small packet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cucumbers</td>
<td>½ packet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eggplant</td>
<td>7 plants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kale</td>
<td>½ packet</td>
<td>¼ packet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kohlrabi</td>
<td>½ packet</td>
<td>¼ packet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leaf lettuce</td>
<td>1 packet</td>
<td>½ packet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muskmelon (cantaloupe)</td>
<td>1 packet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Okra</td>
<td>.25 ounce</td>
<td>.12 ounce</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onion sets or plants</td>
<td>40</td>
<td>.12 ounce</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peas</td>
<td>1.5 ounce</td>
<td>.75 ounce</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peppers</td>
<td>7 plants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potatoes</td>
<td>10 pieces</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>10 plants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pumpkins</td>
<td>½ packet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radishes</td>
<td>1 packet</td>
<td>½ packet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spinach</td>
<td>1 packet</td>
<td>½ packet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer squash (zucchini)</td>
<td>½ packet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter squash</td>
<td>½ packet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tomatoes</td>
<td>4 plants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watermelon</td>
<td>¼ packet</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Horticulturally speaking, plants produce “fruits” but nutritionally speaking, some of those fruits are called “vegetables.” Generally, if the fruit is sweet and you eat it as a dessert or side dish it is still called a fruit. If it is not so sweet and you can eat it as a main dish or side dish, it is called a vegetable. For example, tomatoes, cucumbers, peppers, and peas are the fruit of the plant, but we eat them as vegetables.**
Planting Our Food Garden

CONTENT OBJECTIVES
Plant a garden using “Our Food Garden Plan” from Lesson 4A and the most appropriate planting methods according to the type of garden and the plants that have been chosen for the garden. Experience personal health benefits of going outside, physical activities, water, and eating foods grows in gardens.

LIFE SKILL OBJECTIVES
Critical thinking, Decision making, Healthy Living, Citizenship, Leadership, Communication

INDICATORS
Students will successfully plant the garden according to the plans and planting methods from these lessons; Create a seed to seed cycle model; Exercise in the garden, use water, and eat foods grown in a garden

EVALUATIONS
21st Century Skills: Employability skills, Health literacy

SUBJECT STANDARDS
Science: Science as inquiry, Earth and space, Life science
Mathematics: Operations and algebraic thinking, Numbers and operations, Measurement and data, Geometry, Mathematical practices
Social Studies: Behavioral sciences, Geography
Literacy: Reading, Speaking, Listening, Viewing

CORE CONCEPTS AND SKILLS
Linguistic-words, Logical-mathematical, Spatial-visual, Bodily-kinesthetic, Interpersonal, Intrapersonal, Natural

LEARNER TYPES
Seed to Seed Cycle activity in the Introduction:

MATERIALS
Sunflower Life Cycle (one copy per student, found in the Introduction section)
Scissors, glue, tape, brown crayon, or marker (enough for everyone to share)
Small yellow paper plates (one per student)
Paint stir sticks (one per student)
Sunflower seeds (Could be sunflower seed snacks or birdfood, at least six seeds per student.)
Brown crayon or marker (enough for everyone to share)
Green dessert napkins (Cut along the fold line so two students can use a napkin. You may want to substitute green construction paper and cut out the leaves.)
Sunflower head pictures or an actual sample (optional)

Start Your Own Transplants activity in the Do section:

Strips of black and white newspaper (approximately 4” x 11”)
3 or 4 empty, clean frozen juice cans
You may substitute peat pots for the strips of newspaper and juice cans.
Fresh potting soil

Materials continued on the next page.
MATERIALS CONTINUED

Start Your Own Transplants activity in the Do section, continued:

- Garden seeds or mammoth sunflower seeds
- Garden flats or trays
- Large, clear plastic dry cleaner’s bag (optional)
- Small watering can or pitcher
- Potato (for the Do section seed pieces discussion)
- Our Food Garden Plan (Students’ garden plan from Lesson 4A)
- Garden Matching Game cards (copy and cut out one or more sets of the cards according to the number of students playing the game, see the Do section, found at the end of this lesson)
- Seeds and seed packets, sets, transplants, seed pieces (Please refer to the students’ Our Food Garden Plan from Unit 4, Lesson 4A and Unit 5, How do you plant a garden? General Information section and this lesson to determine what you will need.)
- Garden tools (Refer to the Unit 5, How do you plant a garden? General Information section and the Reflect and Apply sections of this lesson to determine what you will need.)
- Container, raised bed, or tilled garden
- Square-foot garden templates (found at the end of this lesson)
- Bottle of water (one per student)
- Healthy snack (such as apples, berries, or vegetables with or without dip)
- Garden Journal page (copy one per student or display one for the group, found at the end of this lesson)

TEACHER’S NOTES: You may want to do the Introduction, Do, Reflect, and Apply sections on different days. The Seed to Seed Cycle activity in the Introduction and the Start Your Own Transplants optional activity in the Do section could be done a few weeks before planting.

INTRODUCTION

ENGAGE

SET THE STAGE

15 MINUTES

(25 MINUTES IF COMBINED WITH THE START YOUR OWN TRANSPLANTS ACTIVITY FROM THE DO SECTION, THIS SECTION COULD BE ONE DAY AND THE OTHER SECTIONS ANOTHER DAY)

SUNFLOWER SEED TO SEED CYCLE

Distribute one set of the Seed to Seed Cycle supplies as described in the Materials list for this lesson.

Hold up a yellow paper plate.
What shape is this?
Circle
What other things are circles?
Wheels, hoops, plates, pancakes, etc.

What is it called when a wheel or circle makes one complete rotation?
It is a cycle. You probably have a bicycle. “Bi” means two. “Cycle” means it goes around and around in complete circles. Bicycles have two circular wheels that go around and around to move you across the ground.

When something goes through a full cycle, where does it end?
Technically, a cycle never ends unless something stops it. In the case of a seed, a butterfly, or a food cycle, a cycle ends where it started and then it has the ability to start over again. We are going to make a sunflower seed to seed life cycle to show how one sunflower seed starts a cycle by producing a plant and ends by producing more seeds that can grow into more plants.
Instructions to make a sunflower seed to seed cycle model

1. Cut around the circular edge of the Sunflower Seed to Seed Cycle and glue it to the inside of the paper plate.

   What is the picture at Step 1 of the Seed to Seed Cycle?
   It is a seed.
   What do you do with the seed to start the cycle?
   Plant it in the ground and water it.

2. Glue one sunflower seed to the bottom of the paint stir stick as if you were planting the seed in the ground and the stick was the stem that grew from the seed.

   When the seed is watered, what is the next step in the Seed to Seed Cycle?
   Hint: Take a look at Step 2 on the picture.
   The seed germinates or sprouts. The roots start first and then the leaves and stem grow up out of the ground.

3. Use a brown marker or crayon to draw roots growing out of the seed on the paint stick.
   The paint stick becomes the stem that grows out of the ground.
   While the small sprout or sunflower plant continues to be fed by the sun, soil, water and air, take a look at Step 3 and tell us what it does next.
   The stem and leaves continue to grow. You may begin to see a bud for the flower.
4. Take the green napkin and pinch it together in the middle to form two green leaves. Put tape across the pinched part of your leaves and tape them to the back of your stem or stir stick. Take a look at Step 4 of the cycle and describe what happens after a sunflower grows a little taller?
Flowers start to grow on the sunflower plants. Some sunflower varieties have several flowers on one plant, others have just one large flower.

5. Make petals around the paper plate, or sunflower blossom, by coloring the edges and then cutting slits from the outer edge of the plate to the Seed to Seed Cycle picture. You may want to bend some of the petals to make it look more like a real flower. Then put a strip of tape across the back of the paint stick to hold the flower in place. You may choose to glue the flower onto the stick. Look at your bright, colorful sunflowers. This is usually the favorite step or stage of growing a sunflower.

What happens when the sunflower begins to fade?
When flowers fade on plants, fruits form. The dried-up flower head is the fruit of a sunflower. It is represented in Step 5 of the Seed to Seed Cycle.

After the sunflower head dries, what is forming in the middle of the flower or fruit?
Sunflower seeds

Why is Step 6 written next to Step 1 of the Seed to Seed Cycle?
The sunflower plant has produced more seeds like the ones in the picture to start the Seed to Seed Cycle over again.

6. Glue several sunflower seeds in the middle of the Seed to Seed Cycle picture. You will see several rows of sunflower seeds in the center of a real sunflower. You may want to show a picture or have a real sunflower head for the students to examine.

We have gone through one complete seed to seed cycle of a sunflower.

How many steps are there in the sunflower seed to seed cycle?
Six

The sunflower seed to seed cycle also can be called a sunflower life cycle.

How can the seed to seed cycle be the same as a life cycle?
When a sunflower seed is planted and watered, it starts a sunflower sprout or small plant. The sprout needs sun, soil, water, and air to grow and become a healthy larger plant. Then a flower grows on the plant. The flower produces the fruit that contains many seeds. The plant dies, but the seeds from the plant can produce new sunflower plants with more seeds.

Let’s say the steps together:

STOMP foot, CHANT “seed,” and CLAP at the same time
STOMP foot, CHANT “sprout,” and CLAP at the same time
STOMP foot, CHANT “grow,” and CLAP at the same time
STOMP foot, CHANT “flower,” and CLAP and the same time
STOMP foot, CHANT “fruit,” and CLAP at the same time
STOMP foot, CHANT “seed,” and CLAP at the same time
How many seeds did it take to grow one sunflower?
One

How many seeds did one sunflower seed produce?
Sunflowers produce hundred of seeds per plant. Each seed actually starts out as a little flower. The seeds grow in spiral rows creating amazing patterns. Good mathematicians can do Fibonacci Math and figure out the number of sunflower seeds by the number of spirals. (You may want to find a picture, look up “sunflowers” on Wikipedia, or show an actual sunflower head.)

How is the sunflower life cycle or seed to seed cycle similar to the plants that we are about to plant in our garden?
Have the students describe the seed to seed cycle of a few of the crops they will be planting.

Do you think our garden plants will produce as many seeds as you can find in one sunflower?
Start a discussion about the kinds of plants you will be growing in your garden and make predictions. Record the predictions in a garden journal or on a chart.

Let’s get the seed to seed cycle going in our garden.

TEACHER’S NOTE: Hopefully you have read and utilized the charts in the general information for this planting unit and have obtained the seeds, sets, seed pieces, and transplants to carry out the Our Food Garden Plan from Unit 4, Lesson 4A. If you aren’t planting potatoes, it will help in the seed pieces discussion to have one to show the students. Also, copy and cut out the Garden Matching Game cards found at the end of this lesson. If you are working with many students, you may want to make more than one set and have two or three groups playing the game. As a hands-on activity option a few weeks before planting your garden, you may want to do the optional Start Your Own Transplants activity found at the end of this section.

What do we need to plant our garden?
We will need the garden space filled with good soil, seeds to start the plants, tools to help us, and sun, soil, water, and air so the plants can grow.

We just discovered that plants start as seeds, but some plants grow better in our garden if we start them in another way.

SEEDS, SETS, SEED PIECES, AND TRANSPLANTS
Show the seeds, sets, seed pieces and transplants that you will be planting in your garden. If you aren’t ready to plant everything yet, the Garden Matching Game will help the students understand how they will be planting future crops. Here are some tips for discussing each planting strategy.

We can start with seeds when we have enough time to grow them and the plants are easy to grow from seeds. (Show the packets and have the students identify the plant, look at the seeds, and read the information on the back of the packet. You may want to record the information in a garden journal.)
A transplant is a small plant that is started from a seed and grown until it is ready to be moved or transplanted into another container or the garden. Transplants can be grown at greenhouses or we can start them a few weeks before we are ready to garden. They need the right amount of light, water, temperature, humidity, and soil conditions in order to grow into a sturdy plant that can be transplanted. (Show the transplants that will be planted in the garden. Have the students identify the plant and read the label in the container. You may want to record the information on a garden journal. If you are planting some seeds in containers that will be grown in your classroom and transplanted to your garden, finish the other two planting strategies and then proceed to the optional Start Your Own Transplants activity at the end of this section.)

Some plants, such as onions, can be planted using an onion set. Sets are small bulbs that were started from seeds the year before. Sets are a part of a plant. Onions can also be planted as little plants that are sold in bundles. (Show a set.)

Potatoes are planted from pieces of a cut-up potato called a seed piece. Each piece has a bud on it that will grow. (If possible, show a potato that is starting to sprout. Point out the eyes or sprouts and cut the potato into pieces. Each piece should have a sprout.) A potato is actually a swollen, fat underground stem. Each one of the sprouts on the potato is like a bud that will grow into a shoot that grows up and above the ground.

**GARDEN MATCHING GAME INSTRUCTIONS**

Divide the group into Team One and Team Two and make a tally chart where everyone can see. In larger groups of more than 18 students, divide the group into four teams and play two games at once. Give half the Team One Garden Matching Game cards with the garden produce pictures to Team One. Give all the Team Two Garden Matching Game cards with the seeds, sets, seed pieces, and transplant pictures to Team Two.

Team One starts the game by choosing and holding up one of the garden produce pictures for Team Two to see. Team One asks Team Two the following question:

**How should we plant this ________________?**

*(Fill in the blank with the name of the garden produce in the picture.)*

Team Two discusses their responses, chooses the correct picture and holds it up for Team One to see. Team Two gives the following response to Team One’s question:

**We should plant the ________________ using _________________.**

*(Fill in the first blank with the name of the garden produce and the second blank with the planting method.)*

*Use the answer key below to determine the best response. If the answer is not correct, do not share the correct response; instead, give Team One an opportunity to give a response. The team with the correct response gets one point. After Team One is done presenting their half of the garden produce pictures, take the planting method pictures from Team Two and give them to Team One. Give the rest of the garden produce pictures to Team Two and proceed with the game.*
START YOUR OWN TRANSPLANTS OPTIONAL ACTIVITY

1. Wrap a strip of newspaper around a juice can with about 1½ inches hanging over the bottom of the can. Fold the excess paper up around the bottom of the can to form the bottom of the pot. Press it down on the tabletop to secure. Remove the juice can. Fold over the top of the pot ½ inch to the inside to hold the pot together and form a rim.

2. Fill the paper pots with potting soil.

3. Use your finger to make a hole in the center of the pot according to the planting depth instructions on the seed packet. Plant the seed or a few tiny seeds. Cover the seed(s) with soil.


5. Place pots close together on the tray or flat.

6. Cover with large, clear plastic bag.

7. Set in a location that receives bright, indirect light.

8. When the seeds start to germinate, remove the plastic bag.

9. Set the plants where they will receive full sunlight. (If you feel the paper pots are too difficult to make, you may want to substitute peat pots.)

10. When the plants are at least 2 inches tall, you can plant the entire pot in the soil outside. Be sure that the paper is all underground so that it doesn’t act as a wick to take the water away from the plant. The paper will decompose into the soil.

---

ANSWER KEY

<table>
<thead>
<tr>
<th>Plant Type</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pumpkin</td>
<td>Seed</td>
</tr>
<tr>
<td>Onion</td>
<td>Sets</td>
</tr>
<tr>
<td>Tomato</td>
<td>Transplant</td>
</tr>
<tr>
<td>Pepper</td>
<td>Transplant</td>
</tr>
<tr>
<td>Lettuce</td>
<td>Seed</td>
</tr>
<tr>
<td>Broccoli</td>
<td>Transplant</td>
</tr>
<tr>
<td>Cabbage</td>
<td>Transplant</td>
</tr>
<tr>
<td>Spinach</td>
<td>Seed</td>
</tr>
<tr>
<td>Carrots</td>
<td>Seed</td>
</tr>
<tr>
<td>Beets</td>
<td>Seed</td>
</tr>
<tr>
<td>Snap bean</td>
<td>Seed</td>
</tr>
<tr>
<td>Corn</td>
<td>Seed</td>
</tr>
<tr>
<td>Pea</td>
<td>Seed</td>
</tr>
<tr>
<td>Potato</td>
<td>Seed piece</td>
</tr>
<tr>
<td>Cucumber</td>
<td>Seed</td>
</tr>
<tr>
<td>Radish</td>
<td>Seed</td>
</tr>
<tr>
<td>Squash</td>
<td>Seed</td>
</tr>
<tr>
<td>Sweet potato</td>
<td>Transplants</td>
</tr>
</tbody>
</table>
**TEACHER’S NOTES:** The supplies for this section are determined by the types of garden and planting methods you are choosing. Please use the Unit 5, How do you plant a garden?, General Information section as a guide. If you are using the square foot gardening method, make two templates for each plant size for the students to share. Make one seed shaker for each type of tiny seeds you will be planting and one pinch cup for each small to medium seed you will be planting. Make sure you label the containers. You will need the tools, garden label and dibble supplies to complete this section.

**What are we planting and are we using seeds, sets, seed pieces or transplants to plant it?**
Review the crops you are planting and the ways you are planting each crop.

**What type of a garden space will we use to plant our crops – a container, raised bed or a traditional in-the-ground (tilled) garden?**
Review the type of garden they planned from Lesson 4A, Planning Our Food Garden.

**GARDEN TOOLS**
The type of garden space we are using and the way we are planting our crops determines which kind of garden tools we will be using to plant the garden. We need to make sure we have our tools ready and that we know how to use them safely and effectively.

Display the Garden Tools Checklist, found at the end of this lesson, so that everyone can see it. Identify the tools that you will be using, show them the actual tool, and make a checkmark in the appropriate column for each tool. Use the Tool Safety Game to complete the “Know how to use” column.

**What tools do we need to make or get?**
Use the checklist to respond to the question.

**GARDEN LABELS**
The students can make garden labels for each crop and each row or square foot section where it will be planted. You may want more than one label for each row or section. Have fun and be creative with the labels. Use materials that can withstand the weather, soil conditions and watering. Options may include craft sticks, wooden spoons, plastic spoons, garden stakes, vinyl window blinds cut into garden stakes, laminated card stock or seed packets stapled to a stake, small hanging clay pots, etc. Use permanent markers or put a protective spray over the label. Do a search on the Internet for other ideas.

**DIBBBLES**
More than 100 years ago, gardeners used dibbles or dibbers to poke the right-size hole in the garden, drop the seed, and cover the hole. It made planting easier and seeds planted at the right depth have a better chance of growing.

Line your craft stick up with the zero inch mark at the start of your ruler. Find ¼ inch on your ruler and make a little line from ¼” on your ruler onto about a fourth of your craft stick. Do the same at ½”, ¾”, 1”, 1½”, 2”, 3”, 4”, 5”. Then move your rulers to the other side of the stick and do the same thing. In between your two lines, mark the measurements using the number and the inch symbol.
I am going to show you some right and wrong ways to use and store our tools. If you think I’m showing you the right way, clap. If you think I’m showing you the wrong way, stomp your foot.

- **Lift the hoe so that the blade is over your head like you are swinging a hatchet.** 
  
  _STOMP._
  
  I have lifted the hoe too high. I am not chopping the soil. I am hoeing it. It doesn’t work very well this way. Also, you may hit someone who is nearby if you swing the hoe this high in the air.

- **Lift the hoe so that it is about 1 foot off the ground and bring it down in a gliding motion through the surface of the soil.** 
  
  _CLAP._
  
  This is the correct way to use the hoe to cut through crusty soil and remove weeds.

- **Repeat the same motions with the rake.**

- **Lay the rake down, teeth up.** 
  
  _STOMP._
  
  You should never set a rake or a hoe on the ground like this. What do you think would happen? The teeth of the rake or blade of the hoe may go into your foot and the handle could pop up and smack you in the face. (You may want to carefully demonstrate how the handle pops up.)

- **Stand the rake and hoe, handles up, against a wall or hang them.** 
  
  _CLAP._
  
  Rakes and hoes should be stood against a wall or in the shed or garage when they are not being used.

- **Walk with the trowel blade up.** 
  
  _STOMP._
  
  Always carry your tools such as this trowel with the sharp blade facing down.

- **Run a short distance holding a hoe and a trowel.** 
  
  _STOMP._
  
  Never run with tools in your hands.

- **Pretend to wash dirt from the trowel, hoe, or shovel.** 
  
  _CLAP._
  
  It is always a good idea to clean the soil off your tools before you put them away. This shows you are responsible for taking care of your tools.

- **Pretend to fight with a student over a trowel or hoe.** 
  
  _STOMP._
  
  Show respect by taking turns.
Write your name on the back of your new dibble and store it where you can find it when we are ready to plant our gardens.

**Katie Jones**

**SQUARE-FOOT GARDENING**

Use poster board to make square-foot gardening templates from the patterns found at the end of this lesson. Label the templates according to the crops listed on the pattern. Or, make them with newspaper that can be staked down with small sticks and left to become decomposing mulch in the garden.

These are square-foot gardening templates. We will use them to plant (name of crops). You will put them on the soil, figure out how deep to plant the seed, use your dibble or finger to poke a hole in the center of each circle, plant your seed, and cover it up.
TEACHER’S NOTES: Master Gardeners or gardening volunteers can prepare the garden ahead of time by measuring and marking it out with string or stakes according to the students’ plan from Lesson 4A, Planning Our Food Garden. The students will be applying what they just learned as they actually plant their container, raised bed or tilled garden. All the supplies should be ready to go and placed near the garden. You may want to make a Garden Rules sign to display near the garden and to review each time before working in the garden. The snack after gardening includes water and a healthy snack, such as apples, berries, or fresh cut vegetables and dip.

GARDEN RULES

Establish the ground rules for the garden. You may want to write these on a re-usable poster board that can be creatively posted every time the class goes to the garden. Have the students repeat the three R’s – Respect, Responsibility, Readiness and give examples of how each of them applies to the garden.

RESPECT

Yourself – Wear shoes that cover your entire foot, clothes that protect your skin from the sun and from being too cold or too hot, and practice safety.

Your gifts – Share your energy, and use your skills and knowledge to help others.

Other people – Be a good listener, consider others’ ideas, share tools, say please and thank you, ask questions rather than assuming things, do not get into each other’s spaces, and practice safety.

Other people’s things – Do not touch or borrow things without asking, keep things clean and undamaged, and practice safety.

The environment – Take good care of the garden and the space around it and remind others to do the same.

RESPONSIBILITY

Be on time and stay where you are suppose to be.
Listen and follow instructions.
Use garden tools and supplies safely, clean them, and put them away correctly.
Share in the work and the fun of the garden. (Remember what happened in the Little Red Hen?)

READINESS

Be ready to listen, learn, have fun, work hard, share, and most of all grow healthy food!

Establish a “Gardeners Go” cue with a clap or noise to indicate that gardeners can start their tasks and a “Gardeners Stop” cue with two claps or a noise to indicate when gardeners should stop what they are doing and look at you for more directions. Have students practice going and stopping while they pretend to be hoeing or digging with trowels. Explain that this will make it easier to work with so many people in the garden, it will give everyone a chance to garden, and it will help to get the garden chores done in a limited amount of time.
PLANTING

CONTAINER GARDENS

1. **If the container(s) will be movable after planting, put it (them), the soil mix, gardening tools, and what you are planting in the center of newspapers or plastic, such as large outdoor garbage bags, leaving enough space for the students to sit or stand around the edges.** Otherwise, have the students gather around the container(s) in the location where the container(s) will remain. Be sure that the container gardens will have plenty of light, water, and air circulation for the plants to grow.

2. **The container(s) should be sturdy and clean, have enough room for all parts of the plants to grow, and have a good drainage system.** Have the students stand back as you follow the directions to assemble any container kits such as EarthBox™. Then give them an opportunity to mix up the soil, level it off, and measure it to see if it is close to 1 inch from the top of the container.

3. Depending on the size and shape of the container you can plant many kinds of plants in one container using the square foot gardening method, rows, or other arrangements that allow space for the plants to grow. You can also start plants in a container and move them to a raised bed or tilled garden. Work with the students to decide where and how they will plant things using the seeds, sets, seed pieces, or transplants from the Do section and the tools from the Reflect section of this lesson.

4. Read or have the students read the planting depth and spacing information on the seed packets or plant labels. Have the students take turns to come to the container in pairs. They can work together to make a hole with their fingers, dibbles, or trowel; plant the seeds from the seed shaker or pinch cup or they can plant sets, seed pieces or transplants; and put the dirt back over the seeds. Make sure to use the garden markers to show what seeds are planted and where.

5. **Move the container to the spot where it will stay most of the time.** Using a small watering can or another container of water, gently water the entire surface of the container garden. Be careful not to wash out the tiny seeds planted just under the surface of the soil. If the kit has another type of watering system, follow the directions provided.

6. Have all the students thoroughly wash and dry their hands.

RAISED BED AND TILLED GARDENS

1. **The garden should be measured and marked according to the students’ garden plan from Unit 4, Lesson 4A, Planning Our Food Garden.** The seeds, sets, seed pieces, and transplants from the Do section and the tools from the Reflect section should be placed near the garden. You may want to display the Garden Rules sign as a reminder near the garden.

2. If you are working with raised bed gardens, have half of the students stand on one side of the garden and the other half stand on the opposite side of the garden. If the gardens are too big to have the students stand along the sides of the garden and still be able to hear, stand in a group near the garden and gardening supplies.
3. Use the students’ garden plan from Lesson 4A and the marked garden to help the students discover where the crops will be planted in the garden. Then start at one end of the garden, identify the plants that will be grown there, read the planting depth and spacing information on the seed packets or plant labels, and demonstrate how to plant the crop.

If you are using square foot gardening templates, place a template in the designated space; use your finger or a dibble to make a hole in the center of one of the template circles; plant seeds using the seed shaker or pinch cup or plant the sets with the roots going down and the shoots going up; and put the dirt back over the seeds or sets. Show how to flip the template over to plant the next square foot section of the garden. Make sure to use the garden markers to show what seeds are planted and where.

If you are planting in rows, show how the row is marked by a string stretched across the garden. Use the edge of a hoe to make a shallow furrow along the string or use a dibble to make shallow holes following the string line. Use the shaker or pinch cups to plant the seeds. Plant the sets with the roots going down and the shoots going up. Cover the seeds or sets with soil. For transplants or seed pieces, demonstrate how to use a trowel or shovel to dig a hole, use the dibble or another measuring tool to check the depth of the hole. Drop one or two seed pieces in the hole or show how to carefully remove the transplant from the container. Loosen the soil around the roots before placing it in the hole. Cover the seed pieces with soil or fill in the hole around the transplant with the soil.

4. After demonstrating all the planting methods, the students can work in pairs to plant the section of the garden closest to them or you can work together to plant everything. One student can make the hole while another student plants the seeds, sets, seed pieces, or transplants. This is when several dibbles come in handy. Make sure the garden labels are placed with the matching crops in the garden.

5. Use watering cans or a hose with a water breaker attached to gently water the gardens. Be careful not to wash out the seeds. Make a plan for the students to take turns watering.

6. Have all the students thoroughly wash and dry their hands.

WE NEED WATER AND ENERGY, TOO!

What do we need that we just gave to the plants?

People, plants, and animals all need water in order to survive. Everything in our body needs water in order to work as it should. Water also cleanses our bodies.

Distribute water bottles to the new gardeners.

Like people, plants need energy to grow and be healthy. Plants get their energy from the sun, water, and carbon dioxide that are mixed together in the leaves to make plant food. Sometimes we add special soil nutrients or fertilizer to the soil to help plants grow. We are simply going to eat a snack to get energy.
Distribute the snacks and discuss them with the students.

Could some of the ingredients in the snack be grown in a garden like ours?

Could some of the ingredients in the snack be grown in the state where we live?

Does the package tell you where the snack is made or where the ingredients come from?

**GARDEN JOURNAL PAGE**

Remember, if you plant something new or harvest anything from your garden, please record it on your Garden Journal page. If you haven’t started this page, please copy and use the Garden Journal page found at the end of this lesson.
# Garden Tools Checklist

<table>
<thead>
<tr>
<th>Tools</th>
<th>Garden Tool Use</th>
<th>We will use</th>
<th>Need to make or get</th>
<th>Know how to use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gloves</td>
<td>Gloves protect hands and keep them clean.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rake</td>
<td>The short, stiff teeth on a garden rake are strong so that it can break up clods and make the soil smooth for seeds and plants.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fork</td>
<td>A garden fork loosens the soil and turns it over. It also can be used to harvest underground crops such as carrots and potatoes.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Pinch cup and seed shaker</td>
<td>Use a seed shaker made from spice containers to shake a few tiny seeds into a hole. Use a pinch cup to pinch out small to medium-size seeds and release the seed(s) in the hole.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trowel</td>
<td>A trowel looks like a small shovel.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shovel</td>
<td>A shovel is used to dig larger holes for planting larger things in the garden and landscape, like trees and shrubs. It also can be used to turn soil over. Gardeners use shovels to add things, such as compost and manure, to their garden.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dibble</td>
<td>Make a dibble from a craft stick. Use a dibble to dig shallow holes and to measure the depth of holes for seeds, sets, seed pieces, or transplants.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tools</td>
<td>Garden Tool Use</td>
<td>We will use</td>
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<td>-----------------------</td>
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<tr>
<td>Tape measure</td>
<td>A tape measure that is long enough to stretch the length of the garden is important to have when it comes to determining where crops should be planted and giving them enough room to grow.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labels</td>
<td>Garden labels or markers are important to identify the crops and know where everything is planted. Using the tape measure and your garden plan, the labels can be put in just before the garden is planted.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watering can</td>
<td>A watering can holds one to two gallons of water and has a spout that allows you to gently water plants by hand. It is ideal for small gardens, but not very efficient for large, tilled gardens.</td>
<td></td>
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<td></td>
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<tr>
<td>Hose</td>
<td>A hose is used to take water from the water spigot to the garden. Several hoses can be connected so that the garden can be watered a fairly long distance from its source.</td>
<td></td>
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</tr>
<tr>
<td>Water breaker</td>
<td>A water breaker is typically attached to the end of a hose to “break up” the flow of water into an spray or forceful spray. On the “shower” setting, it wets the soil gently without washing the soil away from the roots or damaging the plants.</td>
<td></td>
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</tr>
<tr>
<td>String</td>
<td>A string is used to stretch from a stake on one side of the garden to one on the other side. It is used as a guide to keep seeded and transplanted crops in a tidy straight row.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Square foot template</td>
<td>Place a square foot gardening template where you want to plant a crop. Use your finger or a dibber in the center of each hole and plant a seed. Square foot gardening is easy to do and maximizes the use of garden space.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. Make a copy of this page.
2. Cut around the squares and cut out the circles.
3. Place one template on one corner of a poster board. Draw around the outside of the square and around the circles.
4. Use the same template four times to make a square foot gardening guide.
5. Cut around the square foot and cut out the circles.
6. Write the names of the crops in the center of the guide.
7. You may want to laminate your templates to keep from year to year.

SQUARE-FOOT GARDENING TEMPLATE

onions, carrots, radishes, beets, lettuce, spinach
SQUARE-FOOT GARDENING

TEMPLATE 2

peas, bush beans
My Garden Journal

Date:

What I planted:

What I did:

What I picked:

What I ate from the garden:

What I learned:
GARDEN CHALLENGE

**TEAM 1**
- **Potatoes**
- **Tomato**
- **Peas**
- **Onion**
- **Carrots**
- **Lettuce**
GARDEN CHALLENGE

TEAM 1  pumpkin  TEAM 1  pepper

TEAM 1  broccoli  TEAM 1  cabbage

TEAM 1  spinach  TEAM 1  beets
GARDEN CHALLENGE

TEAM 1 green beans  TEAM 1 corn

TEAM 1 cucumber  TEAM 1 radish

TEAM 1 squash  TEAM 1 sweet potatoes
GARDEN CHALLENGE

TEAM 2 seed pieces

TEAM 2 sets

TEAM 2 transplants

TEAM 2 seeds
GARDEN CHALLENGE

**Team 3**  shallow

**Team 3**  medium

**Team 3**  not seed

**Team 3**  deep

1/4" deep (Enlarged Image)

1/2" to 1" deep (Enlarged Image)
Lesson Eight: Photosynthesis, Watering and Garden Maintenance
For April

“Photosynthesis” from GROWING IN THE GARDEN: ELEMENTARY CURRICULUM, Iowa State University Extension and Outreach; “Watering Garden Plants” from GARDEN MOSAICS, American Community Gardens and Cornell University Garden-Based Learning; “Caring for the Garden” from GOT DIRT?, Wisconsin Department of Health Services.

Students review photosynthesis and watering the garden. They make a plan for garden care during April and May. Now is time to start an optional Action Project based on what students have learned from gardening. Actions projects include doing background research, deciding what to do, completing the project and reporting on it.

Content objectives: Define photosynthesis; Identify the basic ingredients in photosynthesis and where they come from; Describe the basic photosynthesis process; Give reasons why photosynthesis is important to plants and animals; Demonstrate when, how, how much a garden should be watered.

Life Skill objectives: Healthy lifestyle choices, Critical thinking, Communication, Citizenship, Leadership, Decision making, Problem solving

Core and STEM concepts and skills:
Science Science as inquiry, Earth and space, Life science
Math Operations and algebraic thinking, Numbers, Measurement and data, Geometry, Mathematical practices
Language Arts Reading for information, Vocabulary, Speaking, Listening, Viewing

Healthy snack: Green Smoothie

Additional and supporting resources:
Cooperative Extension Master Gardener’s Program can be a resource for garden information.
LESSON PLANS FOR 2012-13 SCHOOL YEAR, GRADE 3

April:  Food for Plants and People

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| Got Dirt?                                        |       |
| Wisconsin Department of Health Services,        |       |
| Wisconsin Department of Public Instruction and   |       |
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| Garden Mosaics:                                  |       |
| Cornell University                               |       |

Garden Journal:

| See the Before section of the Lesson Plan        |       |
|                                                 |       |

Recipe: Green Smoothie

| See the Before section # 7 of Lesson Plan        |       |
|                                                 |       |
BEFORE THE LESSON

1. Grade 3, April: Food for Plants and People, 2012-13 School Year
   This document contains all the curriculum items and resources you need for this lesson. All
   lesson downloads are located on the www.peoplesgarden.wsu.edu Educational Toolkit. Please
   read through everything well in advance of delivering this lesson.

2. Gardening Tips for Working With Kids, Healthy Gardens, Healthy Youth
   Master Gardeners and Extension Educators created the tip list based on their experiences
   gardening with kids for this project and for related summer programs. You may want to make a
   copy to keep handy throughout the gardening season.

3. Gardens: Please follow-through with the notes from your January garden planning session,
   the January - Planning Our Food Garden, and the March - Planting Our Food classroom lessons
   and gardening activities. Look ahead at this month’s garden activity: Caring for Your Garden.

4. Compost: If you haven’t built a compost bin, volunteers such as Master Gardeners or
   student’s families that are familiar with gardening, can build one for your school. Please go to
   the October lesson in the Educational Toolkit.

5. Supplies: Make sure you have all the supplies you will need to do the activities for
   Photosynthesis and Watering as part of this Food for Plants and People lesson, Caring for the
   Garden, and the Green Smoothie snack.

6. Garden Journals: Continue to use the students’ individual Garden Journals to record plant
   growth, weather factors affecting the garden, observations, recipes, new knowledge, and
   future ideas. These journals will be helpful to compile data for the classroom, share stories, and
   make decisions.

7. Recipes: Green Smoothie Recipe makes about 3-1/2 cups. Tasting samples should
   approximately 2 ounces, or 1/8 cup.

   - 1 banana
   - 1 tightly packed cup of kale, stemmed, washed and chopped
   - 1 cup of fresh or frozen berries, diced apple or pear
   - 1 cup juice or 1 cup of non-fat or low-fat vanilla Greek yogurt
   - up to 1 cup of ice

   1. Place the kale, fruit and juice or yogurt into your blender. (If you use fresh fruit, you may
      want to add up to 1 cup of ice to make it slushy; if you use frozen fruit you may not need
      any ice).
   2. Blend the ingredients together until the kale looks like it is well incorporated into the
      smoothie.
8. **Action Project:** Since this is the second year for your gardens, we suggest that the students might want to share something they have learned or experienced through an Action Project. Garden Mosaics created Action Project guidelines and models. Please review the Expansion Activity: Action Projects found in The Lesson section below. A complete Garden Mosaics Action Project guide is included in this lesson. These resources will empower you and your students to make a difference in your community. It is similar to the students doing a community service or service learning project.

This is optional and should be conducted by the students and their teacher as a step to add sustainability and growth to their new gardening program. In April, the students can start with discussions and background research to decide what project they want to do and why. In May or June, they can actually implement or start to implement their plans.

**THE LESSONS**

1. **Photosynthesis**
   The outline below provides ideas so that you can determine how and when you want to complete the lesson. The activities in this lesson help students to identify the basic ingredients in photosynthesis and where they come from, describe the basic photosynthesis process, and give reasons why photosynthesis is important to plants and animals. Here is a basic outline of the lesson.

   **Introduction:**  Plants, animals and food

   **Do:**  Photosynthesis Experiment, Photosynthesis Skit

   **Reflect:**  Review of photosynthesis

   **Apply:**  Photosynthesis Diagram
                Plants and Animals as Partners

2. **Water**
   Follow lesson plan in “Watering the Garden.” Students will learn the proper way to water the plants in the garden. They will learn when and how much water each plant needs. Students will also review the importance of mulching to conserve water.

3. **Caring for the Garden**
   Review Caring for the Garden from “Got Dirt”. Make a plan with the students on how to maintain the garden during April and May. Consider thinning, weeding, watering and pest management. Talk with your Extension Educator to see if Master Gardener might be available to assist with teaching these gardening skills.
4. Read a book with your students: (optional). Check with your library to see if a copy if available. *Photosynthesis: Changing Sunlight Into Food* (Nature's Changes) by Bobbie Kalman. This book describes the history and behavior of plants, and focuses on how energy is produced.

**AFTER THE LESSON**

You may want to go back to the Garden Journals so students can update previous pages and record how the plants are growing. Below are previously suggested pages that could be updated with results:

a. Draw or right down how each plant was started (as seeds, sets, seed pieces or transplants) and how deep they planted them. UPDATE: was there a difference in plants growth for those started with seeds, sets, seed pieces or transplants?

b. Make predictions, with or without reading the seed packet, about when they will see the sprouts coming up out of the soil. UPDATE: when did the seeds sprout? How has the weather affected the seeds growth?

c. Add the Green Smoothie recipe to the journals for future use by students.
USDA FNS People’s Garden School Garden Pilot Project: 
Healthy Gardens, Healthy Youth 

Gardening Tips for Working with Kids 

The following tips are from HGHY Master Gardeners and site leaders and are based on their experiences gardening with kids. These are tips for both school and the summer programs. 

Be Prepared 
1. Send home information about the garden program including the details about who is leading the program, what the kids will be doing, where the gardens are located, when the kids will be gardening, what is happening with the garden produce, and expectations of the young gardeners. All gardeners should be wearing close-toed shoes and have sun protection. They will not be allowed to work in the garden or with food if they are sick or have been sick within the last 24 hours. 

2. Every time you go to the garden, take supplies such as a first aid kit, wet wipes, water jug with cups (or have kids bring their own water) and water for washing the produce. 

3. Use lesson plans and educational resources to prepare for each session. Play a game, sing a song, act out a play, read a book, or make a garden-based craft each session. Remember to have fun! See the Sample Garden Session outline at the end of these tips. 

Working With the Kids 
4. Make sure the young gardeners know the 3 R’s garden rules: Respect, Responsibility, Readiness. 

5. Be fully prepared before heading to the garden so there will be little down time for the kids. The tools and any supplies should be easy to access and ready to go. Break large groups into manageable sizes. Have more than one activity and rotate them. Keep every child busy and on task or their attention will shift and they will drift. Have enough adult supervision to make this happen. 

6. Always demonstrate before letting the kids work on their own. The more adult helpers you have to float around and guide the kids, the better. Do not do things for the kids, show them how and have them show you how back. 

7. Check their work. Don’t take their word for it when they say they have completed a task. You might find that things were missed. 

8. Take frequent shade and water breaks. Break times are good times to introduce healthy snacks, books, garden journals, or other hands-on activities. 

9. Every child will appreciate some one-on-one time with instructors while working in the garden. Let them tell their stories and show you the weeds they found and pulled, etc. 

Planning the Garden
10. Use the hands-on, deeply aligned classroom lessons to help the students plan their gardens. The kids will have fun learning and taking ownership of the garden. They will get excited about choosing what to plant and how much they need to plant by doing these lessons. A Master Gardener or an experienced gardener is a valuable resource to help kids discover what crops can be grown in the climate and in the amount of space they will have to garden. Start a Garden Journal or Garden Records right away.

11. Young students are not able to prepare the site for gardening. Master Gardeners and others can provide leadership for that. FFA students, parents, Ameri-Corps, Food Corps, garden clubs, retired teachers, neighbors and others have been instrumental in preparing the gardens and helping the youth in the planning stages.

12. For the young children, have the sections of the garden already measured out and marked according to the garden plan. For the older youth, help them measure and mark the garden sections.

13. Kids like to use garden tools, but they LOVE to use child-sized tools such as kid-sized rakes, hoes, shovels, watering cans, and gloves. The type of garden tools they need depend on the type of garden they will be working with and how it is planted – square foot vs. rows. They can share tools. Older students have been using adult-sized tools and even tools that have been loaned by Master Gardener groups.

14. Master Gardeners and FFA members are using their green houses to start seeds and grow transplants for the school gardens.

15. Help the students start a compost bin and get the whole school involved.

**Planting**

16. Go over tool safety rules for hoes, trowels, and rakes. A tool safety game is part of the gardening curriculum.

17. Go over ways the plants in your garden are going to be planted: seeds, sets, transplants, seed pieces.

18. Plant fast growing (cool season) crops like radishes and spinach for early satisfaction. Try to stagger your crops for constant harvest opportunities. Make sure the students will have something to harvest when they return to school in the fall.

**Maintaining**

**Watering**

19. Watering is extremely important, especially in raised bed gardens. If you are meeting just once a week, you may have to make plans for additional watering. Families, youth groups, organizations, neighbors can sign up for times. Someone will need to be responsible to make sure the watering plans are carried out.

20. Using a watering wand is a good way to water the garden. Show how to water at the base of the plant. Teach the kids to count how long it takes to water a plant.
Weeding
21. Help the kids distinguish the difference between weeds and garden plants. Show them how to pull weeds so that the garden plants are not disturbed. Tell them where you want them to put the weeds. Have challenges such as finding the biggest weed, most unusual weed, most weeds, etc. Talk about why some parts of the gardens have more weeds than other parts, etc.

Insects and pests
22. Insects intrigue and scare children. They enjoy doing the lessons about pests and going on hunting missions to find and eradicate them. Getting to show everyone the squash bug they found – and sometimes their eggs – is a joy in and of itself!

23. Use the lessons to identify “good guys” and “bad guys” in the garden and to figure out what to do about them. Then help the kids take the next steps to protect their garden from unwanted pests.

Harvesting, Preparing and Eating the Produce!
24. Kids get excited when they see fruits/vegetables growing on the plants. Make sure that they show everyone by pointing and not picking! Describe what to look for to determine when the fruits/vegetables are ready to harvest.

25. Show kids HOW to harvest produce gently. For example, gently hold a bean plant before pulling off the bean, cut the lettuce with scissors, etc.

26. Kids love to harvest and taste the bounty. Try to include this in every lesson.

27. Include in the lesson, ideas for how the food can be eaten. Simple recipes such as cucumber-flavored water, radish or veggie sandwiches, veggies with dip, cucumbers and onions in vinegar, etc. are the best. Get a large bottle of Ranch dressing because the kids will try anything they can dip! There are several ideas in the lessons.

28. Show the whole vegetable before cutting it open. Have them find the seeds.

29. Plastic plates and knives can be used for cutting and preparing produce.

30. Help the kids put their gardens to bed.
Sample Gardening Session

1. Meet in gathering area
   a. Remind everyone about behavior expectations.
   b. Chat a bit – What’s up?
   c. Give garden plan for the day
   d. Split into smaller groups if necessary
   e. Have a planned garden activity for each group with an adult supervisor

2. Garden projects
   a. Planting
   b. Weeding
   c. Pest patrol
   d. Watering
   e. Harvesting
   f. Washing
   g. Cutting (if necessary)

3. Snack time
   a. Make their own snacks
   b. If there is nothing to harvest, consider produce from farmer’s markets
   c. Focus on fruits and vegetables
   d. Send ideas home to the families

4. Activity session – see lessons for ideas for games, songs, stories, plays, crafts

5. Go home!
Photosynthesis

CONTENT OBJECTIVES
Define photosynthesis, identify the basic ingredients in photosynthesis and where they come from, describe the basic photosynthesis process, give reasons why photosynthesis is important to plants and animals.

LIFE SKILL OBJECTIVES
Critical thinking, learning to learn by experimenting and observing, problem solving; communication.

INDICATORS
Draw the photosynthesis formula and diagram, respond to questions, list reasons plants and animals benefit from photosynthesis.

EVALUATIONS
Science: Life (characteristics of organisms, organisms and their environment)
Language Arts: Vocabulary, Character development, Main idea, Interpreting, Inferring, Sequencing, Writing
Math: Algebra

SUBJECT STANDARDS

LEARNER TYPES
Linguistic-words, Logical-mathematical, Bodily-kinesthetic, Spatial-visual, Music, Intrapersonal, Interpersonal, Natural

MATERIALS
At least 4 paper circles (the size of a quarter, see the Photosynthesis Experiment in the Introduction section of this lesson)
4 paper clips (one paper clip per circle)
2 sheets of green paper (in big letters write “Chloro” on one and “Phyll” on the other)
Tape to attach the green paper as name tags
Large plastic mixing bowl
Big mixing spoon
1 cup of water
Green construction paper with small holes punched in it
Flashlight
Marker board or large sheet of paper
Markers
“Photosynthesis” lyrics and “Diagram of Photosynthesis Process” (project on screen or interactive board, found at the end of this lesson)
Overhead projector
Were You Born in a Barn? CD by Chris Rowlands (contact Angela Rowlands at arowland1@woh.rr.com)
CD player
Blank sheets of white paper (one per student)
**One week before the rest of the lesson**

Talk to the school grounds maintenance staff to identify one or two plants to use for a photosynthesis experiment described in this section. You also could use plants in your school classroom. The plants need to have large leaves and a sunny location. You may want to try the experiment on two different plants. The experiment works best outside in the spring and early summer. Have the paper clips and circles ready for the experiment.

**Everyone stand up.**

**What are some wild animals that live in our area?**

Go around the room for answers such as rabbits, mice, insects, wild turkeys, deer, raccoons, snakes, frogs, birds, and so on. Have the students stand like their favorite animal and give them thirty seconds to pretend to find and eat their food.

**What are some examples of domestic animals that live with us or on farms and depend on our care?**

Go around the room for answers such as dogs, cats, horses, beef cattle, dairy cattle, pigs, layers (chickens that lay eggs), turkeys, sheep, and so on. Work in pairs and have one student be a person who cares for the animals and the other one choose which kind of domestic animal to be. Pretend that the caretaker is feeding the domestic animal. Switch roles.

**What are some examples of plants that naturally grow in our area?**

Trees, some grasses and flowers, weeds, etc.; stand like you are one of those plants and pretend to get your food.

**What are some examples of plants or crops that people plant in our area?**

Corn, soybeans, oats, grass, flowers, vegetables, apple trees, berries, grapes, etc.  
In pairs, one person names a crop and stands like the plant. The other person is the one that grows that crop. Pretend that the plant needs food and act out what might happen such as watering or fertilizing the plant.

Think about pretending to be animals and plants trying to find food while you answer the following questions.

**Plants and animals are living things; what makes them alike?**

They both need food and water, and they reproduce. They both live and die.  
**What makes them different?**

Plants cannot move to find food. They can make it for themselves from natural resources. Sometimes people help to feed plants with water and nutrients such as plant food, fertilizer, or animal manure.

**Is it important to animals if plants get fed?**

Yes.  
**Why?**

Most animals eat plants. Plants are also used for shelter and protection.

**What are the two major plant crops grown in Midwestern states, such as Iowa, that feed domestic animals on the farm, such as pigs, cattle, sheep, dairy cows, chickens, and turkeys, and are major ingredients in thousands of the food products we eat?**

Corn and soybeans.
We are going to figure out what plants need in order for them to make their own food in a process called photosynthesis. We’ll start our investigation with an experiment, and then we’ll check on the results of our experiment next week.

PHOTOSYNTHESIS EXPERIMENT

Have the students gather around the plant and explain that they are going to do an experiment. Have four (or more, depending on the number of plants or leaves available) students clip a circle securely on four different leaves. Remind them not to touch the circles until the class comes back to look at them. Return in a week to see what happens.

Before class, put the mixing bowl, mixing spoon, cup of water, green construction paper with holes, and flashlight on a table in the front of the room. Draw a blank “recipe card” on the board or flip chart.

Have the students return to the plants that have the circles clipped on their leaves. Have the students carefully remove the circles.

Do you see any differences in the leaf from when we put the circle on it?
The area under the circle should be lighter green.
What do you think caused that?
Lack of light to that area of the leaf

Let’s go back to the classroom to see how this could happen.

The way plants make food is similar to the way a chef makes bread. It takes a combination of ingredients and someone to mix them. Plant food begins with green pigment in the plants called chlorophyll. (Write “chlorophyll” on the board.) Chlorophyll gives plants their green color. These are very tiny molecules that act as “solar receptors” and absorb light in the plant. Plants need light to make chlorophyll.

Have you ever seen a house with solar receptors or panels on it?
What do they do?
They gather light and turn its energy into another form of energy. That is similar to what the chlorophyll does.

What happened to the leaves that we put circles on?
The circles shaded the leaves so they didn’t have enough light to make chlorophyll, the green pigment.
What color were the areas that didn’t have as much chlorophyll?
Lighter green or yellow

Do you think the circles on the leaves will turn a deeper green again if we leave the circles off?
We’ll check it again in a few days and see what happens.

There is a lot more to making plant food than that, though.


**PLANTS | LESSON 6**

**PHOTOSYNTHESIS SKIT**

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**PLANT FOOD RECIPE**

| water - $H_2O$ |
| carbon dioxide - $CO_2$ |
| sun - light |

Chlorophyll mixes the ingredients together to make plant food for one plant.

---

I need two volunteer chefs to come to the front of the room and mix a batch of plant food in a bowl. *(Attach the “Chloro” and “Phyll” name tags on their shirts.)*

**What are the names of our chefs?**

“Chloro” and “Phyll”

**Together, what is their name?**

Chlorophyll

**What color are they?**

Green

**Where is their kitchen?**

In the leaves of plants

“Chloro” and “Phyll” need a recipe to make their tasty plant food. We need one person to write the recipe on the recipe card I have drawn on the board. First, in big letters at the top of the card, write “Plant Food Recipe.”

Phyll, you can add the ingredients. Chloro, you can mix them up. The first ingredient we need in order to make this batch of plant food is water. Write “water” on our recipe. Next to the word water, write the short name for water, which is $H_2O$. This formula name means water is made up of two molecules of hydrogen and one molecule of oxygen. Phyll has some water in a cup to add to the mixing bowl.

**Where do you think Phyll got the water from?**

Water came into the plant through the plant’s roots, then it traveled up the stem and into the leaves where Chloro and Phyll are making plant food.

The stem is like a straw. We could have Phyll suck the water up through a straw and add it to the bowl, but that would be gross. Phyll, pour the water into the big bowl. Chloro, start stirring very carefully. Water is a precious natural resource. We don’t want to spill any of it.
Now, we need the next ingredient. The recipe says to add **carbon dioxide**. Write “carbon dioxide” on the recipe. Next to the word, write the formula name for carbon dioxide, \( \text{CO}_2 \). This formula name means that carbon dioxide is made up of one molecule of carbon and two molecules of oxygen.

**Where is Phyll going to find carbon dioxide?**
Carbon dioxide is a gas in the air. Air is a natural resource, which means we don’t make it. Actually, people and animals can help us add carbon dioxide to the recipe. How can we do that?
We can breathe into the mixing bowl. What people exhale or breathe out is carbon dioxide. We need just the right amount of carbon dioxide. Four people ought to do it. **Who wants to come up and blow carbon dioxide into the bowl?**
The carbon dioxide enters the plant through tiny openings in the leaves called **stomata** (*stow-MA-ta*). Pick up the piece of paper filled with tiny holes or stomata and blow through the paper. Chloro, stir the water and carbon dioxide very carefully. It’s important to have them thoroughly mixed.

Chloro and Phyll are missing one last ingredient that causes the water and carbon dioxide to change to plant food. In order to make something change, you need energy. **Nature has provided the water and air containing the carbon dioxide, but where in nature can we find energy?**
The sun

Phyll, turn on the sun (*a flashlight*). The sun provides light, which is a source of energy. The energy changes the water and carbon dioxide into the plant’s food. Shine that light into the bowl and stir it in. Add the word “light” to the recipe.

**What have we done to make this recipe work?**
We have Chloro and Phyll. They took water from the soil through the roots, carbon dioxide from the air through the leaves, light from the sun through the leaves, and mixed them together. The water and carbon dioxide are changed by the sun and the chlorophyll to make food.

In the directions under the recipe ingredients, write “Chlorophyll mixes the ingredients together to make plant food for one plant.”

**Is there anything left in the bowl?**
Yes.

**What is it?**
We can’t see it, but it’s there. It’s oxygen. When the ingredients are mixed together, oxygen is left over. Plants don’t use oxygen for plant food.

**What do they do with it?**
Similar to the way we exhale carbon dioxide, plants give off oxygen.

**Who needs oxygen to live?**
People and animals need oxygen to breathe. Phyll, tip the bowl out toward your classmates and scrape the oxygen out at them. The rest of the class, breathe in and fill your lungs with oxygen from the plants. Everybody is happy. The plants grow from the food they made, and people have healthy air to breathe.

**Thanks for your help, Chloro and Phyll.**
This process is called **photosynthesis**. (Write “photosynthesis” on the board.) Photosynthesis comes from the Latin words “photo,” which means light, and “synthesis,” which means make something. Chloro and Phyll used light to make plant food from water and carbon dioxide.

### Reflect

**Develop Concepts**
10 MINUTES

**Life Science:**
- Characteristics of organisms,
- Organisms and environments

**Math:**
- Algebra

**Language Arts:**
- Reading, Vocabulary,
- Factual understanding,
- Inferring, Sequencing

### Explain

**What are the three natural resources needed for photosynthesis to occur?**
- Sun, water, air

**What would happen if there were no water, air, or light?**
Photosynthesis wouldn’t happen, and we wouldn’t have food to eat or oxygen to breathe.

Let’s look at the process of photosynthesis using the formula names. It is kind of like a math equation. (Write the following on the board and discuss what each symbol means, whether all the equations mean the same thing, and whether the equations would end up the same if part of the equation was missing or the answer was incorrect.)

\[
\begin{align*}
H_2O + CO_2 + \text{light} & \rightarrow \text{plant food} + \text{oxygen} \\
\text{Light} + CO_2 + H_2O & \rightarrow \text{plant food} + \text{oxygen} \\
CO_2 + \text{light} + H_2O & \rightarrow \text{plant food} + \text{oxygen}
\end{align*}
\]

People and animals eat the food made by photosynthesis. Fruits and vegetables store that food. Leaves from herbs also store the food made through photosynthesis. Potatoes are swollen underground stems that store starch, a sugar made through photosynthesis. The starch in the potato tuber is food for the new plant that grows from it. It’s also an important source of food for people.

(Project the lyrics to “Photosynthesis” by Chris Rowlands on a screen or interactive board. Follow the lyrics while you play the song from *Were You Born in a Barn?* by Chris Rowlands. Ask the students where the nutrients come from. They enter the plant in the water coming from the soil up through the roots and to the stems and leaves. Write the new words such as autotrophic, cells, organelles, and chloroplasts on the board and discuss them.)

### Apply

**Elaborate in a new way**
30 MINUTES,
POSSIBLY BETWEEN 2 DAYS

**Life Science:**
- Life cycles of organisms,
- Organisms and environments

**Language Arts:**
- Main idea, Interpreting,
- Inferring, Writing

#### PHOTOSYNTHESIS DIAGRAM
Take out a blank sheet of paper and draw a diagram of the photosynthesis process.

1. **What does the sun provide?**
   - Write “light” under the sun.
   - What could you do if you wanted to grow plants indoors where there are no windows?
     - Grow them under special lights.

2. **How does the plant get water?**
   - Through its roots; draw an arrow in the direction the water moves.

3. **What gas is needed by plants?**
   - Carbon dioxide
   - Where does it come from?
     - Air, people, and animals; draw arrows from those places to where the plant takes it in.

4. **What gas is given off by the plants as a byproduct of photosynthesis?**
   - Oxygen; draw arrows showing where the oxygen is coming from and going to.
**PHOTOSYNTHESIS**

by Chris Rowlands

**Chorus**

Photosynthesis is a chemical process
In which plants take things they use
Turn it into food
Energy from the sun, water, CO₂, and nutrients
These are things they use
When they’re making their own food.

Sun shines down on the little plants
Visible light is what they eat
Autotrophic is what they call the plant
They make their own food naturally
From the smallest plant to the biggest tree
They have their own food factory
They give us lots of things we need
Like food and they give us air we breathe.

In the leaves plants have cells
Inside the cells are organelles
Organelles like chloroplast
Are where the sun’s energies are stored and stashed.

In the chloroplasts there still are
Smaller things called chlorophyll
Chlorophyll and chloroplast
Are where the sun’s energies are stored and stashed.
Why do some scientists think that photosynthesis is the most important biological process?
It is essential to plant growth because it makes the food that they eat. Plants are the basic source of food, even for carnivorous animals that eat other animals that probably eat plants.

Why is it important for scientists to study the process of photosynthesis?
To keep our food supply going
In some cases, plants are used to produce more oxygen, which is a byproduct, or it comes from the photosynthesis process.

PLANTS AND ANIMALS AS PARTNERS

Are plants, animals, and people good partners?
Yes.

Let’s make a list of all the things that people, animals, and plants do for each other. Work in small groups to discuss one of these relationships: what plants do for animals, what animals do for plants, and what people do for plants and/or animals. Have someone in your group be the recorder and write down all the things your group comes up with. Someone else from your group will report your ideas to the class. (Give them ten minutes for discussion in their groups. As you hear each group’s report and discuss it, have a student write the ideas on the board in the appropriate column.)

<table>
<thead>
<tr>
<th>What plants do for people and/or animals</th>
<th>What animals do for plants</th>
<th>What people do for plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Give us oxygen</td>
<td>Give them carbon dioxide</td>
<td>Give them carbon dioxide</td>
</tr>
<tr>
<td>Give us food</td>
<td>Fertilize the soil (manure)</td>
<td>Cultivate them</td>
</tr>
<tr>
<td>Give us clothing (cotton)</td>
<td>Move their seeds</td>
<td>Sow their seeds</td>
</tr>
<tr>
<td>Give us shelter (wood)</td>
<td>Thin out populations by eating plants</td>
<td>Protect them from animal grazing</td>
</tr>
<tr>
<td>Give us beauty</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Resource

Watering the Garden
Adapted from:
Basic Vegetable Gardening, 4-H Global Knowledge Center and
Garden Mosaics, Cornell University

Lesson Summary: Students will learn the proper way to water the plants in the garden. They will learn when and how much water each plant needs. Students will also review the importance of mulching to conserve water.

Objectives:
Explain when and how much a garden should be watered.
Describe several different watering methods that can be used in a garden.
Evaluate watering methods to determine which is most suitable for a given situation.
Explain how to conserve water in the garden.

Materials:
Watering cans, pails/buckets, hose
Measuring device such as a ruler, clear plastic container
Plastic milk jug (see directions on Watering Science page; consider alternate methods for making small holes in the jug).
Materials for mulching (if you have not mulched the garden already)

Review the Garden Mosaics Watering Science Page and Watering Teaching Tips

Lesson Steps
1. Introduction

Ask members to tell you why watering is important to plants. Ask if water is a problem for gardeners in your area. Do all farmers have enough water? Is there always enough rainfall? This lesson will review why knowing about proper watering can save both water and time.

2. Learning how to properly water the plants in the garden

Ask the group to brainstorm what they know about watering the plants in the garden. Expected results:
- Water is necessary for the plants to grow.
- Different plants grow at different rates, even if they are the same type of plant. They need different amounts of water. For example, bigger plants or trees may need more water than little flowers or vegetables.
- Some plants have long roots while other plants have branching roots (especially visible when they were transplanting plants).

Some questions to ask:
- Have we been watering each plant with the same amount of water?
- What differences have noticed in the plants? Have you noticed that some plants are growing taller than others, even if they are the same type of plant?
- Have you noticed some areas in the garden that look like they are not getting enough, or getting too much water? What does that look like?

- What can be done to conserve water?
  Answer: use drip irrigation, collect rainwater by setting large containers outside during a rain. If students want to try collection rain water, check with the school for permission. They can use that rainwater to water their garden. Be sure to discuss how properly saving and storing rainwater is important for to prevent mosquito infestation.

- How could we measure how much water, including rain, that our plants are getting?
  Answer: It is easy to put a container outside to measure the amount of rain in the garden. Place a container near the garden, away from any buildings that would change the amount of rain that goes into the container. Make inch markings on the outside or inside of the container. It is helpful if the container is clear.

In general, plants need about 1 inch of rain in 7 days. If they are receiving that much, then it may not be necessary to water the garden with additional water. If they are not receiving about 1 inch every week, then it may be necessary to supplement with additional water. The climate and soil in your area will determine how much water is needed.

- What time of day is best to water the plants?
  Answer: It is best to water the plants in the morning or in the night. If it is really hot during the middle of the day and you water the plants, the water can get too hot for the plants, and it can also evaporate before filtering into the soil.

- How do different watering cans, hoses or drip irrigation affect the way we water?

Remind students that plants have different depths of roots. Plants that have roots along the top of the soil may need to be watered more often than plants that have deeper roots. Draw plants with three different length roots. Which ones will need to be watered more often?

Make a milk-jug drip irrigation system from the Garden Mosaics Watering Garden Plants Science Page. Install it in the garden.

3. Review how to Mulch the garden (see February Lesson)
- Spreading mulch around the plants will help keep the water from evaporating.
- Mulch is made up of coarse plant materials such as leaves, fibers, or wood chips. They can be placed directly into the garden at the base of plants or used to create pathways and borders.
- Benefits include:
  - Conserves water by protecting the soil from sun and wind evaporation.
  - Controls weeds by blocking sunlight to reduce weed growth
  - Insulates soil by keeping soil cooler in hotter temperatures
  - Reduces erosion by slowing the flow of water during heavy rains
  - Improves soil structure by reducing the compaction of soil
  - Adds nutrients to the soil

4. Summary and Debrief
Ask the students the following questions:
- Why is it important to keep track of the amount of water the garden is getting?  
  Answer: It is important so you can determine if the garden needs additional water.
- Why is it important to spread mulch around the plants? Do you think it would be important to spread mulch around plants you are planting at home?
- What materials do we have around the school or around your home that you can use for mulch?
- Do you think it would be important to spread mulch around plants that were planted in small containers?  
  Answer: It would not be necessary because plants in small containers usually are not affected by a large amount of weeds. However, it would still help to stop the water from evaporating.
- What are some other ways we could conserve water in the garden?  
  Answer: It may be possible to provide shade for the garden, which would limit the amount of water that evaporates. We can also plant crops close together, like in a square foot garden, so that plants use rainfall more efficiently.

Consider having them record their answers in their Garden Journal.
WATERING GARDEN PLANTS Science Page

TO WATER OR NOT TO WATER?
In most areas, rain alone does not meet all the water needs of garden plants. You need to water the garden.

The soil is dry all the way down to the depth of the plant roots. It’s time to water.

The soil in raised beds dries out faster, so we have to water more often.

You need to add enough water so that it seeps all the way down to the depth of the plant roots. If you just water the soil surface, the roots will grow close to the surface and then the plants will wilt more quickly.

At least these beds drain well. If the soil were compacted, the water would not drain and the plant roots would drown.

WATERING METHODS
1. A watering can and hose are useful for small gardens.

I’m using a gentle rain nozzle so the water can slowly soak into the soil.

Direct the water to the base of the plant, not on the leaves.

2. Sprinklers are cheap and convenient, but they waste a lot of water to evaporation, especially on hot, windy days.

I’ll move the sprinkler around to other spots so all the garden gets enough water.

3. A drip or trickle irrigation system applies water directly to the area in the soil where roots are growing.

Many farmers in hot, dry places use drip or trickle irrigation.

Little water is lost to evaporation or run-off when you use the drip or soaker hose methods because the water goes into the ground near the plant.

4. A soaker hose is a plastic or canvas hose with holes all along its length. It is placed along one side of plants or underneath mulch. Water seeps out slowly.

The gentle stream of water causes little or no compaction of the soil.

SAVING WATER IN THE GARDEN
Make the most of available water in the garden.

Collect rain water from roof-tops in rain barrels. Keep the rain barrel covered to prevent mosquitoes from breeding.

Add organic matter to the soil. It holds the water, which then can be used by plants.

Water during early morning. At this time temperatures are cooler and it is less windy, so there is less evaporation.

Cover the soil with mulch, which smothers weeds and allows water to seep slowly into the soil. A mulch cover also reduces evaporation of water from the soil.

Garden Mosaics is funded by the National Science Foundation Informal Science Education program, and by the College of Agriculture and Life Sciences at Cornell University.
CROSSWORD PUZZLE

Across
1. Water in the _____ when it is cooler.
4. This type of irrigation system applies water directly to the roots of plants.
7. Watering with a gentle stream of water causes little ______.
9. Farmers in hot, dry countries use this method of watering.
11. A hose with holes all along its length is called a _____ hose.

Down
2. Add _____ matter to soil so that the soil will hold more water.
3. They waste a lot of water to evaporation.
5. Use a gentle _____ nozzle for watering plants.
6. Gardeners can collect rain in rain ______.
8. _____ will help reduce evaporation from the soil surface.
10. When watering add enough water so it seeps all the way down to the ______.

TRY THIS

DRIP IRRIGATION FOR GARDEN PLANTS
What you need
* plastic one-gallon milk jugs * candle
* clothespin with spring * matches
* pin

What to do
1. Light the candle. Use the clothespin to hold the pin. Place the sharp end of the pin in the candle flame until it is hot. Use the hot pin to melt about 8 to 10 small holes in the bottom of the milk jug. CAUTION: Do this only under the supervision of an adult.
2. Put some water in the jug to make sure the water will slowly drip out of it.
3. Bury the milk jug between widely spaced plants in the garden, such as tomatoes, peppers, eggplants, or squash. The bottom 15 cm of the jug should be buried (see picture).
4. Fill the jug with water every few days during dry spells.
5. Observe how well the plants near the jug grow, compared to plants without drip irrigation.

SPOTLIGHT ON RESEARCH

Dream up a watering invention
Can you think of a creative irrigation idea for gardeners and small farmers? Each year the World Bank and the United Nations sponsor a contest to promote irrigation systems for small farmers and gardeners. The irrigation systems must be affordable, creative, easy to operate, and useful in many areas around the world.

One of the contest winners was a “Dream Kit” for drip irrigation, designed by Stephen Ngigi at the University of Nairobi in Kenya. The Dream Kit consists of a bucket mounted on a wooden stand above the ground. The bucket is connected to pipes with tiny holes in them, through which water drips out along a row of crops. In dry areas, the bucket is filled twice a day. Thanks to the Dream Kit, small farmers in Kenya have been able to grow much needed vegetables to sell and to eat.

The kit can easily be put together and repaired by farmers, and costs only U.S. $15.00. Within three months, farmers can make four times this much by selling crops that would otherwise be difficult to grow. The Dream Kit truly deserves its name!


RIDDLE

Where do vegetables go to have a drink?

Answer: A salad bar!
**WATERING GARDEN PLANTS Teaching Tips**

### LEARNING OBJECTIVES
Youth will be able to:
* Explain when and how much a garden should be watered.
* Describe several different watering methods that can be used in a garden.
* Evaluate watering methods to determine which is most suitable for a given situation.
* Explain how to conserve water in the garden.

### HOW TO USE THE WATERING GARDEN PLANTS SCIENCE PAGE

Have youth do a survey of watering techniques being used in the community garden. Find out where the water comes from and how gardeners transport it to their gardens. Observe how and when crops are being watered and compare their vigor. For example, look for different types of drip irrigation systems, including both homemade and store bought devices. Observe how the plants are doing under these watering systems. Are they being watered enough, and in the right way?

Look for plants that appear wilted and stunted because of lack of water. Try to figure out why they are stressed. Are they getting enough water? Is there enough organic matter in the soil? Are plants being mulched?

Look for techniques being used to conserve water. For example, do gardeners collect water in rain barrels? Do they add organic matter and mulch to their soil?

Youth may want to visit several gardens and possibly a farm or university agricultural experiment station to learn about different watering methods. They may also want to do research about watering techniques on the internet. Go over the general watering tips below with the youth. After youth have learned about watering methods for gardens, have them discuss what recommendations on watering they would give to gardeners. They may wish to draw a poster to illustrate their recommendations, and post it in the garden. Or they may want to make a poster on watering for children and other visitors to the garden.

Here are a few tips that many gardeners could use to improve water use in the garden. Water infrequently, but thoroughly. Frequent shallow watering causes plant roots to concentrate close to the surface, making the plant more susceptible to water stress. How often you must water depends on many factors, including the type of soil you have (sandy soils need watering more frequently than do clay soils), how much organic matter and mulch is present (soil without mulch or organic matter dries out faster), whether or not you have raised beds (raised beds tend to dry out faster), and the weather (obviously, you have to water more often in hot, windy, dry weather, and less often in rainy weather). Generally, unless the weather is very hot and windy, about 2 1/2 centimeters (1 inch) of water per week is adequate for most garden plants. To find out how much rainwater the garden is getting, you can place a straight-sided can in the soil, and then measure how much water is in the can after a rainstorm. If the garden is not getting 2 1/2 centimeters of rain, then you need to make up the difference by watering.

To find out for sure if you need to water, check the soil to the depth of the roots. When the soil is dry to a depth of 60 cm deep for tomatoes, pumpkins, winter squash, sweet potatoes, and watermelon; at least 45-60 cm deep for beans, beets, carrots, cucumbers, peas, peppers, and summer squash; at least 30 cm for cole crops, corn, lettuce, potatoes, radishes, spinach, and berries). 2 1/2 centimeters of water will penetrate to a 38 cm depth in a loam soil.

### CROSSWORD PUZZLE

**Answers**

**Across:** 1. morning; 4. drip; 7. compaction; 9. trickle; 11. soaker.

**Down:** 2. organic; 3. sprinklers; 5. rain; 6. barrels; 8. mulch; 10. roots.

### TRY THIS

This is a very simple drip irrigation device that works well for widely spaced plants in the garden. Youth should observe that crops irrigated with this device are more vigorous and have higher yields, compared to crops that are not watered during dry spells.

### SPOTLIGHT ON RESEARCH

Got Dirt?

Garden Toolkit

for implementing youth gardens
For more information about this garden toolkit contact:

Nutrition, Physical Activity and Obesity Program
Division of Public Health
P.O. Box 2659
Madison, WI 53701-2659
Phone: (608) 267-9194
Fax: (608) 266-3125
Email: amy.meinen@wisconsin.gov
Website: http://dhs.wisconsin.gov/health/physicalactivity/index.htm

This garden toolkit was made possible by funding from:

Centers for Disease Control and Prevention Obesity Prevention Grant:
This publication was supported by Cooperative Agreement Number U58/DP001494 from the Centers for Disease Control and Prevention. Its contents are solely the responsibility of the authors and do not represent the official views of the Centers for Disease Control and Prevention.
Caring for the Garden

general upkeep

1. Thinning Seedlings: Once your seeds have begun to sprout and grow in the garden, pull out the extras to provide growing space for the remaining plants. Make sure to remove the extras when the plants are still small, before they compete with others for light, air, and water. When fruits and vegetables grow too close together, the plants growth may be stunted, root crops become distorted, and vine crops grow poorly due to self-shading.

2. Weeding: If you keep weeds out of your garden, you’ll have a better harvest! Weeds compete with your plants for water, light, and nutrients. Weeds also encourage insects and diseases that attack your garden plants. Mulch and cultivation can help keep the weeds in your garden under control. Use organic materials such as grass clippings (from a non-chemically treated lawn) or a good weed-free straw, specifically clean wheat or rye straw, as means for controlling weeds in your garden. Old newspapers combined with a top layer of grass clippings can be placed around and in between plants to provide an excellent barrier for weeds. The coarser the material, the thicker the layer of mulch.

quick tip

Check the Weather Forecast! View the Gardener’s Local Forecast, courtesy of The Weather Channel. Check here www.weather.com/activities/homeandgarden/garden/ and enter your zip code to find out if you’ll need to water your garden today.
3. Watering: The best time to water is in the early morning or early afternoon. This allows for the leaves to dry off before nightfall, reducing the chance for disease. Drip irrigation or soaker hoses can be used to keep plants dry during watering, which also reduces the chance of disease infection. However, drip irrigation can be done anytime during the day if used under newspaper, straw, or grass mulch. Some plants, like tomatoes, do not like their leaves wet. In this case drip hoses work especially well. Note: Watering between 10:00 am and 2:00 pm could burn the plants, unless it is an overcast or cloudy day.

5. Adding Organic Matter: “Organic matter” provides nutrients for plants. Plants take food from the soil as they grow, so organic matter needs to be applied yearly. Some organic matter sources include: well-rotted cow or horse manure, compost made from tree leaves, lawn clippings (without chemicals), garden refuse (disease-free), green manure, and other organic residues. It is important to keep in mind that some fruits and vegetables are “heavy feeders” (i.e. corn and tomatoes), while others are not (i.e. green peppers). It is best to incorporate organic matter in the fall or early spring, as you prepare the garden soil.

how do I keep the weeds to a minimum in my garden?

At the Ho-Chunk Youth Fitness Garden, we found that a layer of leaf mulch did a great job of keeping the weeds down; especially around the squash, pumpkins, and vine plants.

— Roxanne Lane
Master Gardener
Sauk County

Section of fertilizer deleted.
Integrated Pest Control Management

a. Purchase Quality Seeds & Plants: Start by selecting healthy plants or seeds from reputable seed companies and nurseries. There are several different disease-resistant varieties of seeds you can purchase.

b. Plant Spacing: Leave plenty of distance between plants to provide air movement, which reduces the chances for diseases to begin.

c. Plant Appropriately: Setting plants out too early or late can make them weak and more susceptible to a pest attack.

d. Set up Barriers: Use physical barriers between the plants and the pests by using row covers or nets that allow the sunlight and water to penetrate, but keep out pests. The barrier DOES have to be in place before the pest appears. Remember to remove the barriers during the blossoming stage so that insects will be able to pollinate the plants.

e. Pick the Pests: Hand-pick and destroy insect pests.

f. Prevent Weeds: A layer of mulch helps to control weeds and conserve soil moisture. A garden full of weeds is a major attraction to pests!

g. Learn to Look: Monitor your garden weekly for any new pests. Regularly inspect your plants and their leaves for any trace of insect feeding, etc.

h. Keep it Clean: After you have harvested everything from your garden, discard any diseased plant material from the site. Remove debris as soon as possible, as many pests will remain over winter in or under dead plant material. Plow or till the garden in the fall.

i. Rotate Crops Next Year: Move crops to different garden locations each year to reduce buildup of plant-specific pests in the soil.

For more information for controlling diseases in your garden, visit the following websites:

- The Insect Diagnostic Lab, UW-Madison, Department of Entomology: www.entomology.wisc.edu/entodiag.html
- The Plant Diseases Diagnostic Lab, UW-Madison, Dept. of Plant Pathology: www.plantpath.wisc.edu/pddc
- University of Minnesota Extension Service: Controlling Diseases in the Home Vegetable Garden www.extension.umn.edu/gardeninfo
- Ohio State University yard and garden pest information: http://ohioline.osu.edu/hyg-fact/2000/
Keep the Beneficial Insects: Over 90% of insects around the garden are harmless to people and plants. Without the help of these “beneficial insects”, most plants would be overrun with pest insects every year. These beneficial insects feed on many different pest species. Furthermore, several of these beneficial insects are pollinators. With more pollination taking place, more high quality fruits and vegetables can be produced. To keep beneficial insects around your garden, limit or eliminate pesticide use. Consider leaving flowering weeds around the garden (i.e. dandelions and clover) to provide alternate nectar sources for pollination. To have beneficial insects attracted to your vegetable garden, be sure to add some flowers and herbs. Examples of annual flowers that attract pollinators include alyssum, marigolds, nasturtiums, dill, and cosmos.

Mulching: Mulching with untreated, chemically free grass clippings, leaves, or straw in late June provides several benefits. The mulch will help to suppress weeds, conserve soil moisture, prevent compaction of soil by heavy rains, and add more organic matter to your soil.

For Additional Resources on Composting:
- Wisconsin Department of Natural Resources: Recipes for Composting: http://dnr.wi.gov/org/caer/ce/eeek/earth/recycle/compost_waste.htm
- Iowa State University Horticultural Guide: Composting Yard Waste www.extension.iastate.edu/Publications/PM874.pdf

For Answers to General Gardening Questions, Visit These Websites:
- University of Wisconsin Urban Horticultural Website http://wihort.uwex.edu/
- University of Wisconsin Extension-Milwaukee County Yard & Garden Line (Milwaukee County Residents only) www.uwex.edu/ces/cy/milwaukee/hort/consumer/HortLine.cfm

how can I engage youth in gardening?

Getting youth interested in gardening is easy — just provide a safe location, a hand trowel, some seeds and plants, and a volunteer to show them what to do — kids love learning how to grow things. Start small, either with a container garden or a small raised bed no larger than 4 x 4 feet. Square foot gardening is a technique that works well with kids. Have them map out their one foot squares and choose which plants they want in each square, then have them post their map at the garden while they plant. Caring for their garden and watching it grow will be a delight.

— Patti Nagai
UW Horticultural Agent, Racine County
What are Action Projects?

Action Projects often serve as the culmination of a longer-term Garden Mosaics program. Youth apply what they have learned through the *i-m-science investigations* and other activities to help gardeners and their community. Action Projects can also be conducted as standalone projects, or in conjunction with other civic and environmental education programs. Whatever way you conduct Action Projects, be sure to have youth submit the online *Action Project Form* so that others can learn about and be inspired by their accomplishments.

You can use Action Projects to motivate youth who want to do more than learn about the neighborhood, garden, and gardeners. Many older youth want to do something meaningful for the gardeners, to create something beautiful for the garden, and to answer questions about gardening that come up during the *i-m-science investigations*.

Action Projects are carried out in cooperation with the gardeners and other neighborhood adults. They vary widely, depending on the type of youth program, and the interests of the youth and adults. For example, youth at a summer art camp can make sculptures for the garden, or youth in a community action program could meet with elected officials to explain the importance of community gardens to their neighborhood. Youth choose an Action Project related to Art in the Garden, Food Systems, Garden Design, Garden Enhancement, Garden Research, Land Use, or Nutrition and Health.
**ACTION PROJECTS**

Action Projects allow you to make a difference in your community. You can design your own Action Project based on what you have learned from the gardeners and what interests you.

**SOME IDEAS FOR ACTION PROJECTS**

**DESIGN!**

We made this garden plan with people at the community center.

**CREATE!**

Let's paint a mural on that wall!

**PUBLISH!**

This recipe sounds healthy... ...and good to eat!

**BUILD!**

When this path is finished, people in wheelchairs will be able to reach their garden plots more easily.

**EDUCATE!**

It's one of many we made to help explain about the plants growing in the garden.

**CELEBRATE!**

We helped the gardeners grow and cook this food.

**EXPERIMENT!**

This experiment may help gardeners control garden weeds.

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Garden Mosaics is funded by the National Science Foundation Informal Science Education program, and by the College of Agriculture and Life Sciences at Cornell University.
ACTION PROJECTS

WHAT TO DO

1. Do Background Research
   ✓ Read some of the Action Project reports on the Garden Mosaics website.
   ✓ Discuss what you have learned about the gardeners and the neighborhood.

2. Decide what to do
   ✓ Discuss your ideas with the gardeners.
   ✓ Fill out the Action Project Planning Form.
   ✓ Discuss the steps you will take and who will be responsible for what.

3. Do it
   ✓ Carry out your Action Project.

4. Tell others about your Project
   ✓ Share the results with gardeners and other community members.
   ✓ Describe your Action Project using the Online Action Project Form and submit it to the Garden Mosaics website.

Garden Mosaics is funded by the National Science Foundation Informal Science Education program, and by the College of Agriculture and Life Sciences at Cornell University.
Conducting an Action Project

Ideas for Action Projects
You and your group can choose an Action Project in any of these areas. You can view actual examples of Action Projects that other groups have completed on the Garden Mosaics website (www.gardenmosaics.org).

Conducting an Action Project

Choose the Project
1. At the start of your project, let the youth know they will be doing an Action Project. They will use what they learn from their interviews and observations in the gardens and neighborhood to plan the project.

2. Have the youth read about other groups’ Action Projects on the Garden Mosaics Action Projects online database.

3. Decide on the general topic of the Action Project. You can make this decision before the youth program starts. For example, if you are running a summer science program, you can decide that the Action Project will focus on garden research.

We have included guidelines for Action Projects in the following areas:
- Art in the Garden
- Food Systems
- Garden Design
- Garden Enhancement
- Garden Research
- Land Use
- Nutrition and Health
4. Help the youth decide on the specific Action Project based on the results from their i-m-science investigations. If you will be conducting a Garden Research Action Project, during the i-m-science investigations the youth should ask the gardeners what information they might need about plants, insects, soils, and related areas. The youth can conduct research to answer the gardeners’ questions and report back to the gardeners what they discovered. Or if you will be conducting an Art in the Garden Project, the youth should ask the gardeners about their interests in garden improvements and be on the lookout for an area of the garden that could be “spruced up,” such as a fence that would look nice with a mural painted on it. In addition to taking into account the gardeners’ input and the youth’s own observations, you will need to make sure the project is feasible given the time and resources available to your group, and the youth’s ages and abilities.

Plan for the Project

5. Have the youth complete the Action Project Planning Form. Included in the plan should be the objectives, steps needed to reach each objective, background information needed, materials needed, the role of each member of the group, how they will involve gardeners and others (e.g., scientists, artists), and how they will present their project.

Collaborate with Others

6. Discuss ideas for the Action Project with the gardeners to see if the plan addresses the gardeners’ interests. The youth may revise their ideas based on these discussions.

Understand the Science Related to your Project

7. Use the Science Pages and other resources to help the youth understand the concepts and skills necessary to conduct the project. Have the youth conduct the activities on the Science Pages and guide them in a discussion to make sure they understand the concepts.

Conduct the Project

8. Have the youth conduct the Action Project, including taking photos (See Photo Guidelines, Section VII).

Share your Results

9. Have the youth present their results to gardeners and other community members.

10. Have the youth describe their Action Project using the online Action Project Form and submit their form and photos to the Garden Mosaics website.
Art in the Garden Action Projects

Youth can create any number of art objects to give to gardeners for their Art in the Garden Action Project. For example, they might create mosaics from tile fragments, paint a mural, or make paper from plant fibers. They could build a scarecrow, install bird houses, make dye from garden plants, or create a photographic display of the garden. Other possibilities include making a book of plant sketches or pressed plants found in the garden. The youth should ask the gardeners what kind of art they might enjoy and use this information to decide on their Art in the Garden Action Project. Although the examples here come from community gardens, you should be able to adapt them for home or school garden or other youth programs.

Ideas for Art in the Garden Action Projects

- Create a “Garden Mosaic” from tile fragments
- Make dyes using plants from the garden
- Paint a mural along a fence
- Build a scarecrow
- Create or decorate container plantings
- Make birdhouses and bat houses
- Make paper from plant fibers
- Create a collection of pressed plants
- Create a photo book of the garden
- Make a sketchbook of garden plants
Example Projects

Following are example Art in the Garden Action Projects. Our intent here is to give you a range of possibilities, which we hope will prove useful as you help youth develop their own project.

**Create a “Garden Mosaic” from Tile Fragments**

The youth notice that the path in front of the garden shed is dusty and no longer has grass. They think it would be nice to put in stepping stones or a short brick path. They discuss their idea with the gardeners and talk about possible materials. They find out that the gardeners have a pile of salvaged bricks that they could use. The youth decide to create colorful mosaics on the bricks by joining the tile fragments with grout and attaching them to the brick with a tile adhesive. They contact a local plumber and a home improvement store and learn that they have a large quantity of broken tile fragments. The youth then arrange the bricks in front of the shed to see how the path will look and dig out the area for setting the bricks. They dig about an inch deeper than the bricks so that they can place a layer of sand to create a more level surface. Then they adorn the bricks with mosaics and set them in the ground.

**Make Paper from Plant Fibers**

The gardeners are very helpful and generous of their time during the *i-m-science investigations*. The youth hold a brainstorming session to think of a gift that they could make for the gardeners as a sign of their appreciation. During the session, they decide to make paper using the garden plants. They research paper making from plants on the Internet. They ask the garden manager for permission to use a few of the hollyhock plants in the common area. They use the stems of the hollyhock along with other fibers and materials as the ingredients for their paper. Once the paper is made, they present it to the gardeners as a gift.

**Build a Scarecrow**

During the *i-m-science investigations* several gardeners mention that squirrels and certain birds feed on their corn, sunflowers, and fruit trees. This is particularly a problem at harvest time. The youth think it might be neat to make scarecrows. After doing some Internet research, they find that there are many different types of scarecrows and just about any old material can be used. When they talk to a local Cooperative Extension agent they learn that scarecrows can sometimes be effective and are worth trying. They talk with the gardeners about their idea and the gardeners think that a few scarecrows that are put up during the growing season would be useful. The youth hold a scarecrow making day in the garden.
**Create or Decorate Container Plantings**
During the Neighborhood Exploration, the youth notice a construction site that is throwing out old planter boxes and a sink. They talk about how these materials could be used for container plants and decide to share their ideas with the gardeners. The gardeners are not interested in the old sink (although several gardeners think it would be fun, the garden manager does not approve). However, they think that if the youth decorated the planter boxes, they would look nice by the shed. The youth decorate the boxes and plant flowers in them.

**Make Dyes Using Plants from the Garden**
When the youth interview one of the gardeners during the Gardener Story, they learn that she enjoys knitting and used to dye her own wool. The gardener offers to teach the youth how to make dye from plants. With the help of the gardener and a book from the library, the youth make several different colored dyes from garden flowers. The group dyes some cotton fabric to make a table cloth for the picnic table in the garden.

**Create a Photo Album of the Garden**
During the Neighborhood Exploration, the youth enjoy using cameras and creating a photo collage. They decide they would like to make a photo album of their activities, the gardeners, and the changes in the garden over the summer. At the end of the summer, they present the photo album to the gardeners.

**Make a Sketchbook of Garden Plants**
Several of the youth enjoy drawing. The group decides to create a poster of drawings of garden plants to give to the gardeners as a gift of appreciation. They talk to a local artist about scientific drawings. At the end of the program they present their poster to the gardeners.

**Make a Collection of Pressed Plants from the Garden**
During the Gardener Story, the youth learn that the gardeners would love to have children carry on their gardening traditions, but the children do not even know the names of the plants. The youth decide to create a book of pressed plants from the garden, labeling the plants and pointing out identifying features. They talk to a local botanist about the best way to press plants. They also copy the relevant Science Pages describing the different plants and include the copies in the book. They give the book to the gardeners to use when children visit the garden.
**Build Bird Houses and Bat Houses**
The garden manager mentions during the Community Garden Inventory that the garden used to have a bird house but it had to be taken down because it was falling apart. The gardeners say they would like to attract more birds and even bats to keep down the mosquitoes in the garden. The youth decide to make and install bird and bat houses. They research bird and bat houses on the Internet and contact a technology teacher who is willing to help with the project. The youth construct the houses and present them to the gardeners at a final garden celebration.

**Create a Mural**
During the Community Garden Inventory, the youth observe that the fence bordering the garden is covered with flaking paint and old graffiti. They talk with the gardeners about creating a mural and secure permission of the property owner to paint on the fence. The youth next search the Garden Mosaics website for photos of other community gardens with murals. They also look at Science Pages to get ideas for garden science concepts that might be displayed on a mural. They then contact a local artist and art teacher to help them work with the gardeners to sketch out a plan for the mural. Finally, they hold a mural day during which the youth and gardeners paint the pictures on the fence.
Food Systems Action Projects

In the Food Systems Action Project, youth learn about our complex, modern day food system, starting at the local level. For example, they may create a neighborhood map showing sites where residents can buy or grow food. Or they could arrange for extra garden produce to be donated to a soup kitchen. Another possibility would be to conduct a garden produce taste testing party for children and their parents. The youth’s conversations with the gardeners and observations in the neighborhood during the *i-m-science investigations* will help them define their Food Systems Action Project. Although the examples here come from community gardens, you should be able to adapt them for home or school garden or other youth programs.

Ideas for Food Systems Action Projects

- Help establish a local produce stand
- Write a letter to school officials asking to include more local produce in school lunches
- Conduct a vegetable taste testing party for children
- Create a neighborhood food map
- Host a "local harvest" banquet
- Find out how much money gardeners save by growing their own produce
- Conduct a survey of neighborhood residents about access to fresh produce
- Arrange for extra garden produce to be donated to a soup kitchen
Example Projects
Following are example Food Systems Action Projects. Our intent here is to give you a range of possibilities, which we hope will prove useful as you help the youth develop their own project.

Produce Stand
Youth learn during the im-science investigations that there are few places to buy vegetables in the neighborhood. During the Community Garden Inventory, several of the gardeners mention that they would be interested in selling their produce at a Saturday market. Similarly, several neighborhood residents visiting the garden mention that they would like to buy fresh produce. The youth meet with staff from local government agencies and non-profit organizations that work on food systems issues, and ask for advice on how they could start a produce stand. They work with the gardeners who are interested in selling produce and arrange for permission to have a stand in the neighborhood. The youth assist the gardeners with their stand by helping to harvest vegetables, make signs, and sell the produce. This activity is recommended for older youth and young adults.

Neighborhood Food Map
Youth learn during the im-science investigations that the gardeners obtain most of their produce from the garden. They are curious about how other residents in the neighborhood obtain food, especially fresh vegetables, and decide to create a map of all the places in the neighborhood where residents could obtain fresh food. To make their map, the youth walk through the neighborhood, taking notes and photographing places food is purchased (e.g., stores, green markets, or corner stands), grown (e.g., backyard, community, or school gardens), and distributed (e.g., soup kitchens). The youth visit several convenience and grocery stores along the route to ask about the produce and see if it is fresh. They then create a map/photo collage that highlights the places where food is available in the neighborhood. They laminate the map and give it to the gardeners, along with a presentation about their findings.

Food Systems Research
The youth are surprised when they learn how much produce the gardeners grow and wonder how much money they might be saving. The youth decide to conduct a study to determine the cost of the garden grown vegetables if purchased in local markets. They talk with the gardeners and create a list of the most commonly grown vegetables. They also ask the gardeners to estimate the amount produced of each vegetable. The youth then divide the list so that each person is responsible for finding out the cost at the local market of one or two vegetables. For each vegetable, the youth determine the amount of money saved by multiplying the amount the gardeners produce by the price in the store. They organize their results in a table and make a presentation to elected officials about the value of food produced in the garden to local residents.
**Taste Tests**
During the *i-m-science* investigations, the gardeners share their produce and the youth are surprised to learn how good fresh vegetables taste. The gardeners express concern that young people have poor diets and do not appreciate fresh vegetables. The youth decide to conduct a taste testing party for children from the neighborhood. They buy tomatoes from the store and help the gardeners harvest several tomato varieties from the garden. They then make a list of the different tomatoes and give each one a number. Next they cut up the tomatoes into small pieces and place them on plates with their numbers. (The children should not know which tomatoes are from the store and which are from the garden.) The children then taste each tomato, and vote on the tomato they like best. The youth share information on the importance of nutrition and eating healthy foods with the children. The gardeners then share tomatoes with the children to take home to their families.

**Letter Writing**
During their visits to the garden, the gardeners share tomatoes, squashes, and other fresh vegetables with the youth. These vegetables taste far better than those in the store or in school lunches. The youth feel that schools, nursing homes, and other institutions should be serving more fresh and locally grown produce. They write letters to their school administrators to emphasize the importance of fresh, locally grown food and request the use of more of these foods in their cafeterias.

**Sharing the Harvest**
The gardeners are always sharing their produce with garden visitors, including the youth. The gardeners mention that although they take home produce and share it with friends and family there is always more than they can use. The youth ask the gardeners if they would be interested in sharing their harvest with an organization that serves meals to the hungry. The gardeners are open to this possibility and the youth find a church soup kitchen that is interested in donations of fresh produce. They work with the gardeners and the church staff to arrange the donations.

**Food Access Survey**
The gardeners appear to get most of their produce from the garden. However, the youth are wondering if there are fruits and vegetables that the gardeners purchase instead of grow. Where do they go to buy them? Also, where do people in the neighborhood who do not garden go to get their produce? The youth decide to create a survey for the gardeners and neighborhood residents that asks these questions. They contact a social studies teacher to help design and implement the surveys. They compile their results and host a presentation to share their information with the gardeners and community residents.

**Local Harvest Celebration**
The gardeners grow a diversity of vegetables and the youth have enjoyed the opportunity to try some unfamiliar foods. They decide that it would be fun to have a celebration featuring food grown in the garden, as well as other locally grown fruits and vegetables. They learn from their local Cooperative Extension that many foods, such as apples, are grown just outside the city limits. The youth visit the city’s Saturday Farm Market to learn about local produce and how it is grown. They share their findings with the gardeners and get permission to host a celebration for the gardeners and neighborhood residents. They use the Science Pages and the Internet to print out information on the different fruits, vegetables, and herbs they will feature. They then buy produce at the Farm Market and help the gardeners harvest their own produce. For the celebration, they set up tables for people to sample the different foods, and to read about how and where the foods are grown. Everyone enjoys the bounty of the region!
Garden Design Action Project

Introduction
A Garden Mosaics group in Sacramento CA, under the leadership of Ann Marie Kennedy and Daniela Tavares, contributed this Action Project. The Sacramento Garden Mosaics youth discovered that there was a long waiting list to get plots at a local community garden. They decided to design a garden at their school and to provide plots for community members. To help design the new garden, they interviewed gardeners at the existing garden.

Through the Garden Design Action Project, youth use landscape architecture methods to create a design for a new garden. For example, youth may want to create a plan for a school garden or a garden next to a community center. Regardless of where the youth build the garden, you should obtain permission from the necessary authorities.

It is important for youth to learn from experienced gardeners about considerations in designing a garden. You can adapt the Garden Hike Investigation to incorporate questions that will be helpful in designing a new garden. This will allow the youth to see what kinds of things are important to gardeners and to get ideas about their own garden.

Occasionally, the youth may have the opportunity to work with gardeners to redesign an area in an existing community or home garden. If this is the case, you can adapt the Garden Hike to include questions about the needs of the gardeners already in the garden. The garden manager should be able to help you determine whether there might be any interest in redesigning part of an existing garden.

In addition to learning about the needs and interests of existing gardeners, it is important to learn about the ideas others who might use the garden. Landscape architects call this step "Client Needs." For example, in the case of a school garden, it will be important for the youth to talk to teachers, school officials, and other students to find out about their interests and what is possible at the site.

Unlike the other Action Projects where we present several ideas and a general framework for completing the project, here we include a set of steps that landscape architects use when they are designing the garden. After determining client needs and interests, landscape architects describe the existing site, including taking measurements and photographs and making sketches of plants and other features. Finally, they create their garden plan, which includes creating a design, drafting the plan, and making the final master plan. Thus, the steps in a Garden Design Action Project are:

**Client Needs and Interests**
1. Garden Hike
2. Other Client Needs

**Site Description**
3. Measuring the Site
4. Taking Photographs
5. Photo Collage
6. Sketching

**Garden Plan**
7. Design Charette
8. Draft Plan
9. Master Plan

Before starting the Garden Design Action Project, have your youth pay a virtual visit to the Sacramento Garden Mosaics page, which has photos of youth designing a new garden based on what they learned from community gardeners.

The Garden Design Action Project was written by Daniela Tavares, with assistance from Ann Marie Kennedy.
Clients Needs and Interests

Client Needs and Interests involves learning about what gardeners and other “clients” like about gardens in general and what they would like to see in the new garden.

1. Garden Hike

When conducting the Garden Hike as preparation for the Garden Design Action Project, the youth should pay particular attention to documenting any unique and cultural planting practices. Follow the instructions for the Garden Hike with the following modifications.

Preparing Youth for the Garden Hike

In the pre-activity discussion, describe how other youth and garden designers have interviewed gardeners to gain an understanding of the garden site. (See Sacramento Garden Mosaics page). Ask the youth in your group:

- Why do designers need to know about the people who will use the garden?
- How can interviewing an older person help better design the garden?
- How can observing the characteristics of a garden help us to understand the history and customs of gardeners and other people who might use the garden?

Next ask the youth to brainstorm a list of questions for the gardeners that will be useful in designing a new garden or area of a garden.

Conducting the Garden Hike

During the interview, point out how what the gardener is saying might be related to designing a garden.

After the Garden Hike

The youth also may want to incorporate questions that would be useful in designing a new garden into the Gardener Story. Have the youth make drawings to visually record their notes from the Investigations.

2. Other Client Needs

Once the youth have learned about what is important to gardeners, they should make a list of other people who might use the new garden. They should brainstorm a list of questions for these individuals (for example, What kinds of plants do you like? Is there a way to design the garden so it is more accessible for you?). The youth should interview the other users to determine the answers to their questions.

Site Description

The site description involves four activities: (1) measuring the dimensions of the site where the youth will design the garden; (2) taking photographs of the site; (3) compiling the photos into a collage showing areas that meet and do not meet the gardeners’ and other users’ needs; and (4) identifying and drawing sketches of garden plants.

3. Measuring the Site

Time Needed

- Before meeting with youth: variable depending on time needed to obtain aerial photograph and base map
- Preparation with youth: 30 minutes
- Activity in garden: 2 hours
- Discussion: 30 minutes

Materials

For each group of youth:
- Aerial photograph of the site
- Base map of site or grid paper
- Measuring tape (100-200 ft or 30-60 meters)
- Clipboards
- Markers and pencils

Procedure

- Before Meeting with Youth:
  1. Obtain an aerial photograph of your site. If your group is too large to gather around the airphoto, make an enlargement or make laser color copies of the photo for the youth.

  2. If possible, obtain copies of a base map of the garden. School officials will likely have such maps for school grounds. For community gardens or vacant lots, these may be available through the gardeners or the city.
Reduce the original base map to fit on 8.5” x 11” paper. This will provide youth with the outline of the site and allow them to easily draw and label structures or other components of the garden onto the map.

3. If you are not able to obtain an existing base map, draw a rough outline of the site on paper and copy for the youth. Alternatively, draw an outline of the site on a chalk board, and provide the youth with grid paper to draw their own outline of the site.

• Preparing Youth:
  1. Pass out copies of aerial photographs of the garden or have the youth gather around one enlarged airphoto. Help the youth identify landmarks surrounding the garden (e.g., tall buildings, parking) and the borders and entrance to the garden. Point out North and other directions on the airphoto.
  
  2. Pass out the base map of the garden and help the youth label key landmarks, such as the entrance, on the map. If you don’t have a base map, have the youth draw the border and entrance of the garden on the grid paper.
  
  3. Divide the youth into teams of three (one note taker and two measurers) to take measurements and photos in the garden.

• Conducting the Activity:
  1. Remind youth that they should be respectful and non-disruptive inside the garden. They should explain what they are doing and why to anyone who asks.
  
  2. Pass out clipboards and the maps the youth prepared in the classroom.
  
  3. Assign the youth structures and other features to measure in the garden, such as the border, buildings, water sources, etc. The youth should measure the size of larger structures (e.g., buildings) and the location of all features so that they can place them on their maps.
  
  4. Youth should divide into their teams of three members and proceed to find their assigned features to measure.
  
  5. Remind youth to note on their map any key components of the that can not be captured on a photo or a sketch garden (e.g., a hot area, a windy area, an open area, a change in slope).

• After the Activity:
  1. Have the youth share their maps, measurements, and observations. They should add the features that other groups measured to their map, so each group has a map with all the features. Or they can make one composite base map with all the features.

4. Taking Photos

Time Needed

• Preparing the youth: 15 minutes
• Activity in garden: 90 minutes

Materials
For each youth group:
• Disposable or Polaroid camera (minimum 15 exposures)
• Copy of Photo Activity Checklist

Procedure
• Preparing Youth:
  1. Group the youth into teams of two.
  2. Provide a camera for each team with their names taped or written on it in a font that is fun for the youth.
  3. Have the youth tape the Photo Activity Checklist to their camera.

• Conducting the Activity:
  1. Instruct the youth to check off each feature as they photograph it. The order of photos doesn’t matter. Tell them not to worry if they don’t think they got a good picture of any particular feature. For each feature, they should go to the place that comes to their mind—not what they think other people would think of, or what they think you want them to answer.
  
  2. The youth may want to include each other in the photos. They can stand next to the feature from the checklist and point to it.
**After the Activity:**
1. If you used disposable cameras, label each film envelope with the team’s name and send them off to be developed. (If possible, get double prints and give the youth copies of photos.)

5. **Photo Collage**

**Time Needed**
- Before meeting with youth: 30 minutes
- Activity: 1.5 hours

**Materials**
For each youth team:
- Newsprint
- Photos from the garden
- Pencils
- Markers
- Masking tape
- 3” x 3” post-its

**Procedure**
- **Before Meeting with Youth:**
  1. For each youth team, divide a 24” x 36” sheet of newsprint into 15 sections and label each section with an item from the Photo Activity Checklist. Label each sheet with the team members’ names and tape them on the wall, leaving room for youth to move around and observe the charts.

- **Conducting the Activity**
  1. Explain to the youth that the purpose of the photo workshop is to share their impressions about the garden and to learn what the other youth thought about the garden.

  2. Distribute to each team the envelopes with their developed photos. Then have the youth discuss with their partner where each photo should go on the newsprint, based on how they had earlier interpreted it in the garden.

  3. Using masking tape, have the youth tape their photos in the appropriate box on their newsprint, one photo per section. Have the youth write a short comment on the newsprint about why they believe that photo should be under that category.

4. Have the youth look at the photos taken by other youth. Using the post-its, have them write a short a comment on five key pictures that stood out for them from the other groups, and post them on the appropriate newsprint.

5. Guide the youth in a discussion of what they saw and experienced during the activity. Make notes on a separate sheet of newsprint about consistent observations from the garden (e.g., the garden as a social place or a lonely place).

6. Tell the youth that making observations is part of how landscape designers analyze a site. Designers take photos of key components of the garden that catch their attention and use those pictures when they are working in their studio to remind them of how they saw and felt about the garden.

6. **Sketching**

**Time Needed**
- Before meeting with youth: 15 minutes
- Preparation with youth: 20 minutes
- Activity in garden: 2 hours
- Discussion: 45 minutes

**Materials**
For each youth:
- Sketching paper (8.5” x 11” newsprint or acid-free sketch paper drawing pads are ideal)
- Sketching/drawing pencils (2B, 4B, 6B, 8B highly recommended, available at art supply stores)
- Clipboards
- Paper for notes
- Pencils

**Procedure**
- **Before Meeting with Youth:**
  1. Decide which concepts the youth need to go over from the Sketching Concepts Handout. If the youth are familiar with drawing/sketching techniques they can help out others who are new to drawing.
• Preparing the Youth:
1. Suggest a few quick exercises to help the youth learn about shadowing, texturizing, and letting loose their hand when sketching.

2. Discuss the different ways a designer can record information in the field, both visual and using words (e.g., photos, maps, sketching, and note taking). Explain that when they sketch, the youth should quickly jot down notes to capture the essence of the object being observed without getting into too much detail.

3. The sketching should focus primarily on plants, especially plants the youth are unfamiliar with, and on structures found in the garden (e.g., tool shed, shade structure, casita, bench). Explain to the youth that by sketching, they will add to the visual understanding of the garden they gained through taking photos.

• Conducting the Activity:
1. In groups of two-three, have the youth find a quiet spot that is not disruptive of any gardener and sketch a particular plant or structure in the garden.

2. Walk around and provide feedback to the youth on their sketches.

3. Have the youth show the drawings to the gardeners and ask them the names of the plants in English and in the gardeners’ native languages. Have the gardeners also explain culinary and medicinal uses and cultural significance of the plants.

4. Have the youth take notes on what they learn from the gardeners.

Garden Plan
In this series of activities youth create a plan for the garden based on what they learned through talking with the gardeners, measuring the garden, and photographing and sketching plants and other features in the garden. There are three parts to creating the plan, including the design charette, draft plan, and final master plan.

7. Design Charette

Time Needed
• Before meeting with youth: 30 minutes
• Activity: 90 minutes

Materials
For each youth team:
• Newsprint
• Base map of garden (24” x 36” recommended)
• Markers (different colors)
• Scissors
• Glue or tape
• Construction paper: green for different circular forms for trees, shrubs; brown for paths, planting boxes, structures; and blue for water features (ponds, fountain).

Procedure
• Before Meeting with Youth:
1. Prepare copies of the base map the youth made in Measuring the Site on 24” x 36” newsprint. Include existing objects that are relevant to designing a new garden on the site, and that cannot be removed (e.g., trees, plant beds, water sources). The youth will use the base map to make their initial site plan.

Conducting the Activity
1. Explain that the purpose of the design charette is to brainstorm ideas for the garden plan. Drawing from the ideas they brainstorm, the youth will come to a consensus on what is important for the garden plan.

2. If you are working in an existing garden, guide the youth in a discussion of what part of the garden they might help by developing a new design. Have them consider what needs to stay as is and what the gardeners have expressed an interest in or concern about. Provide some examples of the photos the youth took at the garden to highlight important elements, both positive and
negative, in the garden. Issues they might discuss include:
• unique cultural practices
• plant needs (e.g., water)
• needs of the gardeners, their children, and other visitors to the garden
• areas with poor soil
• non-cultivated areas of the garden
• areas that get lots of sunlight and areas that are shaded by buildings.

3. If you are working in a site that is not presently a garden, guide the youth in a discussion of what they might like to include in their garden. They should consider what needs to stay the same and what might be changed at the site, what gardeners find important, and the interests of potential users of the new garden (e.g., students and teachers for a school garden).

4. Create a poster of brief bullets that capture the essentials of what youth discuss and what you remember from previous discussions and observations.

5. Help the youth decide what aspect of the garden they will create a design for.

6. Divide the group into teams of four-five members. Provide each team with a manila envelope with construction paper, scissors, glue/tape, and markers. Have the teams label their envelope with the names of the members.

7. Have the teams brainstorm designs that might help the garden and the gardeners. In addition to drawing from what they learned in the garden, they can think back to ideas from previous exposure to different landscapes (e.g., schoolyards, parks, other gardens).

8. To create an initial site plan, have the youth mark-up their copy of the base map with their ideas and place the construction paper shapes on the map with text explaining the shapes. Their site plan should begin to come to life!

9. Have the youth glue or tape down the construction paper shapes on this initial site plan and label it with their names.

10. Allow youth to walk around to view each other’s site plans and to jot down notes about their observations.

11. Hold a discussion of the various design ideas.

8. Draft Plan

**Time required**
• Before meeting with youth: 30 minutes
• Activity: 4 hrs

**Materials**
For each youth:
• Engineering ruler (available in art store) or regular ruler
• Mechanical pencils (available in art store, provide a consistent line and are easily erased)
• T-square and triangle to enable youth to create angles and squares (available in art store)
• White erasers (erase without smudging, available through art store)
• Base map or 8” x 11” paper
• Transparency paper (e.g., tracing or other flimsy paper, 18” x 24” recommended, available through art store)
• Masking tape
• Newsprint (18” x 24” or 24” x 36”)

**Procedure**
• Before Meeting with Youth:
  1. Because it may be expensive to buy engineering rulers for each student, you may want to obtain one ruler and copy the scale (side of the ruler) the youth will use for the site plan. Then the youth can cut out the copied scale and tape it on top of an inexpensive ruler.

  2. Prepare copies of the base map the youth made in Measuring the Site on 24” x 36” newsprint. Include existing objects that are relevant to designing a new garden on the site, and that cannot be removed (e.g., trees, plant beds, water sources). The youth will use the base map to make their initial site plan.
**Conducting the Activity**

1. Help the youth become acquainted with the engineer scale. Each edge of the ruler has a scale showing feet per inch. This amount is usually a multiple of ten (e.g., 20' per 1", 30' per 1", etc.). So, using a 60 scale, 60 feet on the site would measure 1 inch on the site plan. If you are developing a plan for a smaller site, you can divide by 10 so that 6 feet on the ground = 1 inch.

2. If a base map drawn to scale is already available, help the youth become acquainted with the scale provided. Make them aware of actual measurements in the garden, such as the dimensions of walkways, planting beds, and benches. Have them sketch these items using the scale chosen. If they are unfamiliar with scale, you may want to have them measure structures, sidewalks, etc. and then draw them to scale.

3. If a base map drawn to scale is not available, determine the perimeter of the garden, based on the measurements taken during Measuring the Site. Once the dimensions are sketched out on a regular 8.5" x 11" paper, help the youth choose a scale that captures the same dimensions to scale on a 18" x 24" or 24" x 36" sheet of paper. Use a T-square and triangle to achieve perfect 90 degree corners.

4. Tape a piece of tracing paper or other transparency, slightly smaller than the base map, onto the base map. Tape the base map to the table with masking tape.

5. Explain to the youth about line hierarchy. When drafting structures or walkways, the width of the line should reflect the thickness and importance of the structure. For example, a building will have the heaviest line since it is a solid and thick structure. A bench should be thinner than the building but thicker than a line for a walkway. To make thicker lines, press on the hand that holds the pencil.

6. Explain to the youth about shadows, which should vary from light to medium to dark, depending on the size or thickness of the structure and the way light falls on the plants and other objects.

7. Distribute the pencils, erasers, and paper necessary to begin tracing the site plan onto the transparency. Instruct the youth to create the site plan from the initial plan they made in the design charrette.

8. Youth should roughly, and very lightly, lay out on the site plan transparency the major components from their design charrette. This may include new pathways, beds, gathering areas, and other features.

9. Next youth should draw the structures and pathways to scale using their scale ruler, never forgetting to keep track of what scale they are using.

10. Instruct the youth to cover the part of the plan they are not working on with paper to prevent smudging.

11. Instruct the youth to distinguish between different types of plants by using different textures (see Sketching).

12. Throughout the activity, remind the youth about line hierarchy and the use of shadows.

13. Ask youth to clean up and erase any smudges and messy lines on their site plan.

14. Youth should make a neat and accurate border around their plan by using their triangles and t-square making a perfect 90 degree square.

15. Instruct the youth to leave enough room at the bottom of their site plan to put the title of the project (in the middle), the name of the youth organization and date (in the left bottom corner), and the scale that was used along with an arrow showing
North (bottom right corner). Youth can either type or neatly print out the text, making sure they keep their writing consistent.

16. Youth should label objects and structures in the garden, small enough as to not distract from the line hierarchy of the plan, but consistent with the importance of the object or structure.

17. The text for the site plan title should be the boldest, the name and scale should be less bold, and the text inside the plan should be smaller and not distract from the lines. Text should always face the same way.

18. Collect the site plans taped over the base maps and have them copied onto bond paper, which is more professional and lasts longer than newsprint. Youth can keep the original black and white drafts.

9. Master Plan
In this activity, the youth will complete their site plans, including a master plan, sketches, maps, and written notes. They will then be ready to present their plans to the gardeners and other interested people.

Time Required
• Before meeting with youth: 30 minutes
• Conducting the Activity: 2-4 hours

Materials
For each youth:
• Their own draft site plan, copied onto bond paper
• Coloring media (green colors are popular for gardens): soft pastel (soft visual effect), oil pastel (bold visual effect), colored pencils (detailed visual effect), watercolors (romantic visual effect)
• Fixative or hair spray if using soft pastels
• Foam board the size of the plan (may need cutting blade to cut foam board)
• Adhesive spray

Procedure
• Before Meeting with Youth:
  1. Using a sharp, strong cutting blade, prepare foam board the same size as site plans.

• Conducting the Activity
  1. Remind youth that the purpose of the master plan is to present a visual image of the garden to the gardeners and other interested people.

  2. Introduce youth to the different media and allow them to experiment and choose the media that best suit them. If available, show the youth plans using different media.

  3. Go over drawing concepts, including:
    • Shadowing
      Which side sun is coming from; south side gets the most light; north gets darker colors due to shadowing; distinction between light, medium, and dark colors; transition from very light colors to very dark/shadowy colors.
    • Color scheme
      No more than 4-6 colors should be used on a plan; more colors make the drawing “muddy;” mix and match colors to create new colors.
    • Mix-match media
      Use color pencils to highlight detail on pastel work; use pencil to highlight detail in any medium.
    • Neatness
      Keep the site plan clean at all times by putting scratch paper on top of area that is not being drawn.
    • Boldness
      Use bold colors to highlight important parts of plan through pressure on the pencil, color pastel, and using more detail and shadows.

  4. Distribute the youth’s site plans copied onto bond paper and have them complete the master plan using the various media. Provide enough scratch-paper to cover portions of the site plan they are not working on and to test the media as they go along.

  5. Ask youth to erase any accidental smudges.
6. For youth who used soft pastel, have them spray fixative on the plan to prevent fading and smudges. Hair spray also works but is heavier and smellier.

7. Pass out the foam boards and help youth glue their master plan down with the adhesive spray, following instructions on the can. Spray the adhesive onto the board first and then beginning at one side, slowly and carefully attach the master plan, making sure that no air bubbles appear.

8. Set up an appointment to meet with the gardeners and other interested individuals for a final presentation of the design project.

Photo Activity Checklist

Small font for taping on camera
1. A place to rest
2. A place where you would like to hang out
3. A place to talk with others
4. A lonely place
5. A place to play games (for example, cards, horseshoes)
6. An exciting place
7. A place where you would like to walk
8. A beautiful place
9. An ugly place
10. A boring place
11. An unsafe or stressful place
12. A safe, peaceful place

Larger font for cutting out and putting on newsprint
1. A place to rest
2. A place where you would like to hang out
3. A place to talk with others
4. A place to play games (for example, cards, horseshoes)
5. A lonely place
6. An exciting place
7. A place where you would like to walk
8. A beautiful place
9. An ugly place
10. A boring place
11. An unsafe or stressful place
12. A safe, peaceful place


Sketching Concepts Handout

If lines give structure and content to a drawing, then it is light, shade and shadow that make a drawing come alive. DaVinci advised: “You who draw from nature, look carefully at the extent, the degree and the form of the lights and shadows.” Tone and shadow breathe life into a landscape drawing while giving it depth and atmosphere. Landscape drawings are usually a combination of line and tone (Sullivan, 1997).

Tone
Tone refers to light and dark in a drawing. You can integrate light and dark to create a range of tones. To produce tone with a pencil or charcoal, place the strokes close together to create subtle, smooth, even gradations. With pen and ink, you apply light parallel and cross-hatched lines.

Hatching
Hatching refers to short parallel lines repeated in patterns. You can make tones appear light or dark by changing the variety and spacing (tight or loose) of the hatching. For added character, you can curve the hatch lines slightly or place them at different angles.

Cross-Hatching
Cross-hatching is a variation of hatching, but can produce a wider range of tones. To create cross-hatching, draw a series of short parallel lines. Then draw a series of lines on top of and at right angles to your first set of lines. Keep repeating this process by overlapping the hatched lines at a slightly different angle each time until you produce almost total blackness.

Light
Before beginning a drawing always note where the light is coming from.
Exploiting the light will illuminate your landscape drawing and make it appear three-dimensional. Work out the composition of your drawing using light lines, starting with the light areas and then adding the shade. The source and the quality of the light will affect your gray tones.

**Shadow**
The area of an object opposite the light source is shaded. The cast shadow generally appears darker than the shaded side of the object, and the shadow is darkest along its leading edge. The shadow also will reflect the form of the object that is casting the shadow.

**Texture**
The landscape contains an endless variety of textures. You may want to look at some famous paintings, such as those by Vincent Van Gogh, to get an idea of how a landscape artist can create an amazing array of textures. Every element in the landscape has texture, and you should reflect these unique textures in the drawing to give each element a separate identity. At the same time, develop a textural style that unifies the picture and avoids “chaos” in the drawing. Shadows reflect the various textures of the landscape upon which they are cast. Texture is more than just pattern—it is lively, interwoven lines that remind the viewer of the sense of touch and stimulate the imagination.

Garden Enhancement
Action Projects

In the Garden Enhancement Action Project, youth make improvements or build something for the garden. For example, youth can construct raised beds or a compost system. Or they might want to help gardeners repair or paint a fence. The youth should ask the gardeners questions about what is needed in the garden during the *i-n-science investigations*. They should then use this information to decide what to build or improve as part of their Action Project. Although the examples here come from community gardens, you should be able to adapt them for home or school garden or other youth programs.

**Ideas for Garden Enhancement Action Projects**

- Build a compost system
- Construct a bench
- Paint a picnic table or a fence
- Build a water collection system
- Arrange for mulch to be donated and delivered to the garden
- Paint a mural along a fence
- Organize and participate in a day where youth help gardeners weed their plots
- Create and put up interpretive signs
- Plant flowers
- Build a raised bed
- Plant flowers
Example Projects
Following are example Garden Enhancement Action Projects. Our intent here is to give you a range of possibilities, which we hope will prove useful as you help the youth develop their own project.

**Raised Beds**
During the *im-science investigations*, the youth learn that the garden needs a wheelchair accessible raised bed. (Such a bed would need to be higher than the beds currently in the garden.) The youth ask the garden manager if they could meet with other gardeners and talk about ideas for the new bed. To prepare for their meeting, the youth read the Raised Beds Science Page and talk with an occupational therapist to learn about needs of people in wheel chairs. They also spend time observing in the garden to see what location might be best for the new bed. They make several phone calls to local hardware stores to figure out the cost of supplies. They then develop a design for the bed and present it to the gardeners and explain the different materials that could be used and their costs. They ask the gardeners to help them select which materials and location would be best. The youth obtain the materials and supplies and organize a work day to construct the bed. The gardeners get soil delivered from the city parks department to fill the bed.

**Compost System**
During the *im-science investigations*, the youth observe that gardeners are throwing weeds and clippings into the trash. They also note that the soils are gray and appear to lack organic matter. They discuss with the gardeners the possibility of building a compost bin to recycle the weeds and clippings. They use the Composting Science Page to learn about the science behind composting, and the Internet to learn how to construct a compost pile. Then they contact a local “Master Composter” from Cooperative Extension to speak with their group and the gardeners about different types of compost systems. They work with the gardeners to build a compost system from scrap lumber. Finally, they create a poster for the gardeners about how to maintain the composting system.

**Mulch**
During the *im-science investigations*, the youth observe that one gardener is mulching his plots, and that his plants seem to be healthier during hot, dry weather. The youth talk with the other gardeners and learn that they also would like to mulch their plots, but have not been able to find a source of mulch. The youth become familiar with different kinds of mulching through reading the Mulch Science Page. Next they contact a local greening organization that works with community gardens and ask them to help locate a source of mulch. It turns out that mulch is available through the Parks Department and the greening organization will deliver it. The youth organize a garden workday with other youth from the neighborhood. They help the gardeners to haul and spread the mulch in their plots.
**Watering System**

During the *i+m-science investigations*, the youth observe that the gardeners do not have access to the city water supply and obtain water from barrels located throughout the garden. The barrels get filled by rainwater, and so are empty during dry spells. They talk with an urban gardening expert to learn more about different types of systems used by gardeners to collect water. They notice that the casita in the garden has a sizable metal roof and might be perfect for collecting rain water. They discuss their ideas with the gardeners and present several options for constructing a rainwater collection system. Finally they help the gardeners obtain the materials and organize a workday to build the collection system.

**Interpretive Signs**

During the *i+m-science investigations*, the youth note that children’s groups often visit the garden. They also observe that, due to their limited ability to speak English, the gardeners have a difficult time talking to the youth about their plants and planting practices. The youth ask the gardeners if they might work together to create interpretive signs for children visiting the garden. They talk with the gardeners about what would be the most important things they want the children to learn. They then use the appropriate Science Pages to learn more about the garden plants and practices, and laminate appropriate color Science Pages for posting in the garden. They also develop some of their own signs for the garden.

**Plant Flowers**

During the *i+m-science investigations*, the youth observe that on both sides of the entrance to the garden, there is a section of bare dirt that is at times dusty or muddy. They notice another garden during their Neighborhood Exploration that has a beautiful flower bed planted along the fence. They talk with the gardeners about putting in a flower bed on both sides of the entrance. The gardeners are interested and take a walk with the youth to observe the flower bed at the other garden. The youth obtain seeds through a local greening organization and then plant the flower bed with the gardeners.

**Create a Mural**

During the Community Garden Inventory, the youth observe that the fence on the side of the garden is covered with flaking paint and old graffiti. They talk with the gardeners about creating a mural and secure permission from the property owner to paint on the fence. The youth next search the Garden Mosaics website for photos of other community gardens with murals. They also look at Science Pages that are of interest to them to get ideas for garden science concepts that might be displayed on a mural. They then contact a local artist and art teacher to help them work with the gardeners to sketch out a plan for the mural. Finally, they hold a mural day during which the youth and gardeners paint the pictures on the fence.
Garden Research Action Projects

In the Garden Research Action Project, youth conduct research to answer a question that the gardeners or youth raise during the *i*nternational *m*-science investigations. You can help the youth decide which questions and methods are best, given the gardeners’ interests, and time and other constraints of your program. The focus of the Garden Research Action Projects can be on plants, soils, water, light, or insects or other animals in the garden. Although the examples come from community gardens, you should be able to adapt them for home or school garden or other youth programs.

Youth can conduct observations, take measurements, or learn from other scientists to answer any number of questions. Alternatively, they may want to conduct a longer-term research project involving an experiment. Experimental research usually incorporates the three other types of research.

Types of Garden Research Action Projects

- **Learn From Other Scientists**
  - Contact a local expert or conduct an Internet or library search.
- **Measurements**
  - Take measurements of soils or plants.
- **Observations**
  - Make observations of plant growth in relation to the environment and formulate preliminary hypotheses that could be tested by an experiment.
- **Experiments**
  - Conduct a controlled experiment to test the effect of one factor on plant growth.

Often an experiment begins with observations in a garden. For example, youth may observe that collard plants growing in the shade seem to have fewer leaves than collards growing in the sun. This may lead to a question that the youth want to investigate further: What is the effect of sunlight on growth of collards? The youth may form a hypothesis: Collards growing in the sun are more productive than collards growing in the shade. The first step in testing their hypothesis would be to conduct background research, or learn from what other scientists have already discovered. This can be done either by talking with scientists or reading about their work, often on university or government agency websites. Based on what they learn from other scientists, the youth may want to refine their question and hypothesis. They likely also will learn about methods for testing their hypothesis. Conducting the experiment can involve taking measurements and making additional observations.
If they are conducting research on a practice the gardeners are using, the youth need to be aware of issues related to gardener knowledge and scientific knowledge. Gardeners generally use practices that they feel give desired results, but there may not be any scientific research to back their claims. For example, many gardeners use companion planting to reduce pests, but there is little research that shows this is effective. The youth need to be aware that experiments conducted under controlled conditions are one form of knowledge, but that the knowledge of gardeners based on many years of experience is also important. You will need to work with the youth so they present their research results but also are respectful of the gardeners' knowledge. The youth should also be open to further research where their results may conflict with what the gardeners believe is true from experience.

**Example Projects**

Following are examples of each of the types of Garden Research Action Projects. Our intent here is to give you a range of possibilities, using different research methods and resulting in different actions. We hope these examples prove useful as you help youth develop their own project.
**Learning from other Scientists**

Youth can use the Internet or library to research a question that comes up during the *i-m-science investigations*. They should be aware of the source of information on the Internet. If a website is developed by university or government scientists, you can generally count on the scientific information being accurate. Commercial and other websites sometimes promote a product or point of view rather than present unbiased information.

**Example Learning from other Scientists Project: Insecticide Safety**

During the *i-m-science investigations*, the gardeners express concern about the safety of an insecticide they are using. The youth decide to research the question: “What are the safety risks of this insecticide?” They decide to use the Internet and local experts to answer their research question. They search for sites describing the pesticide and its risks, and compile information from university and government websites. They next ask an entomologist to come to the garden to discuss insecticide uses and risks. They present their results in a poster for the gardeners. They also laminate the poster and post it along the fence in the garden for others to read, and report their results to the Garden Mosaics website using the online Action Project Form.

**Ideas for “Learning from other Scientists” Action Projects**

- What are the health risks of a pesticide used by the gardeners?
- How do farmers and gardeners in other cities grow taro?
- What lead levels in soil are dangerous to children?
- Are marigolds effective in protecting plants from soil insects?
- What varieties of trees grow well in urban gardens?
- Does using treated lumber in raised beds contaminate the soil?
- What varieties of collards are resistant to whiteflies?
- How do the “beneficial” insects attracted to cilantro benefit other plants?
Measurements

Some questions can be answered by taking measurements on soil or plant samples. Whenever youth take measurements, they need to decide where and when to sample. This is because the plants and soils may vary depending on where they are in the garden. The research question should guide decisions about where and when to sample. For example, if the gardeners want to know whether lead is a problem in soils, the youth would need to ask if they are concerned about soils only in the plots with vegetables or also where flowers and other ornamentals are grown.

In some cases, the youth may collect samples and send them to a lab for testing. For example, youth could measure plant height or soil pH, but they will need to send plant or soil samples to the lab to be tested for lead or other contaminants. Check university and other website guidelines for collecting and sending in samples, and for costs associated with different analyses.

Example Measurements Project: Soil Percolation

During the i-m-science investigations, the youth observe that the soils look very hard and that water seems to collect on top of the soils. They decide on their research question: “How fast does water move in soils in each plot in the garden and in the paths between the plots?” They next read the Water in the Garden and Watering Garden Plants Science Pages to gain background understanding for their research. They discuss their question with the gardeners to get their input and to explain what they will do. They use the “Soil Perc” test to measure the soils in each plot and along the paths (see Try This, Water in the Garden Science Page). They discover that water percolates very slowly in some plots, so they contact their Cooperative Extension agent to learn how to reduce soil compaction. The youth and gardeners conduct a workshop for other gardeners to share the results, demonstrate the Soil Perc test, and discuss ways to enhance water movement in soils. They also send photos of their project and report their results to the Garden Mosaics website using the online Action Project Form.

Ideas for “Measurements” Action Projects

- How fast does water move through the soil?
- What is the texture of the soil?
- How much rain did we get each week during the summer?
- How tall do the sunflower plants grow?
- How many tomatoes are produced on one plant?
- What is the maximum and minimum temperature each day?
- What is the lead level of the soil?
- How many hours a day are the garden plots in the sun?
Observations
Youth can conduct observations in the garden and compile them into reports that are useful to the gardeners.

Example Observations Project: Plant List
The youth realize that the Hmong gardeners use names for insects in their own language but aren’t always familiar with the English names. The youth decide to answer the question: “What are the English and Hmong names of all the plants in the garden?” Working with the gardeners and a horticulturalist from a nearby university, the youth observe and compile a list of the plants growing in each plot. They also take photos of each plant they observe. Throughout the observations, they refer to the Science Pages to learn more about the plants. They then develop a table of the English and Hmong names of each plant. They create a poster with the names and a photograph of each plant and present it to the gardeners. They also add their plant list to the Community Garden Inventory Form that they submitted to the Garden Mosaics website. Finally, they report their results, including photos, to the Garden Mosaics website using the online Action Project Form.

Ideas for “Observations” Action Projects

- What insects feed on leaves of plants in the garden?
- What insects pollinate flowers in the garden?
- What plants are wilted on hot, dry days?
- What vegetable are commonly found in the garden?
- What medicinal herbs are found in the garden?
- What plant diseases are found in the garden?
- What different methods do gardeners use to control weeds?
- What weeds are present in the garden?
- What plants do birds visit in the garden?
Experiments

Experiments usually involve all three research methods we have discussed so far: learning from other scientists, taking measurements, and making observations. Youth conducting experiments define a hypothesis in addition to defining a research question. The hypothesis makes a prediction about what the results will show. For example, youth in Chicago may hypothesize that a variety of a plant developed for northern climates will grow better than a variety developed for the south.

When conducting an experiment, the youth should vary only one factor at a time. For example, if they test two varieties of a plant, the only factor they should vary is the plant variety. (The plant variety is called the “treatment.”) Everything else, including soils, watering, and light, should be kept the same for both varieties. If two or more factors are varied at the same time (e.g., amount of fertilizer and plant variety), then it will be very difficult to say which factor caused any differences in plant growth.

Ideas for “Experiments” Action Projects

- What is the effect of mulch on growth of weeds?
- Does corn grow more rapidly when planted with beans?
- What is the effect of adding compost to soil on soil drainage?
- What variety of chili peppers produces the most chiles?
- Does weeding result in larger eggplants?
- Does planting marigolds around the edge of a raised bed reduce insect damage to kale?
- Is hot pepper solution effective in controlling insects?
- Does applying manure result in larger bitter melons?

It is much easier to control all factors except for the “treatment” in a greenhouse than in a garden. For example, when comparing plant growth in two different plots in a garden, it may be impossible to find plots that receive exactly the same amount of sunlight. Youth will need to find plots as similar as possible, and consider the possible effect of any factors they can’t control when interpreting their results.
**Example Experiments Project: Use of Homemade Sprays to Deter Insects**

During the *i-m* -science investigations, youth learn that gardeners use a homemade soap spray to deter insects on amaranth. The youth define their research question: “Is the soap spray effective in controlling insects on amaranth?” They use the Controlling Insects and Conducting an Experiment Science Pages to gather background information. They then ask the gardener if they can conduct a controlled experiment in the garden. They decide what measurements they will take (e.g., number of insects observed during 15 minutes in the morning and afternoon five days/week over a two-week period, number of leaves with insect damage). They create a data form for taking the measurements. They also choose two plots with amaranth, making sure that other factors (soil, sunlight, water) are the same for both plots. The youth next apply soap solution to amaranth in one plot and leave the amaranth in the other plot alone. They record the number of insects they observe and the amount of damage done to the leaves in both plots. To analyze their results, the youth average the measurements for each plot. They then summarize the results by making bar graphs of the average number of insects and average number of leaves with insect damage for each treatment (plants sprayed and not sprayed). In presenting the results to the gardeners, the youth are sensitive to the fact that if their results do not show an effect of the soap solution, this does not necessarily mean the gardeners are wrong in all cases. The educator leads the youth in a discussion of what other factors might affect their results (e.g., unusually dry or wet weather), and of the importance of years of experience versus an experiment. The educator asks the youth how they might conduct further research to determine the effectiveness of the spray. They report their results, including photos, to the Garden Mosaics website using the online Action Project Form.
Land Use Action Projects

In the Land Use Action Project, youth learn about the relationship of people to land in their neighborhood. For example, the youth may meet with a city planner, survey vacant lots, or create a Green Map™ of the neighborhood. Or they might learn about threats to green spaces and gardens and conduct a campaign to support community gardens. The youth’s interactions with the gardeners and their observations of the neighborhood during the i-m-science investigations will help them define their Land Use Action Project. Although the examples here come from community gardens, you should be able to adapt them for home or school garden or other youth programs.

Ideas for Land Use Action Projects

- Create a Green Map of your neighborhood
- Inventory multiple gardens and submit the data to the Community Garden Inventory
- Make a presentation to government officials about the importance of community gardens to neighborhoods
- Write a letter to local politicians about the need to preserve and create new community gardens
- Organize a garden celebration and invite local politicians
Example Projects

Following are example Land Use Action Projects. Our intent here is to give you a range of possibilities, which we hope will prove useful as you help the youth develop their own project.

**Inventory Multiple Gardens**

The youth have conducted the Community Garden Inventory *i-m-science investigation* and submitted their data online. They are aware that many community gardens in the neighborhood have not been added to the inventory. They decide to conduct the Community Garden Inventory and submit the data for all the gardens in the neighborhood. They work with Garden Mosaics to also post the data on the website for their youth organization.

**Create a Green Map™**

During the Neighborhood Exploration, youth observe the variety of ways that people use space in the neighborhood. They think it would be interesting to create a map of the neighborhood that would be a guide for residents and visitors, as well as a tool for influencing policy makers. They use the Aerial Photographs and Topographic Maps Science Pages to learn more about land use. They visit the Green Map™ website ([www.greenmap.org](http://www.greenmap.org)) and learn about how other youth have mapped their community. After discussion and reviewing a street map, they establish the boundaries of their map. They next break into teams to look for the different types of places identified on Green Maps™, including farmers’ markets, parks, public and community gardens, recreation areas, and pollution sources. When their map is complete, they make copies and distribute them to the gardeners, community members, and local officials.

**Garden History**

Youth learn from the garden manager that the garden is on the site of a former parking lot. The youth are amazed that what was once a barren landscape is now a thriving vegetable and flower garden. They realize however, that because of polluted soils, the gardeners must grow their plants in raised beds with soil that is delivered to the site. This story inspires them to further investigate the history of the land on which the garden now grows. Through contacting the local historical society and the city records office, and through conversations with elderly gardeners and neighborhood residents, the youth are able to create a timeline of the garden site history. They incorporate various photographs and airphotos from different time periods into the timeline. They present and discuss their findings with the gardeners and interested community members.

**Garden Open House**

Several of the youth live near the garden. Before participating in Garden Mosaics, they didn’t realize that there was a place like this in their community. They suggest to the gardeners hosting a garden open house or neighborhood block party as a way to introduce the garden to more neighborhood residents. The gardeners agree that this would be a nice way to tell community members that they are welcome to visit the garden and share its beauty. Also, the gardeners feel that vandalism would decrease if more neighborhood residents were aware of the garden and helping to keep an eye on it. The youth and gardeners discuss plans for the event with several neighborhood leaders and the youth offer to help advertise and organize the event. They invite friends and family to the garden block party and share what they’ve learned about the garden with the broader community.
Meet with a City Planner
On their walk around the neighborhood, the youth become aware of the lack of green spaces, such as parks, gardens, and tree-lined walkways. They discuss questions with their group leaders: What are other sections of the city like? Who decides where parks are located? Who decides where trees are planted? The group leader suggests that they talk with a city planner to learn more about green space in their city and about why the city ends up looking the way it does. During their meeting with the planner the youth learn a lot about green spaces and the urban development process. They also learn that the planner is very interested in having meetings with residents from different parts of the city and learning more about community gardens. The planner visits the garden to meet with the gardeners and everyone learns from each other.

Create a Plan for Vacant Lots
Visiting the garden, and learning about the history of the community gardening movement, inspires the youth to think about how vacant lots could have other uses. They decide to survey the neighborhood’s vacant lots and come up with plans for how these lots might be used. They call a city planner who is very interested in hearing their plans and who will help them organize an event where they share their ideas with local officials. The planner explains how some lots are owned by the city and others by absentee landlords. He also tells the youth that the city has to pay several hundred dollars a year to maintain one vacant lot. Some of the city-owned lots might be available for lease by people interested in starting gardens. The planner shares with the youth the latest map showing the location of vacant lots. The youth next “ground truth” the map, adding any new vacant lots and indicating former vacant lots that now are community gardens or that have been developed. They present the updated map to the planner, and arrange for a meeting of the planner with gardeners, other neighborhood residents, and local officials to discuss the future of the lots.

Support Community Gardens
The group leader arranges for the youth to meet with a Cooperative Extension educator who works with community gardens. The educator takes the youth on a tour of gardens and the youth meet with several gardeners. During the tour, the youth learn about the problems gardeners face, such as lack of funding for supplies and the need for more garden plots. The youth are inspired by their tour and ask how they could support community gardens in the city. The educator makes suggestions about organizations that help with supplies and creating new gardens. The youth contact these organizations and arrange for a meeting between their staff and the gardeners to discuss the gardeners’ needs.
Nutrition and Health Action Projects

In the Nutrition and Health Action Project, youth carry out an activity to promote good nutrition and health related to the garden. For example, they could host a banquet, develop a recipe book, create interpretive signs, research a health issue, or host a health and nutrition educational event. They can use what they learn during the *i-m-science investigations* to help decide the specifics of their Action Project. Although the examples here come from community gardens, you should be able to adapt them for home or school garden or other youth programs.

Ideas for Nutrition and Health Action Projects

- **Hold a banquet using dishes prepared with vegetables from the garden**
- **Host a barbecue in the garden for elders from the neighborhood**
- **Create a poster about diet and health and laminate it for display in the garden**
- **Use the Internet to find out more about the nutritional value of plants in the garden**
- **Invite a Cooperative Extension agent to the garden to speak about diet and disease**
- **Make a cookbook from gardeners' recipes**
- **Present a workshop on the health benefits of vegetables for elders or children**
Example Projects
Following are several example Nutrition and Health Action Projects. Our intent here is to give you a range of possibilities, which we hope will prove useful as you help the youth develop their own project.

Garden Banquet
Youth learn during their *i-m-science investigations* that the gardeners will be celebrating the fifth anniversary of the founding of the garden. They plan a banquet for the gardeners and their families, using produce from the garden. The youth and gardeners do the cooking for the banquet.

Recipe Book
Youth learn during the *i-m-science investigations* about the ways in which the gardeners use their plants in cooking. They work with the gardeners and a nutritionist from Cooperative Extension to create a cookbook. The cookbook includes not only the recipes but also their nutritional and health value. The youth sell copies of the cookbook to earn money for the garden.

Interpretive Signs
Youth create interpretive signs focusing on the plants they learn about from the gardeners. They use the plant Science Pages, the Internet, and interviews with the gardeners to learn about the nutritional and medicinal value of the plants.

Educational Event
The youth make observations of health issues facing the gardeners, children, and other members of the community. They also express their own health concerns (e.g., weight, diabetes). They talk to a community nutritionist to learn more about their concerns. They then organize a Health Day at the garden, where they invite local health and nutrition organizations to set up booths to educate community members.

Research a Health Issue
Youth use the Internet or library to research a question about cancer and diet that comes up during their *i-m-science investigations*. They use websites developed by university scientists to ensure that the scientific information is accurate. They synthesize what they learn into a poster or PowerPoint presentation for the gardeners.
Action Project Planning Form

1. What is your goal for the project? (What do you hope to accomplish or make?)

2. List the steps needed to reach your goal.

3. What background information do you need? Where will you find it?

4. What supplies do you need?

5. What will be each person’s role in your Action Project? (List each member of your group and what they will do.)

6. How will gardeners, scientists, and others be involved in your Action Project?

7. How will you present your project to the gardeners and other community members?
Lesson Nine: Let’s Celebrate Our Garden Harvest!

For May/June

“How do You Harvest Garden Produce” from GROWING IN THE GARDEN: LOCAL FOODS AND HEALTHY LIVING, Iowa State University Extension and Outreach; “Healthy Harvest Celebration” from GROWING HEALTHY KIDS, Oregon State University.

How do you know when a crop is ready to harvest? What are the consequences of harvesting too early or too late? Where should picked vegetables be stored to retain their freshness? Students will learn about harvesting vegetables from the garden. They plan a healthy meal using MyPlate, sing and dance about the garden, and make a plant part salad. Did students start Action projects? They can finish them up and report on the projects after the garden is harvested.

Content objectives: Describe the importance of eating fruits and vegetables; Review fruits and vegetables they eat; Recognize when plants are ready for harvest.

Life Skill objectives: Healthy lifestyle choices, Critical thinking, Communication, Citizenship, Leadership, Decision making

Core and STEM concepts and skills:
Science Science as inquiry, Earth and space, Life science
Math Numbers, Measurement and data
Language Arts Vocabulary, Speaking, Listening, Viewing

Healthy snack: Plant Part Salad

Additional and supporting resources: Cooperative Extension Master Gardener’s Program can be a resource for garden information.
**LESSON PLANS FOR 2012-13 SCHOOL YEAR, GRADE 3**

**May/June:** Let’s celebrate our garden harvest!

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Posters and Flash Card:
MyPlate Garden Poster, the Plant Part poster and the Growing Healthy Kids (GHK)
Vegetable Flash Cards are in a separate files on the Educational Toolkit website.
BEFORE THE LESSON

1. Grade 3, May/June: Healthy Harvest Celebration, 2012-13 School Year
This document contains all the curriculum items and resources you need for this lesson. All lesson downloads are located on the www.peoplesgarden.wsu.edu Educational Toolkit. Please read through everything well in advance of delivering this lesson.

Food Safety Tips for School Gardens, excerpted from United States Department of Agriculture
Harvesting and Storing Vegetables, Iowa State University Extension and Outreach
Please read and use these resources as guides to tell you when and how to harvest the crops from your school garden. If the students and their families have a garden or would like to start a garden, you may copy these resources to send home with the students. Please continue with your gardening through the end of the school year. Work with your Extension Educator to finalize plans for the garden during the summer, and make plans for next year.

3. Garden Journal
Have students complete any items for their garden journal.


THE LESSON
You may want to spread your Harvest Celebration over several days.
Overview:
1. Healthy Meal Activity: Students will work with a partner to create a healthy meal, by drawing foods from the MyPlate Garden Poster on a paper plate.
2. Roots, Stems and Leaves Song: Students will sing and dance to a song that reinforces the concept of edible plant parts.
3. Be a Food Adventurer: Adjectives, Plant Part Salad Recipe: Students will help make and will be offered an opportunity to try a healthy recipe. They’ll try this snack with at least one of their senses, and will report their experience using adjectives.
4. People’s Garden Sessions: Students reflect on what they have learned in the People’s Garden program, and receive a wristband with a healthy message.
5. Optional: Harvest Party. Consider inviting guests to your Healthy Harvest Celebration. Have students brainstorm who to invite, and what to show them. If parents or other school administrators are attending, they can participate in the lesson by joining in the song, helping students prepare the salad, and tasting the recipe. Consider offering a garden tour.
Harvesting is one of the nicest chores of the season. If you follow a few important, but easy tips, you will get the most of your crops. Some crops (e.g. carrots) only provide one harvest, while other crops (e.g. lettuce) can provide multiple harvests. If possible, harvest early in the morning, after the dew dries, but before the heat of the day.

**LEAFY GREENS – Lettuce & the Brassica Family (including Spinach, Kale, Chard, Collards, Asian Greens, Mustards)**

To harvest at peak flavor and freshness, harvest young greens when they are just a few inches long. At this stage all greens are tender and delicious eaten raw in a salad. These are called “baby greens”. Pick the largest, outside, leaves first while leaving the smaller and younger inside leaves for harvesting in a week or two. If possible, eat your greens the same day you pick them. Larger leaves, 6-12” long, are less tender and are best for cooking. Remember that greens cook down; plan about 6 cups of greens for 4 usual servings. Always wash garden greens carefully before eating or cooking to remove dirt and small insects.

*Tip:* Snip (with scissors or skilled fingers) the greens about ½-1” above the base of the plant to encourage new growth. Harvesting this way will allow you to get 3-5 cuttings of lettuce and spinach and even more from kale, chard and other hardier greens.

*Note on Lettuce:* If you planted head lettuce and prefer to harvest an entire head, wait until the entire lettuce plant is about softball - melon size and looks like the shape of head lettuce, as you know it. Don’t wait too long though - Growing head lettuce rather than harvesting baby greens often allows more time for pests and diseases to attack the crop.

**LEGUMES – Peas, Snow Peas, Beans**

Harvest peas with 2 hands, holding the vine with one hand while snipping the entire pod off the vine with your other hand. Harvest when fully mature, about 2” long for peas and 4” long for beans, depending on the variety planted. Harvesting encourages new growth, so be sure to pick off over-ripe pods you may have missed earlier on. Continue to harvest from the same vines as the legume ripens.

**Simple Greens Recipe**

- Wash and dry greens and cut larger leaves into pieces about 3 inches long.
- Heat a bit of olive oil in pan with a clove of chopped garlic or a few tablespoons of chopped onion. Cook 2-3 minutes.
- Add greens and a dash of water. You may keep the greens plain or drizzle with a dash of soy sauce or balsamic vinegar.
  Cook 3-4 minutes until softened.
- Remove from heat, place into bowl. Sprinkle with slivered almonds, sunflowers seeds and dried cranberries, or chives chopped chives from your garden.
  Serve cold or warm.
Peas and young beans can be eaten raw, added to salads, or lightly steamed or sautéed.

**CUCUMBERS & SQUASH (CUCURBIT FAMILY)**
Harvest cucumbers as they ripen to the desired size. For pickling, fruits should be 4 to 5 inches long, for eating fresh; most varieties grow to 7-8 inches long. Cucumbers will develop a bitter taste if they are allowed to over-ripen. (Note: Some varieties such as European or Dutch cucumbers can grow much longer. This is another reason why clear labeling of the plants in the ground is useful.)

To ensure cucumber vines continue to produce heavily all season long, it’s best to harvest daily to prevent them from becoming overgrown.

Even though huge zucchini squash are impressive, they will be more flavorful if they are picked when they are smaller.

**Tip:** Use a sharp knife or pair of scissors when harvesting, and leave a short length of stem on each fruit.

**ROOTS—Carrot, Beets, Radish, Potato**
It can be difficult to determine if root crops are full grown and ready to harvest because they grow underneath the soil. You may recall, most seed packets will tell you how many “Days to Harvest”. This is the number of days it takes from planting to harvesting. If you can keep track of when you planted the seeds (maybe you wrote it down in the garden journal or it’s listed on the label that next to the plant in the ground), you’ll know about when they are ready. That said visual clues are always helpful. Roots start to lift themselves up out of the ground a bit as they develop. You’ll see radishes, beets and carrots creep a bit (< 1/4 inch) above the soil giving you a clue about how wide they are getting.

**Tip:** Radishes and beets are easy to pull out of the ground whole. Carrots often break off, leaving half of that sweet orange snack for the worms. To harvest them whole, use a digging fork to loosen the soil around the root and pull it out at the base of the greens. For radishes and beets, grab the plant right at the base of the stem, loosen the root a bit by rocking it back and forth, and then pull. If the whole thing does not come up, gently use a digging fork as you would for carrots.

For potatoes, you can start gently digging for new potatoes once the plants start to bloom. Wash and cook new potatoes immediately, as they do not store well at all. If you are planning to harvest potatoes to store for a while, wait until the tops of the plants start to yellow and die back. Then gently dig around the perimeter of the plant and dig up the tubers. If you are...
planning on storing them, don't wash them! Let them sit out in a cool place for a few days to cure, then gently rub off any dirt, and store in a cool, dark place.

**FRUITS – Strawberries, Tomatoes, Peppers, Eggplant**
Similar to cucurbits, fruits like to be harvested when ripe and harvesting regularly encourages new production. Use a scissors or be very careful to snip eggplant and peppers from the stem without damaging the fruit. Leaving a small stem on the harvested fruit will help keep it ripe and ensure you don’t bruise it when harvested. Carefully pick tomatoes from the plant. For strawberries, grasp the stem just above the berry between the forefinger and the thumbnail and pull with a slight twisting motion. Carefully place the fruit into your containers.

**HERBS – Basil, parsley, mint, cilantro, oregano, rosemary, tarragon, sage, chives, lavender, thyme & more.**
Herbs are grown for their leaves, flower, roots or seed. Most commonly, culinary herbs are grown for their leaves and should be harvested before they flower. Flowering can cause the foliage to develop a bitter flavor. For example, while chives are quite attractive in bloom – and their flowers are edible and delicious – the stems tend to become tough and woody after bloom. Some general guidelines for harvesting herbs:

- Begin harvesting the herb when the plant has steadily been producing new growth. Harvesting generates the plant to continue to produce. Just be sure to leave enough leaves so the plant can continue to photosynthesize. Don’t be afraid to harvest. Up to 75% of the current season’s growth can be harvested at one time!
- Harvest herbs before flowering, otherwise, leaf production declines because the plant will put its energy towards flowering and producing seed to reproduce. *Tip:* Pick off flowers buds as you notice them develop.
- ‘Annual’ herbs (basil, cilantro, chives) will have to be planted each year. They have soft stems and can be harvested until frost. Perennial herbs (rosemary, lavender) have somewhat woody stems and can be clipped until about one month before the frost date.
“Healthy Gardens, Healthy Youth”
People’s Garden School Pilot Project

This project has been funded at least in part with Federal funds from the U.S. Department of Agriculture. The contents of this publication do not necessarily reflect the view or policies of the U.S. Department of Agriculture, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.
Food Safety Tips for School Gardens

Growing and Harvesting Produce
A school garden provides an opportunity for children and volunteers to learn about how to handle food safely. The following are some food safety tips to follow when growing and harvesting produce.

• Ensure that all persons, including staff, students, and volunteers receive basic food and gardening safety training instructions according to local health regulations. The following topics are recommended:
  ✔ Handwashing and personal hygiene
  ✔ Cleaning and sanitizing garden equipment and containers used to hold produce
  ✔ Handling produce during harvest, washing, and transportation
  ✔ Glove use
• Ensure that volunteers are covered by the school district insurance policy in the event of accident or injury.
• Require signed permission slips for all student gardeners. Permission slips should list potential hazards of working in a school garden and identify any allergies the child may have.
• Do not allow anyone to work in the garden while sick, or until 24 hours after symptoms, such as vomiting or diarrhea, have subsided.
• Ensure that all harvesters wash hands thoroughly in warm, soapy water for at least 10 to 15 seconds, and then rinse with potable water. Ensure that all open cuts or wounds on hands, arms, or legs are properly covered prior to participating in the harvest.
• Require harvesters to wear closed-toed shoes to prevent cuts, stings, or other injuries.
• Consider using single-use disposable gloves when harvesting, or handling, fresh produce as an extra precaution.
• Harvest the garden regularly and remove any rotten produce.
• Use cleaned and sanitized food grade containers, such as plastic bins or buckets, to hold harvested produce. Do not use garbage bags, garbage cans, and any container that originally held chemicals. These types of containers are made from materials that are not intended for food use.
• Clean harvesting tools, such as knives, scissors, etc., with soap and potable water immediately before and after each gardening session.

Using School Garden Produce in your School Meal Program
• Check with your local health department to ensure that local regulations permit food from gardens to be served as part of school meals.
• If the harvest from the school garden will be used in the school meals program, the school garden coordinator should work cooperatively with the school nutrition director to plan and implement the garden.
• Discuss food safety practices in the garden with school garden coordinators. Consider asking gardeners to document their practices. Use the information in this document as a guide to identify appropriate practices.
• Accept produce harvested from school gardens only when school nutrition staff is present to receive it. All produce dropped off or left when staff is not present should not be used in the school meal programs.
• See Best Practices: Handling Fresh Produce in Schools for guidelines on receiving, storage, preparation, and service of fresh produce in schools.
• Reject produce that does not meet school nutrition program standards.
• Receive and inspect produce harvested from school gardens according to the same procedures used to inspect produce from the district’s distributors.
• Do not use any produce that has been noticeably contaminated by animals or insects.
• Refrigerate garden produce immediately, unless the particular item is normally held at room temperature.
• Store, prepare, and serve school garden produce separately from other sources of produce to maintain traceability.
• Document service of school garden produce on the menu management/food production record. See Ensuring Traceability of Fresh Produce for more information.
• Ensure that liability for a potential foodborne illness caused by produce grown in school gardens is covered by your school district.
You may want to use the Harvesting and Storing Vegetables chart found at the end of this introduction as a quick guide for harvesting, cleaning and storing vegetables.

How do you know when a crop is ready to harvest? What are the consequences of harvesting too early or too late? Where should picked vegetables be stored to retain their freshness? These questions and others will be answered in the lessons in this unit. Here are some guiding tips.

WHEN AND HOW TO HARVEST
There is a difference between “mature” and “ripe” garden produce that determines when to harvest them. A mature fruit or vegetable is one that has reached a sufficient stage of development that, after harvesting, is or will be at the best stage to eat. A vegetable or fruit is ripe when it is at its prime edible state. For example, pears, bananas, and sometimes tomatoes are harvested when they are mature, yet they may still be green in color. A few days after harvest, they “ripen” to the stage at which we like to eat them.

Beginning gardeners and children often pick vegetables, such as peppers, eggplant, carrots, cucumbers and potatoes, before they have reached the best stage for harvest. At a small stage, these crops are technically mature, but harvesting them too early results in low yields and less to eat. There are some exceptions and it depends on how you are going to use them.

Early harvested, small potatoes – called “new potatoes” – are a tasty treat in early summer. Cucumbers are sometimes harvested early at a small size and used for pickles.

If you want a bell pepper for slicing or stuffing, it is best to wait to harvest it when it has reached its full size. A full-sized green tomato will ripen to red, orange, or yellow; and, if left on the plant, a full-sized green bell pepper will ripen into red, yellow, or even purple, depending on the variety.

Crops that are harvested and eaten at their peak ripeness are typically tastier and have a better texture than those eaten before they are ripe or when they are over ripe. As much as you don’t want to harvest crops too early, you don’t want to let them become over ripe in the garden. Crops that are left in the garden too long may become soft or even begin to rot. They are wasted and no longer edible.

General Information continued on the next page.
Crops that continue to produce for several weeks in the summer, such as green beans, zucchini, cucumbers, peppers, and tomatoes, need to be harvested regularly to keep them producing and setting on more fruits. The plant will set fewer fruit if they are left on the plant too long and become large and over ripe.

Some leafy crops, such as spinach, leaf lettuce, and chard can be cut about an inch and a half to two inches above the ground and they will grow back. This can be done two or three times in the spring. These plants cannot withstand the heat and long days of the summer. At that time remove the plants entirely from the garden and plant another crop, such as green beans, for a fall harvest. Make sure there are enough days remaining in the growing season (before the first average fall frost in your area) for that crop to mature.

Seed packages, plant labels, and garden catalogs often give the “approximate” number of days for a crop to mature. Growing conditions, such as weather, moisture, and weed competition affect this number. So it should only be used as a guide. Work with the youth to figure this out together.

To help you to be watchful of the best stage for harvest, you may want to use the Approximate Harvest Dates chart found towards the end of this lesson.

HARVEST TOOLS
- Scissors are best for the students to cut leaf lettuce and spinach
- Pruning shears may work better for harvesting zucchini, squash, pumpkins, peppers and eggplant
- Buckets and/or bags for harvest
- Garden fork for carrots, potatoes and sweet potatoes
- Trowel for loosening soil around root crops and onions

FOOD SAFETY AND CLEANING
At harvest time, make sure everyone practices good food safety. Wash hands thoroughly before and after picking vegetables. The harvest containers should be clean and free from soil and old plant residue. Gallon-sized bucket can be lined with plastic grocery bags which will make hauling and clean up easier and insure clean harvest containers.

Clean your vegetables before you put them in the refrigerator. Rinse leafy vegetables (lettuce, spinach, chard, cabbage and kale) in clean cold water, preferably in a strainer to drain the excess moisture. Then store in airtight bags. Tomatoes, peppers, melons, squash, and cucumbers, can be rinsed off and air dried. Rinse and rub (not scrub) the soil from root crops such as carrots and beets. Soil residue on onions, garlic, potatoes and sweet potatoes should be rubbed off after they are cured (see Storing Vegetables). Never wash or soak them in water.

STORING VEGETABLES
Different crops have different storage needs. Some, such as potatoes and onions, need to be “cured” before they are stored. Curing is a treatment that increases their storage life. Once crops are harvested their quality starts to deteriorate. To slow that process, most vegetables need to be refrigerated almost immediately. If that is not possible, put them in a cool, shady location. Do not leave them sitting in bags in the hot sun.
**APPROXIMATE HARVEST DATES**

Please record the harvest information about the crops you are planting in your garden. You may find this information on the seed packet, the tag for the transplant, in garden catalogues, on the Internet, or at your local extension office. Besides using visual clues, this will help you to determine when the crops may be at the best stage to harvest.

<table>
<thead>
<tr>
<th>CROP</th>
<th>DAYS TO MATURITY</th>
<th>PLANTING DATE</th>
<th>ESTIMATED FIRST HARVEST DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: radishes</td>
<td>28</td>
<td>April 20</td>
<td>May 18</td>
</tr>
<tr>
<td>Example: zucchini</td>
<td>48</td>
<td>June 15</td>
<td>August 3</td>
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<tr>
<td>CROP HARVEST GUIDE</td>
<td>HARVEST TIMES</td>
<td>OPTIMUM STORAGE CONDITIONS, °F</td>
<td>APPROX. STORAGE PERIOD</td>
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<tr>
<td>SNAP BEANS (bush or pole)</td>
<td>Pick often to keep plants producing more beans.</td>
<td>Cool Refrigerate: 40 - 45°</td>
<td>7 – 10 days</td>
</tr>
<tr>
<td>Harvest the pods when they are almost full-sized but before the seeds begin to bulge. Hand pick with small stem attached to the pod. Do not break pod.</td>
<td>(Adapted from ISU Extension Publication, PM 731 Harvesting and Storing Vegetables)</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>4 months</td>
</tr>
<tr>
<td>BEETS</td>
<td>One time harvest. Clean garden area after all beets are harvested.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>10 – 14 days</td>
</tr>
<tr>
<td>Pull or dig beets when roots are 1 to 1½ inches in diameter. Cut tops to ½ inch above root.</td>
<td>(Grade 3 Lesson 9 Celebrate Harvest)</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>1 to 2 months</td>
</tr>
<tr>
<td>BROCCOLI</td>
<td>Tender side shoots, 1 to 3 inches across, will develop after the central head is removed. After those are harvested, remove the plants from the garden.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>1 to 2 weeks</td>
</tr>
<tr>
<td>Cut when flower heads are blue-green and about 6 to 7 inches across but before small yellow flower buds start to open. The stems below the flower head and small leaves are also very nutritious.</td>
<td>(Grade 3 Lesson 9 Celebrate Harvest)</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>3 or more months</td>
</tr>
<tr>
<td>CABBAGE</td>
<td>One time harvest. Clean garden area after harvest.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>1 to 2 months</td>
</tr>
<tr>
<td>Cut when heads become large and solid. Don’t delay because heads are prone to cracking when they get large.</td>
<td>(Grade 3 Lesson 9 Celebrate Harvest)</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>1 to 2 weeks</td>
</tr>
<tr>
<td>CANTALOUPE (Muskmelon)</td>
<td>One plant can produce 2 to 5 fruit, not all at once. Check often once they start to mature.</td>
<td>Cool Refrigerate: 40 - 45°</td>
<td>3 or more months</td>
</tr>
<tr>
<td>The skin between the netting turns from green to orangish-yellow. The fruit will separate easily from the stem.</td>
<td>(Grade 3 Lesson 9 Celebrate Harvest)</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>3 or more months</td>
</tr>
<tr>
<td>CARROTS</td>
<td>One time harvest. Clean garden area after harvest.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>3 or more months</td>
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<tr>
<td>Dig when roots are ¾ inch or more across. Be careful so that you don’t break the roots when digging. Remove tops to ½ inch above the root.</td>
<td>(Grade 3 Lesson 9 Celebrate Harvest)</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>3 or more months</td>
</tr>
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<tr>
<td>CUCUMBERS</td>
<td>Check plants often once they start bearing. Keep fruit harvested for continuous production.</td>
<td>Moderate Refrigerate: 45 - 55°</td>
<td>1 to 2 weeks</td>
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<td></td>
<td>Check plants often once they start bearing. Keep fruit harvested for continuous production.</td>
<td>Moderate Refrigerate: 45 - 55°</td>
<td>1 week</td>
</tr>
<tr>
<td>EGGPLANT</td>
<td>Harvest anytime after the fruits are 2 inches across until they are 4 to 6 inches in diameter (depends on the variety). Light thumb pressure will leave a dent at the proper harvest stage. Cut from plant with pruning shears. Leave about 1 inch of stem on the fruit.</td>
<td>One time harvest. Clean garden area after harvest.</td>
<td>Cold Refrigerate: 32 - 40°</td>
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<tr>
<td>GARLIC</td>
<td>Pull in mid-summer when bottom leaves begin to dry. Cure the bulbs in a warm ventilated area in single layers for 10 days. Remove the tops about 1 inch above the bulb.</td>
<td>One time harvest. Clean garden area after harvest.</td>
<td>Cold Refrigerate: 32 - 40°</td>
</tr>
<tr>
<td>KOLHRAHIBI</td>
<td>Pull plants when stems are swollen to 2 to 3 inches in diameter. Remove leaves and roots.</td>
<td>One time harvest. Clean garden area after harvest.</td>
<td>Cold Refrigerate: 32 - 40°</td>
</tr>
<tr>
<td>LETTUCE</td>
<td>Leaf lettuce should be cut when the leaves are 4 to 6 inches long. Cut about 1 ½ inches above the ground for re-growth to occur.</td>
<td>Cut and it will come back for one or two more harvests, then remove spent plants.</td>
<td>Cold Refrigerate: 32 - 40°</td>
</tr>
<tr>
<td>ONIONS (green)</td>
<td>Any standard onion can be used as a green onion and harvested young. Harvest when 6 to 8 inches tall.</td>
<td>One time harvest. Clean garden area after harvest.</td>
<td>Cold Refrigerate: 32 - 40°</td>
</tr>
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<tr>
<td><strong>ONIONS (dry)</strong></td>
<td>One time harvest. Clean garden area after harvest.</td>
<td>Cold (after curing) Refrigerate: 32 - 40°</td>
<td>3 months (use before they sprout)</td>
</tr>
<tr>
<td>Harvest when the tops fall over and begin to dry. Pull with tops on and dry them in a protected place for 3 to 4 days. Cut tops to 1 inch above the bulb and store in shady area in mesh bags or single layers for further curing until stems tighten up and outer scales are dry.</td>
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<tr>
<td><strong>PEAS</strong></td>
<td>Check plants often once they start producing seed pods. Keep pods harvested for extended production.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>1 to 2 weeks</td>
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<tr>
<td>Pick peas with edible pods such as snow peas when pods are just filled, but before the seeds become hard and starchy. Store peas in the pod. Harvest snap peas when the pods are beginning to plump and while the pods are still glossy and smooth.</td>
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<tr>
<td><strong>PEPPERS</strong></td>
<td>Check plants often once they start bearing. Keep fruit harvested for continuous production.</td>
<td>Moderate Refrigerate: 45 - 55°</td>
<td>2 to 3 weeks</td>
</tr>
<tr>
<td>Harvest when the pepper is large, firm, and crisp. Fully ripe peppers are slightly sweeter and may be red, orange, yellow or other colors.</td>
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<tr>
<td><strong>POTATOES</strong></td>
<td>One time harvest. Cure potatoes in a cool shady location for two weeks. Clean garden area after harvest.</td>
<td>Cool Refrigerate: 40 - 45°</td>
<td>New potatoes only store for a few weeks. Large, cured potatoes can be stored in a dark location for 3 or more months</td>
</tr>
<tr>
<td>New (small) potatoes can be dug in early summer when the vines are lush and green. Large potatoes are dug as soon as the plants die. Be careful not to cut the potatoes when digging by placing the fork at least 8 inches from the stem of the plant.</td>
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<tr>
<td><strong>RADISHES</strong></td>
<td>One time harvest. Clean garden area after harvest.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>3 weeks</td>
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<tr>
<td>Pull when the roots are 1 to 1½ inches in diameter, remove tops about ½ inch above the root.</td>
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<tr>
<td>SPINACH</td>
<td>Cut and it will come back for one or two more harvests, then remove spent plants</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>1 to 2 weeks</td>
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<tr>
<td>Harvest when leaves are 2 to 6 inches long. Cut about ½ inches above the ground for re-growth to occur.</td>
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<tr>
<td>SUMMER SQUASH (Zucchini)</td>
<td>Check plants often once they start bearing. Keep fruit harvested for continuous production.</td>
<td>Cool Refrigerate: 40 - 45°</td>
<td>1 to 2 weeks</td>
</tr>
<tr>
<td>Cut squash from plant when they are 6 to 12 inches long. The rind is very tender and scrapes easily. Scallop type (‘Patty Pan’) are harvested when 3 to 5 inches in diameter. Leave ½ inch stem on the fruit.</td>
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<tr>
<td>SWEET CORN</td>
<td>Check frequently when they reach maturity. Harvest all at once or within a few days.</td>
<td>Cold Refrigerate: 32 - 40°</td>
<td>1 week</td>
</tr>
<tr>
<td>Harvest by grasping the ear at its base and then twisting downward. It is ready as soon as the silks are brown and dry at the ear tip.</td>
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<tr>
<td>SWEET POTATOES</td>
<td>Harvest all at once. Cure for 1 week in a warm, shady location.</td>
<td>Moderate Refrigerate: 45 - 55°</td>
<td>3 or more months</td>
</tr>
<tr>
<td>Harvest in late fall, just before frost, by digging with a garden fork. Be careful not to stab a tuberous root.</td>
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<tr>
<td>TOMATOES</td>
<td>Check plants often once they start bearing.</td>
<td>Cool room 55 - 65°</td>
<td>4 to 7 days</td>
</tr>
<tr>
<td>Pick any time from pink to fully red stage. Pick and remove stem from the fruit.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WATERMELON</td>
<td>Check plants often once they start bearing.</td>
<td>Moderate to cool room 45 - 65°</td>
<td>2 to 3 weeks</td>
</tr>
<tr>
<td>Harvest when fruits are full sized, rind is dull in appearance, and the bottom part touching the ground turns from greenish white to creamy yellow. Leave 2-inch long stem attached to fruit.</td>
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</tbody>
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Collecting and Storing Seeds from Your Garden

D. Hatch

One of the first requirements for growing a successful garden is finding good seed from plant varieties that have been adapted to your area. Many companies provide such seed. When you calculate the value of the food you grow, you will find that high-quality seed is a bargain.

At some time, though, you may want to collect, store, and plant seed from your own garden rather than buy the seed. This fact sheet describes how to save seeds from a variety of plants.

Collecting seeds

Don’t save seeds from vegetables or flowers labeled “hybrid.” Seeds from hybrid varieties produce a mixture of plant types, most of which are inferior to the parent. Many varieties could be hybrids but may not be designated as such.

Seeds easily saved

Tomato
1. Save seed from the fully ripe fruit of the desired tomato plant.
2. Squeeze the seeds onto a paper towel or a piece of screen.
3. Leave the seeds at room temperature until they are thoroughly dry.

Pepper
Select a mature pepper, preferably one turning red, and allow it to turn completely red before extracting the seeds. Place seeds on a towel or a piece of screen until they are thoroughly dry.

Eggplant, husk tomato (groundcherry), garden huckleberry
Separate seeds from the mature fruit and dry thoroughly at room temperature.

Beans, peas, soybeans
1. Leave pods on the plant until they are “rattle dry.”
2. Watch the pods carefully because some varieties split and scatter the seeds when they are dry.
3. Pick dried pods and place them in a well-ventilated area at room temperature. When the pods are completely dry, remove the seeds.
4. To control possible weevil infestation, place seeds in a freezer for 24 to 30 hours.

Lettuce
Lettuce seeds are more difficult to collect, but you can save them.
1. Leave a plant or two to produce a seed stalk.
2. After the plant blooms and the flower forms a miniature “dandelion head,” gather the seeds.
3. Separate the seeds from the chaff by rubbing them with your fingers.

Seeds difficult to save

Vine crops: cucumber, melons, squash, and pumpkins
It usually doesn’t pay to save these seeds. Without controlled pollination, these crops cross with other varieties and sometimes other types. Muskmelons do not cross with cucumbers, however.

You can control pollination in your garden, but it requires careful attention. First, you need to distinguish between male and female flowers. Male blossoms are on a longer stalk and do not have a miniature fruit at the base as do female blossoms.

1. With careful observation, note the blossoms that will open the following day. They have a light yellow color and a distinct pointed tip.
2. In the evening, select male and female flowers on the same plant. With a paper clip for small flowers or a rubber band for larger flowers, prevent the flower from opening. Flowers open only early in the day.
3. In the morning, pluck the male blossom and touch the cluster of pollen (called anthers) to the center of the female flower (called the stigma).
4. Close the female flower again so bees can’t get in.
5. Tag the blossom.
6. Grow the fruit to maturity for the desired seed.

The fruit must be very ripe for seeds to germinate correctly. Cucumbers must be entirely yellow, and squash and pumpkin must be thoroughly mature. Separate the seeds from the fruit flesh and dry them at room temperature.

Biennials: carrot, beet, onion, and cabbage family

Biennials are questionable for seed collection. It may take considerable effort to carry over the plant root from the first season to the second year when seed stalks form. Many members of the
cabbage family intercross and also can cross with native wild crucifers such as mustard, cress, radish, or turnip.

- Carrots cross with the prevalent wild carrot. Select desirable beet or carrot roots and keep them cool and moist, perhaps buried outdoors in sand. In early spring, plant the roots in an uncrowded area of the garden because they grow very large.
- Keep onion bulbs cool and dry during the winter, then plant them in early spring.

After spring growth, seed heads form. When heads are quite dry, gather the mature, plump seed before it falls to the ground, and complete the drying at room temperature.

Flower seeds
You can save many flower seeds, though crossing some varieties can cause deterioration from the original over time.

- Gather mature seed pods (stock and poppies) or seed clusters (zinnia, strawflower).
- Leave sunflower heads on the plant as long as birds don’t bother them. When the top of the blossom separates from the seed, or birds start eating the seeds, cut the head and finish curing the seed in a warm, ventilated area. You also can eat seeds or use them as bird feed after the seeds dry.

Storing seeds
Keep seeds in a labeled container or envelope in a cool, dry place where they are protected from insects. Storage life of seeds varies widely. Here is a guide:

- Short-lived seeds (1–2 years): corn, onion, parsley, parsnip, pepper
- Intermediate seeds (3–4 years): asparagus, bean, broccoli, carrot, celery, leek, pea, spinach
- Long-lived seeds (4–5 years): beet, chard, cabbage family (Brussels sprouts, cauliflower), turnip, radish, cucumber, eggplant, lettuce, muskmelon, pumpkin–squash group, tomato, watermelon

An ideal way to prepare seed for long-term storage is to place seed packets in a jar, seal the jar tightly and place it in a refrigerator or freezer. To help absorb moisture, place a small, cloth bag filled with dry, powdered milk beneath the seed packets in the bottom of the jar. Use about 1/2 cup of dry milk from a recently opened package.

Test germination
To test seeds for germination before planting:
1. Moisten two or three layers of paper towels.
2. Place 25 to 50 seeds on the towels and roll the towels loosely. Place them in a plastic bag.
3. Keep the towels in a warm place such as on a kitchen counter or on top of a water heater.
4. Some seed, such as radish, germinates in 2 or 3 days. Peppers can take 10 to 14 days. Observe the seed at 2-day intervals to determine the degree of germination.

For more information
Many OSU Extension Service publications may be viewed or downloaded from the Web. Visit the online Publications and Videos catalog at http://eesc.oregonstate.edu.

Copies of our publications and videos also are available from OSU Extension and Experiment Station Communications. For prices and ordering information, visit our online catalog or contact us by fax (541-737-0817), e-mail (puborders@oregonstate.edu), or phone (541-737-2513).
May June: Let’s Celebrate Our Garden Harvest!

What you will need

Activity 1, Healthy Meal Activity

- MyPlate Garden Poster (found in separate file on the website)
- Paper plates
- Crayons or markers
- Plant Part Poster (found in separate file on the website)
- Access to a large table, to display the healthy meals
- GHK flash cards (optional; found in separate file on website)

Activity 2, Plant Part Dance Party

or purchase at Amazon for $0.99 [http://www.amazon.com/Dirt-Made-Lunch-Banana-String/dp/B000G8P53S/ref=sr_1_3?ie=UTF8&qid=1367009826&sr=1-3](http://www.amazon.com/Dirt-Made-Lunch-Banana-String/dp/B000G8P53S/ref=sr_1_3?ie=UTF8&qid=1367009826&sr=1-3) (It is part of the Dirt Made My Lunch CD, and can be purchased separately)

Activity 3, Food Adventurer Adjectives, Plant Part Salad Recipe

- Access to soap, sink and paper towels to wash hands
- Food Adventurer Adjectives worksheet (one per student)
- Plant Part Poster
- Plant Part Salad recipe sheets (one per group).
- Plant Part Salad ingredients (refer to recipe)

Activity 4, Food Adventurer Mission

- Food Adventurer wristbands

Supplementary Materials (as needed)

- Crayons, storybook, journal and/or coloring sheet

Adapted with Permission from Oregon State University Growing Healthy Kids, [http://extension.oregonstate.edu/nep/garden_nutrition/](http://extension.oregonstate.edu/nep/garden_nutrition/)
Preparation

**Activity 1, Healthy Meal Activity**

- Decide whether or not you will prepare paper plates, by dividing the plate into the different MyPlate groups. Prepare plates, as necessary.
- Arrange for access to a large table or other display space, for students to display the healthy meals they created.

**Activity 2, Roots, Stems and Leaves Song**

- Photocopy Roots, Stems and Leaves song lyrics sheet.
- Set up CD player or other music device.

**Activity 3, Food Adventurer Adjectives, Plant Part Salad Recipe**

- Gather ingredients and supplies for making plant part salad.
- Decide how much preparation you will do beforehand, versus having the students assist with the recipe. Prepare ingredients, accordingly.

**Activity 4, Food Adventurer Mission**

- Photocopy Food Adventurer wristbands.

Adapted with Permission from Oregon State University Growing Healthy Kids, [http://extension.oregonstate.edu/nep/garden_nutrition/](http://extension.oregonstate.edu/nep/garden_nutrition/)
Teaching outline

Activity 1: Healthy Meal Activity

*During our People’s Garden lessons, we have learned that it is important to eat a variety of healthy foods. Who remembers why it is important to eat a variety of foods from MyPlate?*

Allow students to answer. You can offer the rainbow or jigsaw puzzle analogy. Each color of the rainbow or each puzzle piece gives only part of the picture. Together, the colors of the rainbow or the pieces of the puzzle give you the entire picture. In the same way, a variety of foods from MyPlate helps to build a healthy body.

*What is one way you can make sure you’re eating a variety of vegetables and fruits?*

Allow students to answer. You can remind them that eating vegetables and fruits that are different colors, or including a rainbow of vegetables and fruits in their diet, is one way to ensure they are getting the variety of nutrients that their bodies need. You can also remind them that variety may mean eating different plant parts.

*What about the other foods from MyPlate? How can you make sure that you are eating a variety of foods?*

Allow students to answer.

*One way we can make sure to get a variety of healthy foods in our diet is to choose foods from each of the different food groups in MyPlate.*

For this next section, you can have children work with a partner, team or a volunteer, if it would be easier to manage, logistically. Or, each child can work to create their own healthy meal.

*You [and your team or partner] are going to create a meal together. You are going to draw your meal on a paper plate. Include at least one food from each of the MyPlate food groups in your meal. What are the different food groups on MyPlate?*

Allow students to answer: grains, vegetables, fruits, dairy, proteins. Point to the food groups on the MyPlate Garden Poster as the students answer.
When you’re putting your meal together, you can use the GHK flash cards for ideas (if you are using these flash cards). You can use the MyPlate Garden Poster or Plant Part Poster for ideas. You can use our garden for ideas.

If using, distribute GHK flash cards to students.

If you have prepared the plates prior to the lesson, so that there are discrete areas for each of the food groups (such as color coding areas per food group), please go over this with the students. Pass out the markers/crayons, and circulate among the room to help students. When the students are done, you can ask for volunteers who would like to share their meal idea with the class. As students share their paper plate meal, you can ask them questions.

Which food is from the grains group on MyPlate? Which food is a vegetable? Which is from the fruits group?

Allow students to answer.

Why did you pick this particular food for your meal?

Allow student to answer. If you have a large table, display all of the “meals.” Allow students time to gallery walk and look at other students' meals. Encourage them to ask their classmates questions regarding what foods they chose or their favorite fruit or vegetable.

Thank you all for creating great examples of variety on your plates!

Activity 2: Plant Part Dance Party

Throughout our People’s Garden lessons, we’ve been learning about a variety of vegetables and fruits that we can eat. For this section, you can allow students to use the GHK flash cards for reference, if you have printed them.

We’ve learned about roots that we eat. What are some of the root vegetables that we eat? Allow students to answer. Carrots, parsnips, beets, jicama and radishes are all examples of root vegetables.

Adapted with Permission from Oregon State University Growing Healthy Kids, http://extension.oregonstate.edu/nep/garden_nutrition/
We've learned about stem vegetables that we eat. What are some of the stem vegetables that we eat?
Allow students to answer. Celery, rhubarb and asparagus are all examples of stem vegetables.

We've learned about leaf vegetables that we eat. What are some of the leaf vegetables that we eat?
Allow students to answer. Lettuce, spinach, cabbage, radicchio, chard and kale are all examples of leaf vegetables.

We've learned about fruits from the garden. What are some of the fruits that we eat?
Allow students to answer. Squash, cucumbers, apples, pears, berries, tomatoes, pumpkin and melon are all examples of plant fruits.

Students may ask why squash, cucumbers and other foods are considered the fruits of a plant. You can remind them about the difference between culinary fruits and botanical fruits. The foods that we call fruits are often sweet and juicy. However, botanically, the fruit of a plant is usually fleshy and holds the plant's seeds. The scientists who created MyPlate grouped fruits and veggies according to their nutrient content, not where their seeds are. Do not focus too much on this difference, but be prepared to provide a brief answer if students ask.

We've even planted some of these root vegetables, stem vegetables, leaf vegetables and fruits in our garden. You can remind students about the seeds that they have planted in their school garden.

To remind you of the six parts of the plant, we are going to sing and dance to the Roots, Stems, Leaves song.

The full version of the song is rather long. The shortened version of the song includes just the chorus. Depending upon the time you have available, and the attention span of your class, you may want to use the chorus plus one or two verses (so there is a healthy message), rather than the entire song. Access the song at http://www.songsforteaching.com/bananaslugstringband/rootsstemsleaves.htm or purchase at Amazon for $0.99 http://www.amazon.com/Dirt-Made-Lunch-Banana-String/dp/B000G8P53S/ref=sr_1_3?s=music&ie=UTF8&qid=1367009826&sr=1-3 (It is part of the Dirt Made My Lunch CD, and can be purchased separately)

Play the song on a CD player, or sing the song for the students. Have the students sing along.

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Students can also dance. Below are different “moves” that they can use for each plant part, or they can dance free-style.

Roots – Wiggle your feet.
Stem – Bend your legs at the knees.
Leaves – Shake your hands out to the side.
Flower – Raise your arms above your head, to form a “V”.
Fruit – Clasp your hands above your head, to form a circle with your arms.
Seeds – Wiggle your fingers and move your hands down to the ground.

During the last school year, 2\textsuperscript{nd} graders in the People’s Garden program had a specific lesson on plant parts. This may be review or new information for some students.

Activity 3: Food Adventurer Adjectives, Plant Part Salad Recipe

Note: If you can harvest and salad ingredients from your garden, be sure that they are harvested and cleaned appropriately

\textit{Today is our People’s Garden lesson. We’ve worked very hard to learn about healthy foods from MyPlate. We’ve grown many of these foods in our garden.}

\textit{There are many healthy ways to eat plant parts. We have tasted plant parts a few different ways during our lessons. Can you remember what they were?}

Salad, veggies and dip, veggie chips, smoothie, sundae, muesli, food art (varies based on location)

\textit{Today to celebrate the healthy foods we’ve grown, we’re going to make a Plant Part Salad.}

Items in the Plant Part Salad can come from the garden. Make sure that produce harvested from the garden is thoroughly washed before it is prepared. If there is not enough produce or you cannot use it for some other reason, purchase the items for the salad at a grocery store.

\textit{Before we can prepare our salad, we need to make sure that our hands are clean.}

Remind students about proper handwashing technique, as necessary.

\textit{Now we’re ready to prepare our salad. I’m going to divide our class into teams. Each team will work on a different part of the recipe. In this way, we’re working together to make our Plant}
Part Salad, and to celebrate our healthy garden harvest.

Divide students into six or seven teams. Assign each team one task in the recipe. Each task corresponds to a different plant part. If desired, students assigned the seeds can also prepare the dressing (for six teams) or these two tasks can be completed by separate teams (for seven teams).

Have students prepare their plant part, according to the recipe handout. Each recipe handout should have the group’s assignment (e.g. Leaf, Root, Fruit, Seeds, Stems) highlighted. Volunteers can assist teams.

After teams have completed their tasks, serve the salad to students.

Option A: Each group can put their ingredient in a bowl with a plant part label and then students can serve themselves salad-bar style with tongs.

Option B: Combine the plant parts and dressing together in one large bowl for the whole class to serve from.

We’re going to be Food Adventurers, and try our salad using our sense of sight, touch, smell and taste. We’re going to practice using our adjectives to describe how our snack looks, feels, smells and tastes.

As much as possible, encourage children to use descriptive adjectives (objective), and steer them away from subjective adjectives (personal opinion). Objective examples are: cold, fuzzy, smooth, sweet, orange, bitter, sour, round, hard, soft good. Subjective: bad, nasty, delicious, disgusting. In this way, children are encouraged to more objectively experience the samples.

We’re going to use adjectives to describe what we see. Adjectives are words that describe things. For example, if I say ‘green grape’, I’m using the word ‘green’ to describe the grape. ‘Green’ is an adjective. I could also say ‘green apple’, or ‘green lettuce’ to describe the color of an apple or the color of lettuce.

Pass out the Food Adventurer Adjectives worksheets.

Let's look at our plant part salad. What do you see? What color do you see? Can you think of other foods that are the same color?

Allow students time to examine the salad with their eyes, and to record and share their observations.

Adapted with Permission from Oregon State University Growing Healthy Kids, http://extension.oregonstate.edu/nep/garden_nutrition/
Let's try the plant part salad with our sense of touch, by holding the cup in our hands. How does it feel on your skin? Is it warm or cold? Can you softly squeeze the cup? Is it soft or hard?

Allow the students to try the salad with their sense of touch, and to record and share their observations.

Let's try the salad with our nose. What can you smell? Does the smell remind you of another food?

Allow students time to try their snack with their sense of smell, and to record and share their experience.

Let's try our slaw with our mouths. How does it taste? Does it taste like something else that you've tried? What do you think of the taste? Would you try it again?

Allow students to taste their snack, and to record and share their observations.

Great job, Food Adventurers! You can take the recipe for the salad home, to share with your family.

Activity 4: Food Adventurer Mission

How did you like the plant part salad? What did you like about tasting the food that you grew in the garden? Was it exciting to eat food that you grew from a seed?

Ask the students questions, as appropriate. If the ingredients of the plant part salad came mostly from the grocery store, you can explain the connection with eating food that they've grown.

During the People’s Garden lessons,

- We’ve learned about the importance of eating foods from all the different MyPlate food groups.
- We’ve learned it is important to eat a variety of vegetables and fruits. One way to get variety is in colors and another is to eat different plant parts.
- We’ve learned that drinking water prevents us from getting dehydrated and that plants need water, too.
- We’ve been physically active by working in the garden.
- We’ve been Food Adventurers, who tasted healthy snacks, and grew our own food!

Adapted with Permission from Oregon State University Growing Healthy Kids,
http://extension.oregonstate.edu/nep/garden_nutrition/
What was your favorite part of the People’s Garden lessons?

Allow students to answer.

I'd like you to remember what we have learned in these lessons and in the garden. You can share what you've learned with your friends and family. One way to share what you've learned is to wear a People’s Garden wristband.

Display and read the four different messages on the wristbands. Allow each student to select which message wristband they want of the four choices.

Pick one wristband that has the message you would most like to be reminded of. The message you choose might be different from the one your friend or neighbor chooses!

Distribute the wristbands to the students. Read them the message they choose. Secure the wristband on their arm, using tape. Or you can let student partners help each other to read the message and secure the wristband.

Once the wristbands are on, ask the students to read what their wristband says to a partner. Students can name one or more ways they can accomplish their goal.

End the class with a big cheer or round of applause for all of the students' hard work on People’s Garden.

Consider sending home the Journal that student’s have been keeping. Your Extension Educator may like to look at the journals before they go home.

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Supplementary activities

Consider supplemental activities.

☐ Supplementary Activity 1 - Storybook and Discussion and Journal - Read the storybook to children and then lead a discussion on key points that connect the book to People’s Garden messages and activities. Sample discussion questions can be found on the next page. Children then write or color about what they learned on a journal sheet. Add it to their journal. Storybook Options: The Surprise Garden, by Zoe Hall or The Ugly Vegetable by Grace Lin.

☐ Supplementary Activity 2 – Seed Saving – If students will be harvesting lettuce, tomatoes, peppers, beans or peas, they can collect and save the seed for next season’s garden. Work with an experienced gardener, who can provide instruction on seed saving, or refer to Oregon State University Extension publication FS220, “Collecting and Storing Seeds from your Garden”, by Duane Hatch. This activity may work particularly well, if you collaborate with Master Food Preservers to make salsa from garden tomatoes. Seeds are often spooned out of tomatoes prior to making salsa. These seeds can be spread out on a paper towel, and allowed to dry. Once seeds are fully dry, store them in a labeled envelope, noting the crop and the date the seed was collected. Seed packets can be given out to students, so that they can take them home and plant them in their own garden. Or, they can be saved and planted next season, in the school garden. Store seeds in a cool, dry place until you are ready to plant.

Supplementary Storybook Activity: Sample Discussion Questions and Journal Sheet Ideas

The Ugly Vegetable, by Grace Lin

Discussion Questions

☐ Did you see any insects in the story? Are insects good or bad for your garden? (some good and some bad)

☐ Did the kids get any physical activity in the garden or yard? (digging, planting, watering, tree house, sprinkler, picking, basketball, football)

☐ What food did they make with their edible plant parts? (Chinese vegetable soup)

Journal Sheet Idea

☐ Draw a new vegetable you have never tried that you would grow in your garden and cook in soup. If appropriate write down the name of the vegetable.
The Surprise Garden, by Zoe Hall
Discussion Questions

☐ What seeds did mom give to grow in the surprise garden and what edible/eatable plant part were they (refer to last page of book)?
- Seeds – sunflower, bean, pea
- Roots – radish, carrot
- Leaves – lettuce, spinach
- Fruit – watermelon, squash
- Flower – cauliflower, broccoli

☐ Did you see any insects in the story? Are insects good or bad for your garden? (some good and some bad)

☐ How did the kids eat their edible/eatable plant parts? (watermelon slices and salad, sunflower seeds)

☐ How many colors can you find in their meal? This is an example of VARIETY.

Journal Sheet Idea

☐ Draw a meal with your friends tasting editable/eatable plant parts. If appropriate list the foods you are eating.

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Plant Part Salad

This recipe contains more than one type of fruit or vegetable, rich in different nutrients. Try many colors and kinds. This recipe is an excellent source of vitamin A, which keeps eyes and skin healthy and vitamin C, which keeps gums and blood vessels healthy.

Ingredients:
6 cups leaves such as lettuce, spinach, chard
1 cup roots such as beets, carrots, radishes
2 cups flowers such as broccoli, cauliflower
1 cup stems such as celery, broccoli stems, chard stems
2 cups fruit such as apple, tomato, cucumber
1/4 cup seeds such as sunflower seeds, peas, beans

Dressing:
2 tablespoons fruit juice or vinegar such as lemon, orange or apple cider vinegar
2 tablespoons oil
1 clove garlic, minced

Directions:
1. Wash all fruits and vegetables.
2. Tear leaves into small pieces. Place in large bowl.
3. Cut or grate roots, stems, flowers and fruit into bite-sized pieces. Add to bowl.
4. Add seeds to bowl.
5. Make dressing by combining oil, juice or vinegar, and garlic in a small container with a secure lid. Shake until well mixed.
6. Pour dressing over salad and toss lightly.

Servings: 12
Serving size: 1 cup

Nutrition information (per serving):
Calories: 60
Total Fat: 4g
(Saturated Fat: 0.5g)
Cholesterol: 0mg
Dietary Fiber: 2g
Sodium: 20mg

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Source: Oregon State University Extension Service. For more recipes and other resources on eating well for less, visit the OSU web site at www.foodhero.org

This material was funded by USDA’s Supplemental Nutrition Assistance Program - SNAP. The Supplemental Nutrition Assistance Program (SNAP) provides nutrition assistance to people with low income. It can help you buy nutritious foods for a better diet. SNAP puts healthy food within reach – call Oregon Safe Net at 1-800-723-3638. The U.S. Department of Agriculture (USDA) prohibits discrimination in all of its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, political beliefs, genetic information, reprisal, or because all or part of an individual’s income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA’s TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write: USDA, Office of Adjudication, 1400 Independence Ave., SW, Washington, DC 20250-9410 or call (866) 632-9992 (Toll-free Customer Service), (800) 877-8339 (Local or Federal relay), (866) 377-8642 (Relay voice users). USDA is an equal opportunity provider and employer.
Appendix F Roots, Stems and Leaves Song Lyrics

Roots, Stems and Leaves
By the Banana Slug String Band
From the album Singing in Our Garden

<CHORUS>
Roots, stems, leaves, flowers, fruits and seeds,
Roots, stems, leaves, flowers, fruits and seeds,
Roots, stems, leaves, flowers, fruits and seeds,
Roots, stems, leaves, flowers, fruits and seeds,
That's six parts, six parts, six plant parts that people need.

The roots hold the plant in the ground,
They gather up the water that falls around.
And there's a root inside of me,
Because a carrot is a root that I eat.
That's six parts, six parts, six plant parts that people need.

A stem is an elevator growing up from the ground.
The water goes up and the sugar back down.
And there's a stem inside of me,
Because celery is a stem that I eat.

The leaves are the kitchens where the food is done.
They breathe the air and catch rays from the sun.
And there's a leaf inside of me,
Because lettuce is a leaf that I eat.

<CHORUS>
Roots, stems, leaves, flowers, fruits and seeds,
Roots, stems, leaves, flowers, fruits and seeds,
Roots, stems, leaves, flowers, fruits and seeds,
Roots, stems, leaves, flowers, fruits and seeds,
That's six parts, six parts, six plant parts that people need.

The flowers are dressed so colorfully,
They hold the pollen and attract the bees.
And there's a flower inside of me
Because cauliflower is a flower I eat

The fruit gets ripe, then falls on down
It hold the seeds and feeds the ground.
And there's a fruit inside of me
Because an apple is a fruit that I eat.

<CHORUS>
Roots, stems, leaves, flowers, fruits and seeds
Roots, stems, leaves, flowers, fruits and seeds
Roots, stems, leaves, flowers, fruits and seeds
Roots, stems, leaves, flowers, fruits and seeds
That's six parts, six parts, six plant parts that people need.

The seeds get buried in the earth,
And the cycle starts again with a new plant's birth.
And there are seeds inside of me
Because sunflower is a seed that I eat.

Now you know what this whole world needs,
It's roots, stems, leaves, flowers, fruits and seeds.
There's six plant parts inside of me
Because a garden salad is what I eat.

<CHORUS>
Roots, stems, leaves, flowers, fruits and seeds
Roots, stems, leaves, flowers, fruits and seeds
Roots, stems, leaves, flowers, fruits and seeds
Roots, stems, leaves, flowers, fruits and seeds
That's six parts, six parts, six plant parts that people need.

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I will eat more fruit!

I will eat more veggies!

I will drink more water!

I will be more active!

I will eat more fruit!

I will eat more veggies!

I will drink more water!

I will be more active!
Asparagus

Stems
Asparagus

Eat a variety of fruits and vegetables every day.

Steamed asparagus is a yummy and nutritious side dish.

It’s worth the wait for this tasty treat. Asparagus takes 1-2 years to grow before harvest, but lasts for up to 15 years in the garden!
Celery

Stems
Drink enough water, using thirst as a guide.

Full of fiber for our digestive systems, crunchy celery is a healthy snack.

Celery is a slow grower in the garden that loves cool, wet soil.
Balance your day with food and play.

Contains Vitamin C to keep our gums and skin healthy.

Rhubarb can live in the garden for up to 5 years!
Broccoli

Flowers
Balance your day with food and play.

Contains Vitamin A for our eyes and Vitamin C for our skin and gums.

Broccoli likes it cool, and grows great in fall and winter gardens.
Cauliflower

Flowers
Eat a variety of nutrient dense foods every day.

Contains Vitamin C, for healthy skin and gums.

Cauliflower is tricky to grow, but wonderful to eat.
Squash Blossoms

Flowers
Squash Blossoms

Vary your veggies.
Tempt your tastebuds
with something new.

Contains Vitamin A,
which is good for our eyes.

Be quick, from garden to mouth!
Squash blossoms are best eaten
or cooked immediately
after they’re picked.

Flowers
Beets

Roots
Beets

Eat a variety of nutrient dense foods every day.

Beets can stay fresh for months in cool, dry spaces.

Beets turn sweet when the temperature turns cold.
Carrots

Roots
Carrots

Eat a variety of nutrient dense foods every day.

Sweet and crunchy source of vitamin A, which is good for our eyes.

Carrots love soft, loose soil. Get your exercise by removing rocks and digging the bed before you plant.
Celeriac

Roots
Celeriac

Vary your veggies. Tempt your tastebudes with something new.

This vegetable is sometimes called ‘celery root.’

Celeriac is a slow grower in the garden that loves cool, wet soil.

Roots
Parsnips

Roots
Eat a variety of fruits and vegetables every day.

Try parsnips in recipes that call for carrots.

Parsnips look like white carrots, and like it cool. Grow them over winter, and harvest in the spring.
Turnip Roots
Follow MyPyramid for Kids recommendations.

Contains Vitamin C and fiber, for our skin and digestive systems.

Turnips like it cool.
Harvest before the weather turns warm.
Acorn Squash

Fruits
Acorn Squash

Vary your veggies.
Tempt your taste buds
with something new.

Baked or roasted -
acorn squash is sweet and full of fiber.

Harvest when the skin hardens,
and turns a darker color.
Chile Pepper

Fruits
Chile Pepper

Eat a variety of fruits and vegetables every day.

Spice up salsas, soups and stews with chile peppers.

Sun-loving chile peppers like it hot and taste spicy!
Cucumber

Fruits
Cucumber

Select and prepare nutritious snacks.

Crunchy in salads and sandwiches.

Easy to grow, this vine needs lots of space. Be careful when picking this veggie. It's fruit and stem are spiky to the touch.
Tomato

Fruits
Tomato

Eat a variety of nutrient dense foods every day.

Contains Vitamins A and C, for healthy eyes, skin, gums and teeth.

Go from garden to plate.
Tomatoes taste best right out of the garden.
Broccoli Rabe

Leaves
Broccoli Rabe

Eat a variety of fruits and vegetables every day.

Contains Vitamins A and C, for healthy eyes and skin.

Plant early in the spring and don’t wait too long to harvest.

Broccoli rabe ‘bolts’ when the weather gets warm.

Leaves
Eat a variety of nutrient-dense foods every day.

Contains Vitamin A to help fight infection and Vitamin C to heal cuts and bruises.

Kale likes cool temperatures in the garden. Frosty weather makes it taste even better!
Lettuce

Leaves
Lettuce

Pack a safe and nutritious lunch.

Adds a healthy crunch to salads and sandwiches.

Harvest in the morning for maximum crunch!
The Parts of a Plant

Eat Healthy - Grow Healthy

Flower
Leaf
Stem
Root

Flower
Fruit
Seeds
Stem
Leaf

Leaf
Stem
Root

Leaf
Stem
Root

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