

Food Math

Background Information

The amount of nutrients you can obtain from a food depends on the size of a serving. This amount, called **serving size**, is displayed on the **Nutrition Facts** label found on food packaging. Serving sizes are **standard reference amounts** that are set by the United States Food and Drug Administration (FDA). Serving sizes differ depending on the type of food. For example, a serving size of peanut butter is 2 tablespoons, while a serving size of breakfast cereal is 1 cup. Serving sizes are often considered the recommended amount that a person should eat; however, they are simply reference amounts that help us to compare the nutrients in different foods.

In contrast to serving sizes, which are standard measurements, **portions** are **subjective amounts**. Portion sizes vary from person to person, and can be as large or as small as someone chooses.

Portion sizes and serving sizes can be described using different measurements: length, weight, or volume. **Length measurements** are commonly used with fruits like bananas, vegetables such as whole carrots or celery, or dishes like casseroles and lasagnas. **Weight measurements** refer to the mass of a food and can be thought of in ounces or grams for dry products, and fluid ounces for liquids. **Volume measurements** refer to the amount of three-dimensional space a product takes up, like a tablespoon or cup, whether liquid or dry.

Concepts and Vocabulary

- **Length:** a measurement that uses inches or centimeters to describe an object end to end.
- **Nutrition Facts:** a label on food packaging that lists a variety of nutrients and how much of each is contained in a serving.
- **Portion:** a subjective amount of food that can vary in size from person to person.
- **Serving size:** a standardized amount of a food determined by the FDA; found on the Nutrition Facts label on food packaging.
- **Standard reference amount:** an amount that is used for the basis of comparison.
- **Subjective:** something that is dependent upon the views or thoughts of an individual, and may be different from person to person.
- **Volume:** a measurement of the three-dimensional space that a food takes up; measured using teaspoons, tablespoons, or cups for both liquid and dry foods.
- **Weight:** a measure of the mass of an object using grams, ounces, or pounds.
- **Yield:** the amount of crops produced through cultivation of a garden or agricultural land.

Life Skills

Teamwork, Contributions to Group Effort, Problem Solving, Healthy Lifestyle Choices, Communication, Sharing, Critical Thinking.

Subject Links

Science, Math, Health, Nutrition

Educational Standards Supported

Discovering Healthy Choices curriculum supports Next Generation Science Standards, Common Core State Standards, and California Nutrition Education Competencies. For specific details on standards and grade levels, please see page 9.

4.1

Activity 4.1: Classroom Activity

Time Required

60 to 75 minutes

Suggested Groupings

Small groups of 3 to 4 youth

Materials Needed

(*Materials provided in curriculum)

- Flip chart paper
- Markers or writing utensils
- **Breakfast Breakdown* (Appendix 4A)
- **Breakfast Patties* (Appendix 4B)
- Popular children's cereal; enough for each group to pour a generous portion
Facilitator Tip: It is important that the cereal chosen is a popular cereal, not a healthy or generic cereal. You will need enough cereal for each group to pour one generous portion.
- 100% juice (e.g., apple, orange); enough for each group to pour a generous portion
Facilitator Tip: Juice may be substituted with water.
- Peanut Butter
Facilitator Tip: These foods will not be eaten. However, if there are youth with severe peanut allergies, the peanut butter should be substituted with almond butter or fruit jelly.
- Set of measuring cups ($\frac{1}{4}$, $\frac{1}{2}$, and 1 cup); one set for each group.
- Large measuring cup (preferably holding 2 cups or more); one for each group.
- Measuring spoons with teaspoons and tablespoons; one set for each group.
Facilitator Tip: Ask to borrow measuring cups and spoons from parents so they don't have to be purchased.
Facilitator Tip: If there are not enough measuring tools for each group to have one set, they can be shared at a central supplies table.
- Plastic spoons for spreading peanut butter; one for each group
- Paper or plastic cereal bowls; one for each group
- Drinking cups (at least 12 oz); one for each group
- Small paper or plastic plates; one for each group
- Plastic bag or other container for food waste; one for each group

Getting Ready

1. Make copies of the *Breakfast Breakdown* worksheet (Appendix 4A), one for each group.
2. Make copies of the *Breakfast Patties* (Appendix 4B), one set for each group.
3. Set up four food stations: one with the cereal; one with the juice; one with the peanut butter; and one with the sets of *Breakfast Patties*.

Facilitator tip: The peanut butter can get a little messy. Flip chart paper or newspaper can be placed under the food items to help keep the areas clean. Additionally, have paper towels available for wiping hands clean.

- Organize the class into small groups of 3 to 4 youth.

Facilitator Tip: These can be the same groups that were formed in Module 1, Activity 1. By doing so, the youth may continue developing teamwork skills with the same group members.

- Provide each group with a sheet of flip chart paper and markers to answer opening questions/prompts.

Opening Questions/Prompts

Ask the youth to respond to each question below by recording their thoughts on their flip chart paper with markers and sharing their ideas verbally.

- Explain how you decide how much food to eat when you sit down for a meal or have a snack.
- Explain what you know about how we measure amounts of food.

Procedure (Experiencing)

1. Provide each group with a copy of the *Breakfast Breakdown* worksheet.
2. Provide each group with a set of measuring cups and a set of measuring spoons.
3. Provide each group with a plastic spoon, cereal bowl, drinking cup, paper or plastic plate, and plastic bag for food waste.
4. Explain to the youth that they will be serving themselves amounts of foods that are commonly consumed at breakfast. Tell them that the foods used in this activity are not to be eaten during this activity.
5. Distribute the groups equally among the different food stations.
6. Ask the groups at each of the stations to work together to decide how much of each food they might typically take. Ask them to pour the amount of cereal they might typically eat into one bowl. Then, ask them to pour the amount of juice they might typically drink into the cup. Next, ask them to spread the quantity of peanut butter onto the plate that they would spread onto a piece of bread or toast. Lastly, from the set of *Breakfast Patties* handouts, ask the youth to select the size of breakfast patty they might typically choose at breakfast.

Facilitator Tip: These foods may not be what the youth customarily eat, but it is important that they take some of each food. Some youth may take very large amounts of cereal and/or peanut butter.

7. Have the youth rotate between the stations until they have taken one of each of the foods.
8. Ask the youth to use any of the measuring tools available to measure the amounts of cereal, juice and peanut butter that they served themselves. Have them record the measurements in the second column on the *Breakfast Breakdown* worksheet titled “Portion,” making sure to record the units of measurement they used. For the breakfast patties, ask them to record the amount that is found in the lower right-hand corner of the *Breakfast Patties* portion they chose.

Facilitator Tip: Some youth may need help being precise in their measurements. Make sure that they fill up the cups and level them off.

Procedure (Experiencing) (continued)

Facilitator Tip: Do not continue to Step 9 until the youth have finished Step 8. It is important that the serving sizes are not revealed until the youth have finished measuring their portions.

9. On the chalkboard, whiteboard, or overhead projector, write the serving sizes of each food type:
 - Cereal = 1 cup (56 grams)
 - Juice = 8 ounces (1 cup)
 - Peanut butter, Almond butter, or Jam = 2 tablespoons (1/8 cup)
 - Meat patty = 2 ounces (56 grams)
10. Ask the youth to record the serving sizes for each food on their *Breakfast Breakdown* worksheet.
11. Ask each group to calculate the difference between the portion they served themselves and the serving size. Have them record the difference in the third column, titled “Difference between portion and serving size” on the *Breakfast Breakdown* worksheet.

Facilitator Tip: In order to calculate the difference, youth may first need to convert their measurements between cups, tablespoons and ounces. Conversions are listed near the bottom of the *Breakfast Breakdown* worksheet.
12. Ask each group to calculate the number of servings that were in the portions they served themselves by dividing the portion by the serving sizes. Have them record this in the “Number of Servings in the Portion” column.

Sharing, Processing, and Generalizing

1. Have each of the groups share what they noticed as they completed the *Breakfast Breakdown* worksheet.
2. Follow the lines of thinking by the youth through their general thoughts, observations, and questions; if necessary, ask more targeted questions:
 - Explain what you observed when you compared the amount you chose for each food and the serving size.
 - Explain how you went about deciding which measuring tools to use.
 - Explain how you went about finding the difference between the portion and serving size.
 - Explain how you found the number of servings you measured in the portion of each food.
 - Explain what you think is important about knowing serving sizes.

Concept Term Discovery/Introduction

It is important that youth understand the difference between a **portion**, an amount of food subjectively served, and a **serving size** that is a standard measure that is measured precisely. They should also understand that serving sizes are important for being able to compare the nutrients content of foods from one to another. It is important that youth clearly understand that the serving size of a food is not a recommended amount but a reference amount. Make sure the youth discover or are introduced to the following key terms: **volume, length, weight, cups, ounces, tablespoons, teaspoons, serving size, portion, standard, and subjective.**

4.2

Activity 4.2: Home Concept Application

Getting Ready

- Make copies of the *Track Your Snack* worksheet (Appendix 4C), one for each youth.

Procedure (Experiencing)

1. Ask the youth to complete the *Track Your Snack* worksheet at home with their families.
2. Explain that the activity will ask the youth and their family members to serve themselves a portion of any food, and then measure it. Next, they will locate the serving size on the Nutrition Facts label. Finally, they will calculate the difference between the portion and the serving size, and find out the number of servings in the portion.
3. After the youth have returned with their completed worksheets, ask them share their findings.

Time Required

5 to 10 minutes

Materials

- (*Materials provided in curriculum)
- **Track Your Snack* (Appendix 4C)

Activity 4.3 Garden Concept Application

Getting Ready

1. Purchase or harvest vegetables.
2. Prepare the whole vegetables, one for each group, by washing them.
3. Prepare the chopped vegetables by washing them and roughly chopping them, so that there is one whole vegetable that has been chopped for each group. Store each chopped vegetable in a separate plastic storage container, one for each group.
4. Make copies of the *What's in a Vegetable* worksheet (Appendix 4D), one for each group.
5. Make copies of the *Garden to Kitchen Predictions* worksheet (Appendix 4E), one for each group.
6. Organize the class into small groups of 3 to 4 youth.

Facilitator Tip: These can be the same groups that were formed in Module 1, Activity 1. By doing so, the youth may continue developing teamwork skills with the same group members.

Facilitator Tip: One-third of the groups will receive two carrots: one whole carrot and one that has been chopped.

One third of the groups will receive two cucumbers: one whole and one that has been chopped. One third of the groups will receive Swiss chard: one whole bunch and one bunch that has been chopped.

7. Provide each group with a sheet of flip chart paper and markers to answer opening questions.

Time Required

60 to 75 minutes

Suggested Groupings

Small groups of 3 to 4 youth

Materials Needed

(*Materials Provided in the Curriculum)

- Flip chart paper
- Markers or other writing utensils
- **What's in a Vegetable* (Appendix 4D)
- **Garden to Kitchen Predictions* (Appendix 4E)
- Vegetables: medium carrots (6-7"), medium cucumbers (8"), and bunches of Swiss chard
- Plastic storage containers
- Measuring cups
- Rulers

Facilitator Tip: If there are not enough measuring tools for each group, set up a central supplies table for sharing.

4.3

Opening Questions/Prompts

Ask the youth to respond to each question/prompt below by recording their thoughts on their flip chart paper and sharing their ideas verbally.

- Describe what you know about serving sizes.
- Explain what you know about the different tools that are used for measuring serving sizes.

Procedure (Experiencing)

1. Provide one copy of the *What's in a Vegetable* worksheet to each group.
2. Count off the groups in threes (1s, 2s, and 3s).
3. Provide all number 1 groups with one whole carrot and one chopped carrot each.
4. Provide all number 2 groups with one whole cucumber and one chopped cucumber each.
5. Provide all number 3 groups with one whole bunch of Swiss chard and one chopped bunch each.
6. Provide each group with a set of measuring cups and a ruler.
7. Explain to the youth that what they have received is one whole vegetable, and then in the storage container is a whole vegetable that has been chopped.
8. Explain to the youth that the vegetables are not to be eaten.
9. Ask the youth to examine the whole vegetable and record their observations on the *What's in a Vegetable* sheet.
10. Ask the youth to use the measuring tools to find out how much there is when a whole vegetable is chopped. Have the youth record their findings on the *What's in a Vegetable* worksheet.
11. Have each group share the amount of the chopped vegetable that they measured. On the whiteboard, chalk board, or overhead projector, record each group's vegetable type and measurements.
12. Using the measurements reported by every group, have the youth calculate the average for each vegetable type. Ask the youth to record the averages on their *What's in a Vegetable* worksheet.
13. Have the youth convert their measurements into number of servings, on the *What's in a Vegetable* worksheet.
14. Have the youth go out to the garden. Ask them to use what they learned about how many servings each whole vegetable provides to make predictions about how many servings their garden plot will provide when the vegetables are fully grown. Have them record their predictions on their *Garden to Kitchen Predictions* sheet.
15. Have the youth record their predictions of total servings from their plot on the white board, chalk board, or overhead projector. When all of the predictions are reported, ask the youth to calculate the total number of servings of vegetables the whole garden will provide.

Sharing, Processing, and Generalizing

1. Have the youth share their findings.
2. Follow the lines of thinking developed by the youth through the general thoughts, observations, and questions raised by the youth as they share and compare their thoughts and ideas. If necessary, ask more targeted questions/prompts:
 - Explain how you went about deciding how much (i.e., How was it measured?) one whole vegetable provided.
 - Explain how you went about deciding how many servings your whole vegetable provided.
 - Explain how you went about predicting how many servings of vegetables your garden plot will provide.
 - Explain why you think there is a different serving size for vegetables like cucumbers and carrots than leafy greens like Swiss chard.
 - Explain your thoughts about how many servings of vegetables the entire class garden will provide.

Concept Term Discovery/Introduction

It is important that youth understand the difference between the serving sizes of a leafy green and other vegetables, in addition to the idea that many vegetables contain multiple servings in one whole vegetable, or one vegetable plant. Make sure the youth discover or are introduced to the following key term: **yield**.

APPENDIX 4A: Breakfast Breakdown

Food	Portion	Serving Size	Difference between Portion and Serving Size	Number of Servings in the Portion
Peanut Butter or Jam				
Cereal				
Juice				
Breakfast Patty				

Measurement Conversions

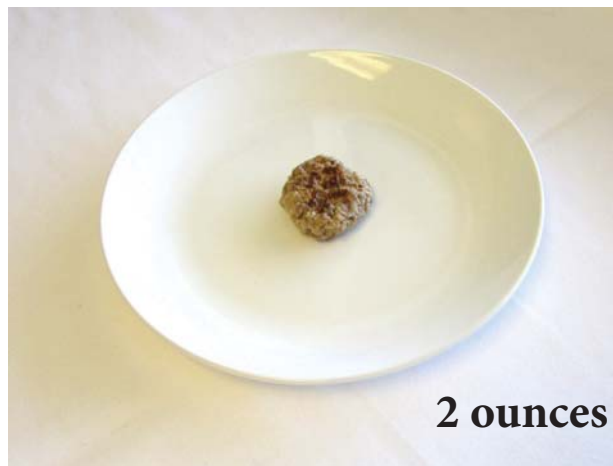
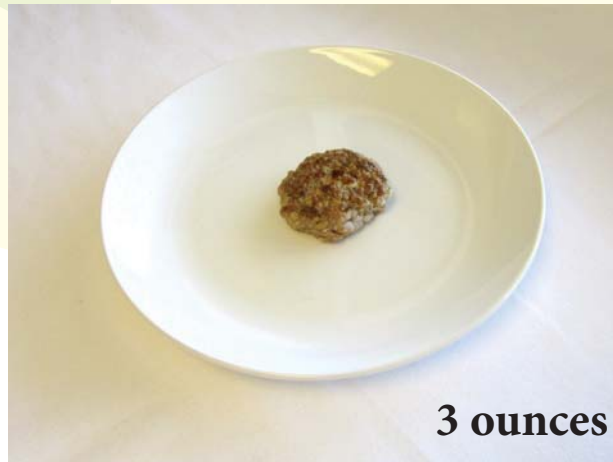
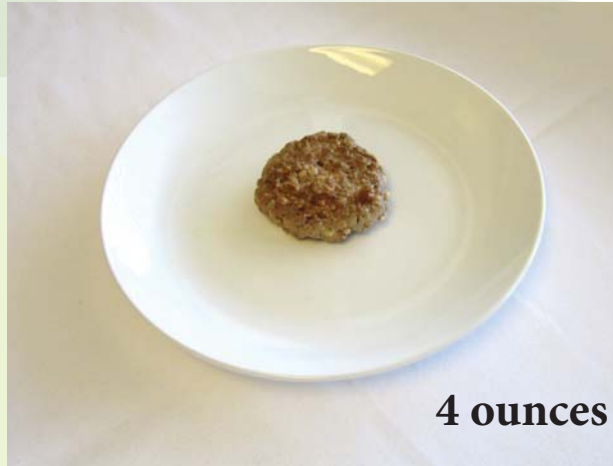
8 ounces = 1 cup

1 cup = 16 tablespoons

1 tablespoon = 3 teaspoons

28 grams = 1 ounce

APPENDIX 4B: Breakfast Patties



APPENDIX 4C: Track Your Snack

Activity: Record some of the foods that you and your family members eat and find the number of serving sizes in the portion you eat. Ask your parents to help you find measuring instruments in your kitchen.

1. Measure and record the amount you serve yourself in the “Portion” column. Be sure to write down the units of measurement that you used.
2. Find and record the serving size. This is found on the food packaging.
3. Calculate the difference between the amount you portioned for yourself and the serving size.
4. Find the number of servings in the portion by dividing the portion by the serving size.

Family Member	Food	Portion (the amount you serve yourself)	Serving Size (listed on the Nutrition Facts label)	Difference between Portion and Serving Size	Number of Servings in the Portion

APPENDIX 4D: What's in a Vegetable?

1. **What vegetable did your group receive?**

2. **What are your observations about the whole vegetable?**

3. **When you measured the chopped vegetable, what amount did you find?**

	Carrot	Cucumber	Swiss Chard
Find the average amount measured for each vegetable			
Serving Size	1 Cup	1 Cup	2 Cups
Number of servings from one vegetable			

APPENDIX 4E: Garden to Kitchen Predictions

1. **In your garden plot, how many servings do you think your vegetables will provide?**

2. **How many servings will the entire class garden provide?**