Lesson Six: Mulching for Water Conservation and Cabbage
For February

“Mulching for Water Conservation” from KIDS COOK FARM FRESH FOOD, California State Department of Education and “Cabbage” from HARVEST OF THE MONTH: Network for a Healthy California.

Students learn about dry-land farming, and how it might apply to their garden. They conduct an evaporation experiment and study how mulching helps water conservation. They decide how to mulch their garden space. This multi-part lesson 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 evaporation with and without mulch; 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 5

**February:** Mulching for Water Conservation and Cabbage

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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](http://www.harvestofthemonth.cdph.ca.gov) website, we are sharing educator newsletters that included information, recipes, and activities about cabbage.

1. **Grade 5, 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](http://www.peoplesgarden.wsu.edu) Educational Toolkit.

2. **Mulch Activities**
   Gather the materials for the Mulching for Water Conservation activity. Read the Mulching for Water Conservation Educator’s Guide and the activity to prepare for the lesson.

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 that 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 educators newsletter. Gather the materials and related documents to prepare for the nutrition lesson.

5. **Garden Journals**
   Continue your garden journals or records. Have student do make a three-column KWL (know, would like to know and learned) chart, 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 Mulching for Water Conservation 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 ‘Mulching for Water Conservation’ 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

1. Help the students follow through with their garden mulching plans.

2. Please complete the Garden Records sheets for the research component of this project and deliver it to your local extension educator or leader. Check with your local Extension Educator if you need a copy of the record.
**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>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>Fin fish</td>
<td>145°F</td>
</tr>
<tr>
<td>or flesh is opaque and separates easily with fork</td>
<td></td>
</tr>
<tr>
<td>Shrimp, lobster 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 three-minute rest time

Cooking food to the proper temperature kills harmful bacteria. So Fight BAC® by thoroughly cooking your food as follows:

**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.
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.
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!
**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.

- 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](http://www.fightbac.org) for optimum storage times.
Educator’s Guide
Mulching for Water Conservation
Healthy Gardens, Healthy Youth

Here are some recommendations for doing the Mulching for Water Conservation activities and helping the students to apply what they learned to their garden.

1. On a screen, project the Springhill Farm, Farm Profile and read it together.

2. Modify numbers 1 and 2 under “Doing the Activity” as follows:
   a.) Ask students to share any surprises and new things they learned from the story.
   b.) Have the students describe what is needed and how to dry-farm potatoes.
   c.) Ask the students what mulch is, what it is for, and how they might use it for dry-farming for their school gardens.
   d.) Read the first three paragraphs in the Background section and add this sentence from “Doing the Activity” number 2: “Farmers and gardeners use mulch to conserve water, to reduce the number of weeds, and to prevent soil from washing away.”

3. Conduct the evaporation comparison experiment as described under “Doing the Activity” numbers 3 through 8. You may want to have the student groups write down predictions or create hypotheses for the experiment. They can write their findings and conclusions after the experiment.

4. After the experiment, lead a discussion about whether or not it would be a good idea to mulch their gardens and or walkways and why. You may want to review the main reasons to mulch. If you are using the square foot gardening method, it is not necessary to mulch. If you are using raised beds, mulching around the outside of the beds is a good idea. Discuss the reasons why with your students. Their answers may include: the mulch will hold the water in the soil and hold the soil in place (think about mud puddles with lots of traffic around the garden beds); 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; mulch will help to prevent weeds – especially if there is landscape fabric underneath it.

5. Discuss what types of mulch would be appropriate for the students’ gardens. Use the following chart to test other types of mulch and to determine what might work best. You may also want to ask Extension Master Gardeners, local garden experts, or check on the internet for tips about types of mulch and how much you will need.
### Mulch Depth

<table>
<thead>
<tr>
<th>Mulch</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dried grass clippings</td>
<td>3 to 4</td>
</tr>
<tr>
<td>Sawdust</td>
<td>1 to 2 (available from lumber yards)</td>
</tr>
<tr>
<td>Straw</td>
<td>4 to 6 (some can sprout)</td>
</tr>
<tr>
<td>Black/white newspaper</td>
<td>6 to 8 sheets</td>
</tr>
<tr>
<td>Carpet samples</td>
<td></td>
</tr>
<tr>
<td>Black Plastic</td>
<td></td>
</tr>
</tbody>
</table>

6. Finally, make a decision about mulching the students’ gardens and or walkways. Create a plan on how to obtain the mulch and when you want to mulch the garden. Mark the mulching date on the calendar so you have something to work towards.

**Notes**
Mulching for Water Conservation

Preparation Time: 20 minutes
Total Lesson Time: 30 minutes to set up experiment, then 5 minutes each day for three days to monitor, and 15 minutes for closure on the last day

Background
Mulch is a soil covering that farmers and gardeners place on top of the soil to save both water and soil. Mulch may be made of a variety of materials, such as plastic sheeting, wood chips, compost, or straw.

In the summer, a nonmulched field must be watered more frequently than a mulched one. Mulch also helps shade the soil surface, keeping it cooler and thus preventing further water evaporation.

Mulch also helps hold the soil in place. Rain can easily erode bare soil, taking important topsoil with it. In many parts of California, soil erosion is evident on hillsides.

In this activity, students will conduct an experiment to see the effect of mulch on the amount of water that evaporates from soil.

Objectives
Students will be able to:
- Conduct an experiment to compare water evaporation with and without mulch.
- Describe the role of mulch in conserving water.

Materials
For the class:
- potting soil or garden soil
- garden mulch (if available)
- newspapers
- shredded newspaper or paper towels
- water
- waterproof pen for labeling
- balance scale, postal scale, or kitchen scale

For each group of 4:
- 2 copies of Springhill Farm farm profile
- 2 clear plastic cups (9-oz. size)
- 2 1-cup measuring cups
Preparation
1. Gather materials. Groups may share the measuring cups.

2. Cover tables with newspaper.

Doing the Activity
1. Give each pair of students a copy of the Springhill Farm farm profile and read it together as a class. Ask students whether anything surprised them about the reading. Lead the discussion toward the fact that Larry Peter dry-farms his potatoes. Make a list of the conditions that dry farming requires: good soil, good mulch, and so on.

2. Ask students what mulch is and have them share their ideas about the purpose of mulch. Explain that farmers and gardeners commonly use mulch to conserve water, to reduce the number of weeds, and to prevent soil from washing away. Tell the class that they will be conducting an experiment to see whether mulch affects the amount of water that evaporates from soil.

3. Have each group measure out $\frac{1}{2}$ cup soil into each of their cups. Have them measure and pour $\frac{1}{2}$ cup water into each cup.

4. Have each group place about one-half inch of shredded newspaper, paper toweling, or garden mulch on top of the soil in one cup. For comparison purposes, the other cup will have no mulch.

5. Have students weigh each cup and record its weight (the two cups will weigh about the same). Have them use a waterproof pen to label the two cups with the groups' names and the date.

6. Place all the cups on a countertop or windowsill.

7. Once a day for the next two or three days, give students time to weigh each cup and record the weights.

8. After the experiment, have students share their results with the class. Discuss how the mulch affected the amount of moisture in the soil.
Springhill Farm

Many varieties of potatoes are grown by Larry Peter at his 320-acre farm in the rolling hills west of Petaluma in Sonoma County. Larry grows at least 15 different types of potatoes each year and sells them as Springhill potatoes. In addition, Larry keeps more than 300 cows that supply milk for his Springhill dairy, where he produces many kinds of cheeses. These are called farm cheeses because they are made the old-fashioned way in small batches, which gives them lots of character.

You could say that being a potato farmer is in Larry’s blood. His ancestors were potato farmers in Ireland, and his parents raised their large family on an 18-acre farm outside Santa Rosa. “We all did garden chores, and I milked the cow,” Larry remembers. He recalls that potatoes grew exceptionally well on his family’s land and that they were part of most family meals.

On his own farm, Larry uses a technique called dry farming, which he learned from his parents. In dry farming, plants are not watered; they use the moisture already in the ground.

Some are big. Some are long and skinny. Still others are round and as small as marbles. They come in red, purple, yellow, white, and blue with names such as Russian Banana, German Butterball, White Rose, and Ruby Crescent. What are they? Potatoes!
Dry farming requires the soil to be specially prepared. In March, after the soil has dried out a bit from the usual winter rains, Larry begins his work. First, he digs down 15 inches and turns the soil over. He does this every week for three weeks in a row. This brings ground water (water already in the soil) up to the surface so there is enough moisture to keep the young potato plants alive. As this surface water begins to dry out, the growing plants will send their roots down deeper to seek out more water. If all goes well, the potatoes will be ready for harvest in 65 to 75 days.

At the markets, Larry and his dad tell customers what the different types of potatoes taste like and suggest ways to cook them, since different potatoes are suited to specific dishes. Some are great for baking but would not make a good potato salad. Some are especially nice steamed with their skins on, and others make great mashed potatoes. Larry undoubtedly could tell you what kind of potato makes the best French fries. Educating consumers is a role Larry clearly enjoys. “I need a break in the routine to get away from the cows and to see people,” he grins.

Harvesting potatoes is a little like digging for treasure. When the green part of the plant above the soil dies, the potatoes are ready to be taken from the ground. This can be done by a machine or by hand with a shovel. Larry uses both techniques.

Larry’s parents, Virgil and Georgia, used to take his potatoes to their house and wash and sort them before they were sent to market. These days, his dad is his top salesman at the Santa Rosa farmers market, one of several farmers markets where Springhill potatoes and cheeses are sold.
Nutrition Lesson: Cabbage
The following activities are from Harvest of the Month: Cabbage.

A. Page 1:
   1.) Conduct a cabbage tasting, using the Cabbage Taste Test Form.
   2.) Graph the results of cabbage preferences.

B. Page 2: Find fresh examples (if not available, find pictures) of the different types of cabbage in the chart under “Botanical Facts” (page 2). 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.
   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.

C. Page 2: Review How Much Do You Need?
   1.) Review amounts needed.
      1 serving of cabbage is one cup raw shredded leaves (about 2 cupped hands full. Cooked, this amount is ⅛ cup.
      Remind students that eating a variety of colorful fruits and vegetables throughout the day will help them reach their recommended needs.
   2.) Complete “Making A Plan” worksheet. Develop a plan to document student goals and results.

D. Page 1 & 2: Read “Reasons to Eat Cabbage” and What are “Cruciferous Vegetables.”
   1.) Ask students to list why it is good to eat cabbage and other cruciferous vegetables.
   2.) Complete the Student Sleuths Activities.

E. Page 4: Read “School Garden Heads of Cabbage.” Complete the activity “Investigating 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.
   6.) Complete Cabbage Worksheet.

F. Page 4, “Science Investigation”: follow the steps listed to determine whether a substance is an acid.

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 (30 ml) 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.

Sample Discussion:
Acids and bases are chemicals with distinct properties. Red cabbage juice is a chemical indicator of acids and bases. This means that the juice will turn color when either an acid or base is present. (Hint: Red cabbage juice turns redder with acids and green with bases. Darker colors indicate a stronger chemical.) Common acids that can be found in the kitchen are lemons, apple juice, orange juice, black coffee and vinegar. Common basic elements include baking soda and egg whites.
Adapted from: The Science Chef Travels around the World, Joan D’Amico and Karen Drummond, 1996.

G. Cabbage Patch Math:
1.) Predict which is heavier – raw or cooked cabbage?  
2.) Weigh a sample of raw cabbage. Then microwave sample and weigh again. Analyze results. (May also bake, boil or steam cabbage to yield different results. Discuss why different cooking methods result in differences in mass.)  
3.) Estimate and measure the circumference of cabbage heads. Compare varieties. Use circumference results to find volume of cabbage heads.

H. Vegetables are Edible Plants:
1.) Complete Vegetables are Edible Plants worksheet.

I. Literary Expressions (optional):
1.) Discuss poetry and literary style elements (e.g., rhyming, alliteration, similes, metaphors, onomatopoeia, allusions, haikus, etc.).  
2.) Make a Venn diagram to compare and contrast different cabbage varieties (e.g., red versus green).  
3.) Use observations from Cabbages Tasting activity to make list of sensory terms. Select one cabbage variety and use sensory terms to write an “Ode to Cabbage.” Read poems aloud in class. Record what style elements are used in each poem.
J. Book: (optional) Consider reading a book with the students. Check with your librarian or the local library for a copy.

Green Power: Leaf and Flower Vegetables by Meredith Sayles. This is one of a science series that provides information on a variety of edible plants. Topics include where the plants originated; how they were first cultivated; how they're currently grown, processed, and sold; to how they're eaten around the world and what their scientific applications are. Each book in the series includes cross-sectional diagrams of the focus plants, literary quotes, nutritional information, sidebars, recipes, and activities. Supports the national science education standards Unifying Concepts and Processes: Systems, Order, and Organization; Unifying Concepts and Processes: Evolution and Equilibrium; Unifying Concepts and Processes: Form and Function; and Life Science as outlined by the National Academies of Science and endorsed by the National Science Teachers Association.

A Seed Is Sleepy by Dianna Hutts Aston (Author), Sylvia Long (Illustrator). The topic is seeds and includes masterful watercolors which includes text on two levels. Short poetic phrases in large print, aimed at younger children, give seeds accessible, anthropomorphic qualities: "A seed is sleepy"; "A seed is adventurous." Paragraphs in smaller print, which tackle science concepts and expand on the phrases, are geared to older readers. The format, with little space devoted to text, doesn't always allow for thorough explanations, and kids will need help with many facts and terms. But the elegant watercolor pictures, which include helpful charts depicting a seed's growth into a plant, will pull children into the basic botany, while the pages filled with enticingly detailed seeds, both common and exotic, will encourage kids to wonder about the plant world's mysterious, gorgeous spectrum of possibilities.

These book offers the opportunity to review/discuss plants, gardens and growing foods.
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, Trans 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: käb’ij
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.

B. oleracea Cultivar Group | Includes:
----------------------------|---------------------|
Acephala                    | Kale, collard greens |
Alboglabra                  | Kai-lan (Chinese broccoli) |
Botrytis                    | Cauliflower         |
Capitata                    | Cabbage             |
Gemmifera                   | Brussels sprouts    |
Gongylodes                  | Kohlrabi            |
Italica                     | Broccoli            |

For more information, visit: http://plants.usda.gov


www.urbanext.uiuc.edu/veggies/cabbage1.html

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><strong>Males</strong></td>
<td>2½ - 5 cups per day</td>
<td>4½ - 6½ cups per day</td>
</tr>
<tr>
<td><strong>Females</strong></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 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

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.

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

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.


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

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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.

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This material was produced by the California Department of Public Health’s Network for a Healthy California with funding from USDA SNAP, known in California as CalFresh (formerly Food Stamps). These institutions are equal opportunity providers and employers. CalFresh provides assistance to low-income households and can help buy nutritious foods for better health. For CalFresh information, call 1-877-847-3683. For important nutrition information, visit www.cachampionsforchange.net. © 2010
Cabbage

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.

Primary/Secondary-level response:

Answers will vary.

- A phytochemical is a natural bioactive compound found in plant foods that works with nutrients and dietary fiber to protect the body against disease.
- Phytochemicals can have complementary and overlapping mechanisms of action in the body, including:
  - antioxidant effects,
  - modulation of detoxification enzymes,
  - stimulation of the immune system,
  - modulation of hormone metabolism, and
  - antibacterial and antiviral effects.
- Research suggests that phytochemicals, working together with nutrients found in fruits, vegetables and nuts, may help slow the aging process and reduce the risk of many diseases, including:
  - cancer,
  - heart disease,
  - stroke,
  - high blood pressure,
  - cataracts,
  - osteoporosis, and
  - urinary tract infections.

<table>
<thead>
<tr>
<th>Vegetable</th>
<th>Phytochemicals found in vegetable:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bok Choy</td>
<td>Sulphoraphane, indoles</td>
</tr>
<tr>
<td>Broccoli</td>
<td>Beta-carotene, lutein, quercetins, sulphoraphane, indoles</td>
</tr>
<tr>
<td>Broccoli sprouts</td>
<td>Sulphoraphane</td>
</tr>
<tr>
<td>Brussel sprouts</td>
<td>Sulphoraphane, indoles</td>
</tr>
<tr>
<td>Vegetable</td>
<td>Nutrients</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Cabbage</td>
<td>Sulphoraphane, indoles</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>Sulphoraphane, indoles</td>
</tr>
<tr>
<td>Collard greens</td>
<td>Lutein, sulphoraphane, indoles</td>
</tr>
<tr>
<td>Kale</td>
<td>Beta-carotene, lutein, quercetins, sulphoraphane, indoles</td>
</tr>
<tr>
<td>Swiss chard</td>
<td>Lutein, sulphoraphane, indoles</td>
</tr>
<tr>
<td>Turnips</td>
<td>Sulphoraphane, indoles</td>
</tr>
</tbody>
</table>

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 cruciferous vegetables.

Primary/Secondary-level response:
Answers will vary.

[Students can view the California Department of Education’s nutrient graphs at www.harvestofthemonth.com/EdCorner/nutrient-graphs.asp for a variety of cruciferous vegetables, such as bok choy, broccoli, cabbage, Chinese cabbage, collard greens, and kale. They can use the nutrient graphs to compare and contrast the various levels of nutrients among cruciferous vegetables. Some conclusions they may make might include: variations in colors result in varying levels of nutrients even among plants in same species (i.e., cabbage family); greens tend to have high levels of vitamin A; most varieties are good to excellent sources of vitamin A and vitamin C; and all varieties provide fiber.]

[Students can look for recipes with cruciferous vegetables at a variety of websites, like:]
- Network for a Healthy California Children’s Power Play! Campaign: www.cdph.ca.gov/programs/cpns/Pages/Recipes.aspx

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.

Primary-level response:
Anthocyanins are the reddish colors found in many fruits, such as strawberries, cherries, cranberries, raspberries, blueberries, grapes, and black currants. They may provide protection against heart disease and certain cancers.
### Foods

<table>
<thead>
<tr>
<th>Foods</th>
<th>Anthocyanin (in mg per 100 grams/food)</th>
</tr>
</thead>
<tbody>
<tr>
<td>aubergine (egg plant)</td>
<td>750</td>
</tr>
<tr>
<td>black currant</td>
<td>130-400</td>
</tr>
<tr>
<td>blackberry</td>
<td>83-326</td>
</tr>
<tr>
<td>blueberry</td>
<td>25-497</td>
</tr>
<tr>
<td>cherry</td>
<td>350-400</td>
</tr>
<tr>
<td>chokeberry</td>
<td>200-1000</td>
</tr>
<tr>
<td>cranberry</td>
<td>60-200</td>
</tr>
<tr>
<td>elderberry</td>
<td>450</td>
</tr>
<tr>
<td>orange</td>
<td>~200</td>
</tr>
<tr>
<td>radish</td>
<td>11-60</td>
</tr>
<tr>
<td>raspberry</td>
<td>10-60</td>
</tr>
<tr>
<td>red currant</td>
<td>80-420</td>
</tr>
<tr>
<td>red grape</td>
<td>30-750</td>
</tr>
<tr>
<td>red onions</td>
<td>7-21</td>
</tr>
<tr>
<td>red wine</td>
<td>24-35</td>
</tr>
<tr>
<td>strawberry</td>
<td>15-35</td>
</tr>
</tbody>
</table>

Source: [www.food-info.net/uk/colour/anthocyanin.htm](http://www.food-info.net/uk/colour/anthocyanin.htm)

**Secondary-level response:**
Anthocyanins are water soluble, reddish pigments found in many fruits, such as strawberries, cherries, cranberries, raspberries, blueberries, grapes, and black currants. Anthocyanins inhibit cholesterol synthesis, provide antioxidant cell protection, and may
help prevent binding of carcinogens to DNA. They may provide protection against heart disease and certain cancers.

See chart above for examples of fruits and vegetables that contain anthocyanins.

4. What effect does cooking have on phytochemicals in cruciferous vegetables? What is the best way to consume cabbage to get the most phytochemicals?

Primary-level response:
Boiling cruciferous vegetables causes some of the phytochemicals to be lost in the cooking water. Cooking methods that use less water, such as steaming or microwaving, reduce nutrient loss.


Secondary-level response:
Boiling cruciferous vegetables causes some of the phytochemicals to be leached into the cooking water. Cooking methods that use less water, such as steaming or microwaving, reduce nutrient loss.


Sources:
- [www.leafy-greens.org/cabbage_family.html](http://www.leafy-greens.org/cabbage_family.html)
- [www.food-info.net/uk/colour/anthocyanin.htm](http://www.food-info.net/uk/colour/anthocyanin.htm)

Updated: April 2011
# Cabbage

Brassicaceae *Brassica oleracea* L. var. *capitata* L.  
(analysis based on raw green cabbage)  
Pictured from left: Savoy, green, red cabbages

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>% Daily Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrate</td>
<td>4%</td>
</tr>
<tr>
<td>Protein</td>
<td>15%</td>
</tr>
<tr>
<td>Fiber</td>
<td>82%</td>
</tr>
<tr>
<td>Fat</td>
<td>4%</td>
</tr>
<tr>
<td>Water</td>
<td>65 Grams</td>
</tr>
<tr>
<td>Sodium</td>
<td>13 Milligrams</td>
</tr>
<tr>
<td>Carotenoids</td>
<td>1 Gram Protein</td>
</tr>
<tr>
<td>Fiber</td>
<td>2 Grams</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Serving Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Cup Shredded</td>
</tr>
<tr>
<td>70 Grams</td>
</tr>
<tr>
<td>17 Calories</td>
</tr>
<tr>
<td>4% from fat</td>
</tr>
<tr>
<td>15% from protein</td>
</tr>
<tr>
<td>82% from carbohydrate</td>
</tr>
<tr>
<td>1 Gram Protein</td>
</tr>
<tr>
<td>4 Grams Carbohydrate</td>
</tr>
<tr>
<td>2 grams dietary fiber</td>
</tr>
<tr>
<td>0.1 Gram Fat</td>
</tr>
<tr>
<td>65 Grams Water</td>
</tr>
<tr>
<td>13 Milligrams Sodium</td>
</tr>
</tbody>
</table>

Savoy cabbage has 7 times more vitamin A than green cabbage; green cabbage has 2 times more vitamin A than red cabbage. Red cabbage has 12% more vitamin C than green cabbage; green cabbage has 18% more vitamin C than Savoy cabbage. Green cabbage has 3 times more folate than red cabbage. Red and green cabbages have 2 times more fiber than Savoy cabbage.
# Green Cabbage

## Nutrition Facts

<table>
<thead>
<tr>
<th>Serving Size: ½ cup cooked green cabbage, shredded (75g)</th>
<th>Calories 17</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 6mg</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Total Carbohydrate 4g</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Dietary Fiber 1g</td>
<td>6%</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 1%</td>
<td>Calcium 4%</td>
<td></td>
</tr>
<tr>
<td>Vitamin C 47%</td>
<td>Iron 1%</td>
<td></td>
</tr>
</tbody>
</table>

Other nutrients: Vitamin K (102%), Folate (6%)

NDB No: 11110
Green Cabbage

Nutrition Facts

Serving Size: ½ cup green cabbage, shredded (35g)

<table>
<thead>
<tr>
<th></th>
<th>Calories</th>
<th>Calories from Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9</td>
<td>0</td>
</tr>
</tbody>
</table>

% Daily Value

- Total Fat 0g 0%
- Saturated Fat 0g 0%
- Trans Fat 0g
- Cholesterol 0mg 0%
- Sodium 6mg 0%
- Total Carbohydrate 2g 1%
- Dietary Fiber 1g 4%
- Sugars 1g
- Protein 1g

Vitamin A 1% Calcium 1%
Vitamin C 21% Iron 1%

Other nutrients: Vitamin K (33%)

NDB No: 11109
## Red Cabbage

### Nutrition Facts

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>% Daily Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories</td>
<td>22</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>0%</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>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>
</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>
<th>% Daily Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fat 0g</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saturated Fat 0g</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trans Fat 0g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cholesterol 0mg</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium 9mg</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Carbohydrate 3g</td>
<td>1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dietary Fiber 1g</td>
<td>3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugars 1g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein 1g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin A 8%</td>
<td></td>
<td>Calcium 2%</td>
<td></td>
</tr>
<tr>
<td>Vitamin C 33%</td>
<td></td>
<td>Iron 2%</td>
<td></td>
</tr>
</tbody>
</table>

Other nutrients: Vitamin K (17%)

NDB No: 11112
Making a Plan

Using the chart below, find out how many cups of fruits and vegetables you should eat every day.

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age 10</td>
<td>Age 11</td>
</tr>
<tr>
<td>Fruits</td>
<td>1.5 cups</td>
<td>2 cups</td>
</tr>
<tr>
<td></td>
<td>Age 12</td>
<td></td>
</tr>
<tr>
<td>Fruits</td>
<td>2 cups</td>
<td>1.5 cups</td>
</tr>
<tr>
<td>Vegetables</td>
<td>2.5 cups</td>
<td>1.5 cups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 cups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.5 cups</td>
</tr>
</tbody>
</table>

Please note: The recommended cups of fruits and vegetables listed on this chart are based on moderately active individuals (30-60 minutes of physical activity per day) from ChooseMyPlate.gov

Make a plan for how you will include fruits and vegetables in every meal.

For breakfast, I will eat___________________________________________________________

___________________________________________________________

For lunch, I will choose___________________________________________________________

___________________________________________________________

For dinner, I will select___________________________________________________________

___________________________________________________________

I am currently eating ____ cups of fruit and ____ cups of vegetables. I will need to eat ____ cups of fruit and ____ cups of vegetables to reach my goal.

My Goals!

Grade 5_6 February Lesson 6 Mulch and Cabbage

For information on obesity prevention or food stamps, call 1-888-328-3483. This material was funded by the USDA’s Food Stamp Program, an equal opportunity provider and employer.

Math Number Sense 1.0, Mathematical Reasoning 3.0
Decision Making 5.5.N18, Goal Setting 5.6.N.21
Did you know?

Cabbage is a high source of vitamin C and K.
Vitamin K helps to make proteins that cause your blood to clot. When you have a cut, vitamin K helps stop the bleeding.
Opening of trade with Asia in the late 19th century brought Chinese cabbage to California.

Summarize the above information:


List 3 adjectives that describe cabbage:
1) __________________________
2) __________________________
3) __________________________

My Goal!
I will eat _____ cups of cabbage or other green vegetables this week.

Cabbage is a high source of vitamin C. Vitamin C:
• Helps keep your gums healthy
• Helps heal cuts and wounds
• Helps fight germs

1) Refer to last month’s worksheet on mandarins. Vitamin C is an example of an __________________________
2) What is the percent Daily Value of vitamin C found in 1 cup of shredded, raw savoy cabbage?___%
3) My body would benefit from eating more fruits and vegetables that contain vitamin C because______________________________

Red (Purple) Cabbage  Savoy Cabbage  Chinese Cabbage  Green Cabbage

Nutrition Facts

<table>
<thead>
<tr>
<th>Serving Size: 1 cup raw savoy cabbage, shredded (70g)</th>
<th>Calories 19</th>
<th>Calories from Fat 1</th>
<th>% Daily Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fat 0g</td>
<td></td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Saturated Fat 0g</td>
<td></td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Trans Fat 0g</td>
<td></td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Cholesterol 0mg</td>
<td></td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Sodium 20mg</td>
<td></td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Total Carbohydrate 4g</td>
<td></td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Dietary Fiber 2g</td>
<td></td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>Sugars 2g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein 1g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin A 14%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin C 36%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium 2%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron 2%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: www.nutritiondata.com

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Vegetables are edible plants!

Flower: Did you know that eating broccoli or cauliflower means that you are eating flowers? The white head of the cauliflower is made up of little white flowers. What flowers do you eat?

Leaves: Some leaf plants like spinach have loose leaves. But have you ever noticed that the leaves of a cabbage head are packed very tightly next to each other? Cabbage heads are round like soccer balls. What leaves do you eat?

Stems & Stalks: They support the plant’s leaves, flowers, and fruits. We eat the crispy celery stalk and the stem of the asparagus plant. Celery sticks are a yummy snack, especially if they are eaten with peanut butter, cottage cheese or yogurt! What stems and stalks do you eat?

Bulbs: Bulbs are thin, tightly folded layers of leaves attached to a short stem. The base of these big leaves is big—and it grows underground. The best example of a bulb is the onion and garlic. What bulbs do you eat?

Tubers: Tubers, like bulbs and roots, grow underground. When you are eating a potato, you are eating a tuber. Have you ever seen a potato looking at you? The spots on a potato are called eyes. They are underdeveloped buds where new plants can grow from. What tubers do you eat?

Roots: If you are eating carrots, sweet potatoes, turnips, or beets, you are eating roots! How did this root get so fat? It is because the plant ends up taking in more food than it can use, and so it stores the extra food in its roots. Then these roots get bigger and bigger until we pull them up and eat them! What roots do you eat?

Content adapted from: jmu.edu/biology/k12/garden.parts.htm
Seasonal Guide to Fruits and Vegetables

It is easy to stay healthy and save money when you buy fruits and vegetables that are in peak season. Keep it safe! You should always rinse your fruits and vegetables before you eat them.

<table>
<thead>
<tr>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
<th>Winter</th>
<th>Year-Round</th>
</tr>
</thead>
<tbody>
<tr>
<td>apricots</td>
<td>apricots</td>
<td>acorn squash</td>
<td>avocados</td>
<td>apples</td>
</tr>
<tr>
<td>artichokes</td>
<td>avocados</td>
<td>brussels sprouts</td>
<td>bananas</td>
<td>jicama</td>
</tr>
<tr>
<td>asparagus</td>
<td>bell peppers</td>
<td>butternut squash</td>
<td>beets</td>
<td>kale</td>
</tr>
<tr>
<td>avocados</td>
<td>cantaloupe</td>
<td>chayote squash</td>
<td>bok choy</td>
<td>leeks</td>
</tr>
<tr>
<td>bell peppers</td>
<td>cherries</td>
<td>cherimoya</td>
<td>broccoli</td>
<td>lemons</td>
</tr>
<tr>
<td>collard greens</td>
<td>corn</td>
<td>grapes</td>
<td>cabbage</td>
<td>lettuce</td>
</tr>
<tr>
<td>grapefruit</td>
<td>grapes</td>
<td>green beans</td>
<td>cactus leaves</td>
<td>limes</td>
</tr>
<tr>
<td>green peas</td>
<td>green peas</td>
<td>honeydew</td>
<td>canned fruits and</td>
<td>mushrooms</td>
</tr>
<tr>
<td>guavas</td>
<td>honeydew</td>
<td>kiwfruit</td>
<td>vegetables</td>
<td>onions</td>
</tr>
<tr>
<td>mangos</td>
<td>mangoes</td>
<td>mustard greens</td>
<td>carrots</td>
<td>parsnips</td>
</tr>
<tr>
<td>oranges</td>
<td>nectarines</td>
<td>oranges</td>
<td>cauliflower</td>
<td>pineapples</td>
</tr>
<tr>
<td>papayas</td>
<td>okra</td>
<td>pears</td>
<td>celery</td>
<td>potatoes</td>
</tr>
<tr>
<td>rhubarb</td>
<td></td>
<td>persimmons</td>
<td>chili peppers</td>
<td>radishes</td>
</tr>
<tr>
<td>strawberries</td>
<td></td>
<td>pomegranates</td>
<td>cucumbers</td>
<td>spinach</td>
</tr>
<tr>
<td>swiss chard</td>
<td></td>
<td>pumpkins</td>
<td>dried fruit</td>
<td>tomatillos</td>
</tr>
</tbody>
</table>

Grade 5-6 February Lesson 6 Mulch and Cabbage