Plant Parts Salad

Grade 1

Standards
GPS S1L1c (science)
NGSS 1.LS1.A (science)
HE1.1 a (health)

Time
(2-3) 45 minute periods over 2 days

Supplies
- Salad spinner or strainer
- Veggies/greens harvested from garden representing different parts of plants (supplemented by purchased vegetables, if needed) for both sorting and salad-making
- Salad dressing – several choices OR ingredients for vinaigrette including oil, vinegar, herbal seasonings
- Large salad bowl, whisk, serving utensils
- Tasting materials (small paper cups and forks- one per student)
- Book: Eat Healthy, Feel Great by William Sears OR The Vegetables We Eat by Gail Gibbons
- 6 index cards, each labeled with a plant part
- 3 – 4 straw bales for compost heap (optional; directions in lesson)
- Student garden/science journals

Garden Connection
Students will grow and harvest fall (or spring) vegetables in a garden.

Note
If using fruits and vegetables from a store or market, purchase plants that would typically be grown in the school garden, such as nutritional leafy green lettuce rather than a head of less-nutritional iceberg.

Overview
Students will harvest vegetables from the garden, taste a variety of plants and learn about their nutritional value. Students will learn parts of a plant by making a 'plant parts salad.'

Guiding Questions
What can I grow in the garden that I can eat?
How do I know if I'm eating healthy foods?
What are the parts of a plant and what does each part do for the plant?

Engaging Students
Students will sort a group of fruits and vegetables by parts of plants.

Exploration
Students will listen to a book about healthy eating and harvest vegetables from the school garden to make a salad that contains all the parts of a plant: leaves, stems, roots, flowers, and fruits, seeds or nuts.

Explanation
Students will be able to explain which vegetables come from which parts of a plant, based on the functions of different plant parts. Students will also understand that a variety of fruits and vegetables of different colors provides the widest nutritional value.

Environmental Stewardship
Students will compost leftover salad ingredients and care for an organic school garden from which vegetables can be harvested for healthy eating.

Evaluation
Students will be able to sort plant parts accurately and explain plant part functions. Students will also be able to gauge how healthy their food choices are by counting the number of colors on the plate (as an indicator of the variety of vegetables and therefore nutrients). A rubric is provided to assess student demonstration of competency in identifying plants parts, explaining functions, and describing healthy eating as it relates to fruits and vegetables.

Standards

Georgia Performance Standards in Science

S1L1. Students will investigate the characteristics and basic needs of plants and animals.

c. Identify the parts of a plant—root, stem, leaf, and flower.

Georgia Performance Standards in Health

HE1.1: Students will comprehend concepts related to health promotion and disease prevention to enhance health. Students will acquire basic personal health concepts that help maintain healthy behaviors and prevent disease. First grade students will understand how healthy behaviors impact personal health and disease prevention.

a. Tell how healthy behaviors impact personal health and wellness.

Next Generation Science Standards

NGSS 1.LS1.A: Structure and Function

All organisms have external parts. . . . . Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)

Teacher Background Information

- Reference chart on parts of plant and their functions: http://gardenabcs.com/uploads/plantparty-4.pdf
- Video on parts of a plant: http://www.brainpopjr.com/science/plants/partsofaplant/preview.weml
- Eating a Rainbow: https://www.wholekidsfoundation.org/downloads/better-bites/better-bites-eat-a-rainbow.pdf
- The Healthy Eating Plate and Nutrition Knowledge http://www.hsph.harvard.edu/nutritionsource/
- Tips for Knowing When to Harvest: http://www.gardening.cornell.edu/factsheets/vegetables/harvestguide.pdf

Teacher Preparation

Obtain supplies for the lesson. Consider teaching Captain Planet Foundation's Square Foot Garden lesson 4 – 8 weeks before this lesson, so students will have planted seeds in the garden in time to harvest plants for this lesson. Request additional salad ingredients from parents or purchase them at a local market to make sure all plant parts are represented in the salad. Plants for salad that can be grown in fall or spring include leaf lettuces, spinach, kale, carrots, and radishes. Some of the fastest growing salad plants are arugula (small leaves in 3 weeks), Cherry Belle radishes (1" round roots in 3 weeks), Black-seeded Simpson lettuce (4 weeks), spinach (small leaves in 5 weeks), Contender bush beans (7 weeks), Sugar Anne snap peas (edible pods in 8 weeks), and carrots (baby carrots in 4 weeks). If the school does not have a compost heap, start one using the directions under Environmental Stewardship.

PROCEDURES FOR LESSON ACTIVITIES

Engagement: Day 1- Sort Fruits and Vegetables by Plant Parts

- Make word cards by writing the names of plant parts on large index cards and placing them at sorting stations.
- Divide the class into small groups of 3 – 4, and give each group several plant parts to sort.
- Tell each group to discuss and agree on how to sort a variety of edible fruits and vegetables, and to place each of those fruits and vegetables next to the appropriate plant part word card.
- Choose more than one plant part from each of the following categories to give to each student group, allowing students to pick them from the garden and supplementing with store-bought fruit and vegetables for variety, if necessary.
  Fruit (seed-bearing structure of the plant): Zucchini, tomato, cucumber, strawberry, pumpkin, okra
  Seed (contains the makings of a tiny plant): Corn, peas, rice, sunflower seeds, beans, coffee beans, wheat flour
  Flower (grows a fruit that holds seeds): Broccoli, cauliflower, squash blossom, nasturtium, pansy
  Leaf (catches light and makes food for plant): Lettuce, spinach, collards, kale, cabbage, Swiss chard, Brussel sprouts
  Stem (holds plant up; moves water from roots to leaves): Kohlrabi, broccoli stem (often asparagus and celery are called stems but they are actually modified leaves)
  Root (anchors plant in ground and absorbs water): Carrot, beet, radish, turnip, rutabaga, jicama, sweet potato
- The following plant parts may be too confusing for classification by first graders. If included, these plant parts should initially include roots still attached, so it is easier to show that roots are separate from these structures:
  Modified stem: onion (bulb); potato, Jerusalem artichoke (tuber); ginger (rhizome); taro (corm). *Leaf stalk*: Celery.
- Leave the plant parts where students sorted them and continue the rest of the lesson.
- Use an LCD projector or Smartboard to show students the section of The Great Plant Escape mission on Plant Parts, simplifying and paraphrasing as necessary for first grade: http://urbanext.illinois.edu/gpe/case1/c1facts2a.html
- Explain to students that "vegetable" means any part of a plant that can be eaten, but it is not a scientific name for any

plant part. Foods we call vegetables can be any part of a plant.

- Engage the class in a discussion about the functions of each part of a plant. Then divide into groups again and give each group a chance to move their fruits and vegetables to different sorting stations (plant-part categories).
- Then show the class which fruits and vegetables were sorted into which plant-part categories, and ask whether each classification is correct. Encourage students to argue from evidence and challenge each other's conclusions based on whether a particular plant part serves the function that defines it. For instance, in arguing that a squash is a fruit, a student might say it contains seeds and since making seeds is the function of a fruit, a squash must be a fruit.
- Save the sorted vegetables and fruits for salad making, to supplement the school garden harvest.

Exploration: Day 2 - Part A – Discover How Healthy Food Choices are Like Eating a Rainbow

- Read the class a book such as: Eat Healthy, Feel Great by William Sears. Talk about the importance of trying new foods and making good, healthy choices.
- OR read a book such as The Vegetables We Eat by Gail Gibbons and take time to let students notice plant parts and how vegetables are classified in the book.
- Discuss the nutritional value of vegetables and how they promote good health, referring to these Nutrition Charts to answer one question from each student about a specific fruit or vegetable and the nutrients it provides when eaten.
    - http://www.fda.gov/downloads/Food/IngredientsPackagingLabeling/LabelingNutrition/UCM169237.pdf
    - http://www.fda.gov/downloads/Food/GuidanceRegulation/UCM153464.pdf
- Familiarize students with words that describe nutrients in foods, without expecting students to understand the role of each nutrient in human health: Carbohydrates; Calcium; Fiber; Protein; Iron; Vitamins; and Minerals
- Facilitate a discussion about whether one fruit or vegetable is better or more nutritious than others. Help students see that some vegetables have more nutrient value than others; no one fruit or vegetable provides all the nutrients and vitamins a person needs; and each plant provides difference nutrient and vitamins. It is therefore important to eat a variety of fruits and vegetables to stay healthy.
- Confirm that the selection of unprocessed, naturally-colored vegetables and fruits are healthy food choices. "Eating a rainbow" means the more colors on your plate, the more variety of fruits and vegetables you are eating, and therefore the greater variety of nutrients, and the healthier the meal.
- Challenge students to count the number of (natural) colors on their plates at lunch and generalize about the healthiness of their food choices based on how many colors they ate.

Exploration: Day 2 - Part B- Harvest a Salad

- Walk students outside to the school garden and harvest any vegetables that are ready to eat.
- Supplement the harvest with veggies from the sorting activity (or market), so all plant parts are represented.
- Wash the fruits and vegetables before using them to make a salad.
- Let students take turns using a salad spinner (gently) to spin-dry the leafy greens.
- Mix the fruits and vegetables in a large salad bowl and serve to students.
- Allow students to choose and add a small amount of salad dressing and ENJOY!
- As an alternative to store-bought salad dressing, students may make a vinaigrette by whisking three parts olive oil with one part vinegar with a pinch of fresh, minced herbs. Here are directions, if needed: http://www.cookinglight.com/cooking-101/techniques/how-to-make-vinaigrette-recipes/view-all
- If the school has a Captain Planet Foundation mobile cooking cart, consider using olive oil to sauté greens from the garden (such as kale) and sliced radishes, as salad toppers. Many students who do not care for the taste of raw vegetables will find them more palatable when cooked.

Explanation

- Conclude the activity by having each student get out his or her garden journal and draw a picture of a fruit or vegetable they taste-tasted in the salad; label it with a plant part word, e.g. root, stem, leaf, flower, fruit, seed; and write a sentence about why it is healthy and nutritious to eat.
- The teacher may wish to print the FDA posters on plant nutrition for reference, so students can ask for information about the vegetable they have chosen, to include in sentences in their journals. For instance, a student who asks about the nutrition provided by a cantaloupe could be told it provides vitamin A and vitamin C.
- http://www.fda.gov/downloads/Food/GuidanceRegulation/ucm063477.pdf Vegetable Nutrition Chart from FDA
  http://www.fda.gov/downloads/Food/GuidanceRegulation/UCM153464.pdf Fruit Nutrition Chart from FDA
  http://www.fda.gov/food/ingredientspackaginglabeling/labelingnutrition/ucm063367.htm Poster size charts

Environmental Stewardship

Students will place leftover salad ingredients in a compost heap near the school garden.

- If a compost heap does not already exist, one can be made quickly and inexpensively by arranging straw bales in a U or square, lining the bottom with small sticks or brown leaves to provide air flow, and placing vegetable matter such as food scraps (no meat) in the center. Whenever green matter is added (food scraps or grass clippings), add a layer of brown matter also (shredded newspaper, wood chips, dry leaves or garden weeds). Use a large garden fork or shovel to turn the compost once a week and water occasionally to keep it about as wet as a wrung-out sponge. When compost has decomposed into small, crumbly particles, it can be added to soil to enrich the garden with nutrients. Because garden plants draw nutrients out of the soil, it is continuously necessary for those nutrients to be replaced, and compost provides a natural fertilizer for the organic garden.
- For more information on composting, check out this article on the Kids Gardening web site: http://www.kidsgardening.org/node/73512

Evaluation

Students will be able to sort plant parts accurately and explain plant part functions. Students will also be able to gauge how healthy their food choices are by counting the number of colors on the plate (as an indicator of the variety of vegetables and therefore nutrients). A rubric is provided to assess student demonstration of competency in identifying plant parts and describing healthy eating.

Extensions

Visit the Nourish Interactive web site to print out garden journal pages and coloring sheets such as these:

- "What Parts of the Plant Can We Eat?" http://www.nourishinteractive.com/nutrition-education-printables/128-kids-garden-healthy-foods-parts-of-plants-learning-coloring-sheet

Help student associate colorful foods with healthy eating by doing this coloring activity: "Chef Solus' Colorful Plate"

- http://www.nourishinteractive.com/nutrition-education-printables/15-kids-drawing-coloring-activity-color-your-plate-rainbow-foods .

Show a video on parts of a plant:

- http://www.brainpopjr.com/science/plants/partsofaplant/preview.weml

Explore the concept of eating foods of several different colors at each meal, to ensure a variety of nutrients

- Eating a Rainbow https://www.wholekidsfoundation.org/downloads/better-bites/better-bites-eat-a-rainbow.pdf

Show students Harvard's updated Healthy Eating Plate, which modifies the USDA My Plate model based on evidence-based nutrition science

- http://www.hsph.harvard.edu/nutritionsource/

Fruits

Nutrition Facts

Raw, edible weight portion.
Percent Daily Values (%DV) are based on a 2,000 calorie diet.

Fruits Serving Size (gram weight/ounce weight)	Calories	Calories from Fat	Total Fat g	%DV	Sodium mg	%DV	Potassium mg	%DV	Total Carbohydrate g	%DV	Dietary Fiber g	%DV	Sugars g	Protein g	Vitamin A %DV	Vitamin C %DV	Calcium %DV	Iron %DV
Apple 1 large (242 g/8 oz)	130	0	0	0	0	0	260	7	34	11	5	20	25g	1g	2%	8%	2%	2%
Avocado California, 1/5 medium (30 g/1.1 oz)	50	35	4.5	7	0	0	140	4	3	1	1	4	0g	1g	0%	4%	0%	2%
Banana 1 medium (126 g/4.5 oz)	110	0	0	0	0	0	450	13	30	10	3	12	19g	1g	2%	15%	0%	2%
Cantaloupe 1/4 medium (134 g/4.8 oz)	50	0	0	0	20	1	240	7	12	4	1	4	11g	1g	120%	80%	2%	2%
Grapefruit 1/2 medium (154 g/5.5 oz)	60	0	0	0	0	0	160	5	15	5	2	8	11g	1g	35%	100%	4%	0%
Grapes 3/4 cup (126 g/4.5 oz)	90	0	0	0	15	1	240	7	23	8	1	4	20g	0g	0%	2%	2%	0%
Honeydew Melon 1/10 medium melon (134 g/4.8 oz)	50	0	0	0	30	1	210	6	12	4	1	4	11g	1g	2%	45%	2%	2%
Kiwifruit 2 medium (148 g/5.3 oz)	90	10	1	2	0	0	450	13	20	7	4	16	13g	1g	2%	240%	4%	2%
Lemon 1 medium (58 g/2.1 oz)	15	0	0	0	0	0	75	2	5	2	2	8	2g	0g	0%	40%	2%	0%
Lime 1 medium (67 g/2.4 oz)	20	0	0	0	0	0	75	2	7	2	2	8	0g	0g	0%	35%	0%	0%
Nectarine 1 medium (148 g/5.0 oz)	60	5	0.5	1	0	0	250	7	15	5	2	8	11g	1g	8%	15%	0%	2%
Orange 1 medium (154 g/5.5 oz)	80	0	0	0	0	0	250	7	19	6	3	12	14g	1g	2%	130%	6%	0%
Peach 1 medium (147 g/5.3 oz)	60	0	0.5	1	0	0	230	7	15	5	2	8	13g	1g	6%	15%	0%	2%
Pear 1 medium (166 g/5.9 oz)	100	0	0	0	0	0	190	5	26	9	6	24	16g	1g	0%	10%	2%	0%
Pineapple 2 slices, 3" diameter, 3/4" thick (112 g/4 oz)	50	0	0	0	10	0	120	3	13	4	1	4	10g	1g	2%	50%	2%	2%
Plums 2 medium (151 g/5.4 oz)	70	0	0	0	0	0	230	7	19	6	2	8	16g	1g	8%	10%	0%	2%
Strawberries 8 medium (147g/5.3 oz)	50	0	0	0	0	0	170	5	11	4	2	8	8g	1g	0%	160%	2%	2%
Sweet Cherries 21 cherries; 1 cup (148 g/5.0 oz)	100	0	0	0	0	0	350	10	26	9	1	4	16g	1g	2%	15%	2%	2%
Tangerine 1 medium (109 g/3.9 oz)	50	0	0	0	0	0	160	5	13	4	2	8	9g	1g	6%	45%	4%	0%
Watermelon 1/18 medium melon; 2 cups diced pieces (280 g/10.0 oz)	80	0	0	0	0	0	270	8	21	7	1	4	20g	1g	30%	25%	2%	4%

Most fruits provide negligible amounts of saturated fat, *trans* fat, and cholesterol; avocados provide 0.5 g of saturated fat per ounce.

U.S. Food and Drug Administration
(January 1, 2008)

Vegetables

Nutrition Facts

Raw, edible weight portion.
Percent Daily Values (%DV) are based on a 2,000 calorie diet.

Vegetables Serving Size (gram weight/ounce weight)	Calories	Calories from Fat	Total Fat g	%DV	Sodium mg	%DV	Potassium mg	%DV	Total Carbohydrate g	%DV	Dietary Fiber g	%DV	Sugars g	Protein g	Vitamin A %DV	Vitamin C %DV	Calcium %DV	Iron %DV
Asparagus 5 spears (93 g/3.3 oz)	20	0	0	0	0	0	230	7	4	1	2	8	2g	2g	10%	15%	2%	2%
Bell Pepper 1 medium (148 g/5.3 oz)	25	0	0	0	40	2	220	6	6	2	2	8	4g	1g	4%	190%	2%	4%
Broccoli 1 medium stalk (148 g/5.3 oz)	45	0	0.5	1	80	3	460	13	8	3	3	12	2g	4g	6%	220%	6%	6%
Carrot 1 carrot, 7" long, 1 1/4" diameter (78 g/2.8 oz)	30	0	0	0	60	3	250	7	7	2	2	8	5g	1g	110%	10%	2%	2%
Cauliflower 1/6 medium head (99 g/3.5 oz)	25	0	0	0	30	1	270	8	5	2	2	8	2g	2g	0%	100%	2%	2%
Celery 2 medium stalks (110 g/3.9 oz)	15	0	0	0	115	5	260	7	4	1	2	8	2g	0g	10%	15%	4%	2%
Cucumber 1/3 medium (99 g/3.5 oz)	10	0	0	0	0	0	140	4	2	1	1	4	1g	1g	4%	10%	2%	2%
Green (Snap) Beans 3/4 cup cut (83 g/3.0 oz)	20	0	0	0	0	0	200	6	5	2	3	12	2g	1g	4%	10%	4%	2%
Green Cabbage 1/12 medium head (84 g/3.0 oz)	25	0	0	0	20	1	190	5	5	2	2	8	3g	1g	0%	70%	4%	2%
Green Onion 1/4 cup chopped (25 g/0.9 oz)	10	0	0	0	10	0	70	2	2	1	1	4	1g	0g	2%	8%	2%	2%
Iceberg Lettuce 1/6 medium head (89 g/3.2 oz)	10	0	0	0	10	0	125	4	2	1	1	4	2g	1g	6%	6%	2%	2%
Leaf Lettuce 1 1/2 cups shredded (85 g/3.0 oz)	15	0	0	0	35	1	170	5	2	1	1	4	1g	1g	130%	6%	2%	4%
Mushrooms 5 medium (84 g/3.0 oz)	20	0	0	0	15	0	300	9	3	1	1	4	0g	3g	0%	2%	0%	2%
Onion 1 medium (148 g/5.3 oz)	45	0	0	0	5	0	190	5	11	4	3	12	9g	1g	0%	20%	4%	4%
Potato 1 medium (148 g/5.3 oz)	110	0	0	0	0	0	620	18	26	9	2	8	1g	3g	0%	45%	2%	6%
Radishes 7 radishes (85 g/3.0 oz)	10	0	0	0	55	2	190	5	3	1	1	4	2g	0g	0%	30%	2%	2%
Summer Squash 1/2 medium (98 g/3.5 oz)	20	0	0	0	0	0	260	7	4	1	2	8	2g	1g	6%	30%	2%	2%
Sweet Corn kernels from 1 medium ear (90 g/3.2 oz)	90	20	2.5	4	0	0	250	7	18	6	2	8	5g	4g	2%	10%	0%	2%
Sweet Potato 1 medium, 5" long, 2"diameter (130 g/4.6 oz)	100	0	0	0	70	3	440	13	23	8	4	16	7g	2g	120%	30%	4%	4%
Tomato 1 medium (148 g/5.3 oz)	25	0	0	0	20	1	340	10	5	2	1	4	3g	1g	20%	40%	2%	4%

Most vegetables provide negligible amounts of saturated fat, *trans* fat, and cholesterol.

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Assessment for Plant Parts Salad

Student Name(s): _____ **Date:** _____

Level of Mastery → / **Benchmark or Performance Measure** ↓	 **Not yet proficient**	 **Partially proficient**	 **Mastered task 80%+ proficiency**	**TOTAL POINTS**
Student can identify the following plant parts: roots, stems, leaves, flowers and fruit, and explain the function of each part.	By the end of the lesson, student sorts (or draws and labels) common vegetables and fruits by parts of a plant, including root, stem, leaf, flower, and fruit or seed, with less than 50% accuracy OR identifies the function of each plant part with less than 50% accuracy .	By the end of the lesson, student can sort (or draw and label) common vegetables and fruits by parts of a plant, including root, stem, leaf, flower, and fruit or seed with 50% accuracy AND can explain the function of each part with more than 50% accuracy. (Acceptable answers: roots anchor plants or roots absorb water and nutrients from soil; stems hold plants upright or stems help transport water and nutrients inside the plant; leaves catch sunlight or leaves make food for the plant; flowers attract pollinators or flowers make seeds (which are sometimes inside fruits or nuts); and fruits contain seeds to make new plants.	By the end of the lesson, student can sort (or draw and label) common vegetables and fruits by parts of a plant, including root, stem, leaf, flower, and fruit, with 80% accuracy AND can provide evidence for classification based on function of each part. (Clarification: this does not include uncommon vegetables and fruits or unusual plant parts such as inverted flowers, swollen leaf structures, etc.)	
Student can explain that fruits and vegetables are an important part of the diet because they provide nutrients (or vitamins or minerals). Student can determine whether food choices are healthy by checking his or her plate to see if it contains foods of several different natural colors.	Student may know that eating vegetables and fruits are important parts of a healthy diet but cannot explain why.	Student can explain that plants (or fruits and vegetables) provide humans who eat them with nutrients (or vitamins or minerals).	Student can explain that because each plant provides different nutrients, it is necessary to eat a variety of vegetables and fruits to stay healthy. Student can also tell if his or her food choices are healthy by the number of different colored foods on the plate. The more colors, the greater the variety (and quantity) of nutrients the food provides.	