



Salad Investigation

Middle School Food and Agricultural Literacy Curriculum

Precepts

- J. Mental Growth
- J1. Think critically

National Standards

- PS.01.02.02.a. Identify the components, the types and the functions of plant roots.
- PS.01.02.03.a. Identify the components and the functions of plant stems.
- PS.01.02.04.a. Discuss leaf morphology and the functions of leaves.
- PS.01.02.05.a. Identify the components of a flower, the functions of a flower and the functions of flower components.
- PS.01.02.06.a. Explain the functions and components of seeds and fruit.
- FPP.04.02.02.a. Identify and describe products derived from fruits and vegetables.
- CS.02.04.01.c. Demonstrate critical and creative thinking skills while completing a task.
- NL-ENG.K-12.3 – Evaluation Strategies
- NS.5-8.3 – Life Science

Student Learning Objectives

- As a result of this **unit** the students will...
- Utilize plant science concepts in the agriculture industry.
- As a result of this **lesson** the students will ...
- Cite examples of edible plant parts.

Content Outline

Objective 1. Cite five examples of edible plant parts.

I. Edible Plant Parts

- A. Plants are the most important source of food in the world (both for humans and animals). The fruits, vegetables, and starches we enjoy each

Time

Instruction time for this lesson: 45 minutes.

Resources

National FFA Organization. (2009). LifeKnowledge Online. Retrieved July 9, 2009, from — <http://agedlearning.org> — National FFA Organization. (2003). LifeKnowledge Precepts and Signs of Success. — University of Illinois Extension. <http://urbanext.illinois.edu/gpe/case1/c1f.html>

Tools, Equipment, and Supplies

Overhead projector/ transparencies
Enough to make each student one small salad each with:
Carrots
Lettuce
Tomatoes
Sunflower seeds
Celery
Broccoli
Plates and Utensils – for each student
Two cans mandarin oranges
Variety of salad dressings
MS.PS.1.3.TM.A – one per teacher
MS.PS.1.3.TM.B – one per teacher
MS.PS.1.3.TM.C – one per teacher
MS.PS.1.3.AS.A – one per student
MS.PS.1.3.AS.B – one per student
MS.PS.1.3.ASSESS.A – one per student

Key Terms

The following terms are presented in this lesson and appear in **bold italics**:

Vegetable

Fruits

Flowers

Stems

Leaves

Roots

Seeds

day come from different parts of the plants. These foods are all one of the six main plant parts: ***roots, stems, leaves, flowers, seeds, and fruits***. Edible plant parts are classified as either ***vegetables*** or ***fruits***.

- B. ***Vegetables***: ***Vegetables*** are any edible part of the plant that is not the fruit. This includes foods that are leaves, roots, stems, flowers, and seeds.

- 1. ***Roots***: ***Roots*** are used to collect water and minerals from the soil. ***Roots*** are also used for energy and food storage for some plants.



Salad Investigation

Examples of edible **roots** include: carrots, beets, turnips, and rutabaga.

1. **Stems:** **Stems** transport water and minerals from the roots to the rest of the plant and transports the energy created by photosynthesis from the roots to the rest of the plant. Commonly eaten stem parts include celery, onions, and potatoes (potatoes are actually modified stems that plants use to store energy which is why they are such a great source of energy.)
 2. **Leaves:** **Leaves** are the primary site of photosynthesis in plants. They are also the site of transpiration. Leaves are a great source of many vitamins needed for healthy humans and animals. Commonly consumed leaf foods include: lettuce, kale, spinach, cabbage, collards, and mustard greens.
 3. **Flowers:** **Flowers** are the reproductive structure in plants and can contain male (stamen) and/or female (pistil) structures. Flowers are usually the flashiest part of the plant in order to attract pollinators. Interestingly, many flowers are common foods for humans including: broccoli and cauliflower.
 4. **Seeds:** A **seed** is the mature ovule which is originally found in the female part of the flower and is usually housed in a type of **fruit** or cone. Seeds contain the embryo which will germinate and become a new plant. Common edible seeds include: lima beans, peas, sunflower seeds, green beans, and pinto beans.
- C. **Fruit** –Technically, **fruits** that we consume (apples and oranges, for example) are the fruiting body of the plant. Believe it or not, ketchup is a **fruit** product because it is derived from the **fruit** of a tomato plant.
1. **Fruits** are formed from the fertilized ovule (seeds) and the ovary walls of the female part of the flower. The fruit protects the seed and assists in the dispersal of seeds (by attracting animals that may consume the fruit and disperse the seed). Edible fruits include: apples, oranges, and strawberries. Although they are often called vegetables, tomatoes and cucumbers are also the **fruit** of the plant.

Interest Approach

Before class begins, get ready for this lesson by preparing enough miniature salads for each student in the class to have one. Salads should include samples of at least one of each of the six basic plant parts. (Suggestion: have salads prepared and set at each student's individual seat with a fork and napkin). A suggested menu includes: lettuce, carrots, tomatoes, sunflower seeds, mandarin oranges, cucumbers, and broccoli. Also prepare by projecting **MS.PS.1.3.TM.A** on a large board or suitable wall space. Instruct students not to touch the items on their desk. Also, instruct students as they enter to wash their hands. Or you may wish to provide hand sanitizing gel.

Welcome class! I am very happy to see everyone in their seats and eager to begin class. Let's jump right into today's lesson. Today we are going to learn a little more about where our food comes from, especially the **fruits** and **vegetables** we all love. As you come in, please do not touch or eat the salad sitting at your desk until I say to do so. Has everyone washed their hands?

Provide a minute or two and a bottle of hand sanitizer for students to sanitize their hands before consuming food in class. During this time, hand out **MS.PS.1.3.AS.B** to each individual student.

Great! Now that we are all clean and ready to eat, let's talk about today's mission. Today, you are going to be a detective. The salad you have before you has seven different components. When I say DETECT, you will investigate your salad and name the seven different food components found in the salad on the Salad Investigation Report you have at your desks. You will list this information in the first column on the left that says "salad component."

Point out this section to the students to ensure they all see the section on the student activity sheet.

You will have three minutes to find, name, and record all seven components on your student worksheet. Let's review those directions.

When will you begin?

When the teacher says DETECT

How long will you have to complete this activity?



Lesson Number: MS.PS.1.3

Middle School Food and Agricultural Literacy Curriculum

Salad Investigation

Three minutes

How many food components should you have in your salad and recorded?

Seven

What other questions are there?

Pause for 10 seconds to accept student questions before continuing.

DETECT.

Monitor the class during this activity to ensure students are on task and understand the activity. Allow three minutes for this activity. Provide a warning announcement when 30 seconds remain. Then, continue the lesson by ensuring the students dissected the seven components of the salad. Next, review the parts of a plant (refer to lesson MS.PS.1.1).

Summary of Content and Teaching Strategies

Objective 1. Cite examples of edible plant parts.

Display **MS.PS.1.3.TM.A.**

Thank you for working so diligently. Let's review the items everyone should have in their salad.

Verbally list each item. A suggested menu includes: lettuce, carrots, tomatoes, sunflower **seeds**, mandarin oranges, cucumbers, and broccoli.

Great! It looks like we have the correct components.

Please focus your attention back to the front of the room. To continue our discussion, let's make sure everyone remembers the parts of a plant.

Plants are the most important source of food in the world (both for humans and animals). The **fruits**, **vegetables**, and starches we enjoy each day come from different parts of the plants. These foods are all one of the six main plant parts: **roots**, **stems**, **leaves**, **flowers**, **seeds**, and **fruits**.

Point out each plant part to quickly review them before continuing.

Now that you have listed all of the seven components of your salad, when I say GO we have two minutes to go through each of the seven foods in the salad and decide first, whether it is a **fruit** or **vegetable** and then, what part of the plant it is. Remember, do this activity in pencil so we can go through each one and correct any answers that need to be rethought.

Ask review questions to ensure the students understand the assignment.

Remember class, this assignment requires you to think critically. This means reviewing what you already know, contemplating the issue or question at hand, evaluating all possible solutions, and choosing a solution or answer based on your prior knowledge and recent observations. But before you begin, let's review the assignment.

Great, now that you all understand and are ready....GO!

Monitor the class during this activity to ensure students are on task and understand the activity. Allow three minutes for this activity. Provide a warning announcement when 30 seconds remain. Students may get your attention and ask for answers. If so, review the steps of thinking critically and encourage them to decide on an answer on their own. After this activity, begin by discussing the difference between fruits and vegetables and then review the correct answers needed to complete **MS.PS.1.3.AS.A.**

Time is up! Please refocus your attention to the front of the room. Now, take a look back at your paper for a second. Raise your hand if you decided that all of the food items in your salad are vegetables. Pause for students to react.

OK, now raise your hand if you counted one **fruit** and the rest **vegetables**.

Pause for students to react.

OK, now raise your hand if you counted more than one **fruit**.

Pause for students to react.



Lesson Number: MS.PS.1.3

Middle School Food and Agricultural Literacy Curriculum

Salad Investigation

OK everyone, thank you for your input; you may put your hands down. Actually, there are two **fruits** on the list, mandarin oranges and the cucumber. Did this surprise you?

Let me explain. Many people commonly misname **fruits** as **vegetables** and **vegetables** as **fruit**. However, there is a simple way to remember the difference. Pay close attention as you will soon be able to impress your friends and family at the grocery store and dinner table. **Vegetables** are any edible part of the plant that is not the **fruit**. This includes foods that are **leaves, roots, stems, flowers,** and **seeds**.

Point out these plant parts on **MS.PS.1.3.TM.A**.

Now, let's discuss the **vegetables** you have listed on your worksheet. You should have lettuce, carrots, sunflower **seeds**, broccoli, and celery. As we discuss each of these, record the correct answers on the worksheet and name at least two other examples of food that comes from each part of the plant. If at any time you have questions, raise your hand and I will gladly assist. You may also look on the board and I will review answers as we go.

Project **MS.PS.1.3.TM.C** and reveal the answers as they are discussed (slide a sheet of paper down after discussing each).

First, we will start with lettuce which is the leaf of the plant. **Leaves** are the primary site of photosynthesis in plants (which is why they are usually green in color). They are also the site of transpiration. **Leaves** are a great source of many vitamins needed for healthy humans and animals. Commonly consumed leaf foods include: lettuce, kale, spinach, cabbage, collards, and mustard greens.

Continue to next food.

Next, are carrots. What was your guess about carrots? What part of the plant do you think carrots are?

Take about a minute to take suggestions from the class.

Very good! Carrots are the **root** of the carrot plant. **Roots** are used to collect water and minerals from the soil. **Roots** are also used for energy and food storage for some plants. Examples of edible **roots** include: carrots, beets, turnips, and rutabaga.

Continue to next food.

Next is the broccoli. Raise your hand if you like broccoli. Pause as students react.

Well, if you like to eat broccoli, you can tell your friends that you enjoy eating **flowers**.

Flowers are the reproductive structure in plants and can contain male (stamen) and/or female (pistil) structures. **Flowers** are usually the flashiest part of the plant in order to attract pollinators. Interestingly, many **flowers** are common foods for humans including: broccoli and cauliflower.

Continue to next food.

OK, next we will discuss sunflower **seeds**, which are obviously the **seeds** of the sunflower. A **seed** is the mature ovule which is originally found in the female part of the **flower** and are usually housed in a type of **fruit** or cone. **Seeds** contain the embryo which will germinate and become a new plant. Common edible **seeds** include: lima beans, peas, sunflower **seeds**, green beans, and pinto beans.

Continue to next food.

For the final **vegetable**, let's discuss celery. Which part of the plant do you think celery is?

Pause to allow student responses.

Actually, celery is the stem of the plant.

Stems transport water and minerals from the **roots** to the rest of the plant and transport the energy created by photosynthesis from the **roots** to the rest of the plant. Commonly eaten stem parts include celery, onions, and potatoes (potatoes are actually modified **stems** that plants use to store energy which is why they are such a great source of energy).

Great! That should complete the list of **vegetables**. Take two minutes to review the board (or **MS.PS.1.3.TM.C**) and make sure you have completed your worksheet accurately.

Allow two minutes for the students to complete the first five rows of the worksheet. Then continue by discussing fruits.



Lesson Number: MS.PS.1.3

Middle School Food and Agricultural Literacy Curriculum

Salad Investigation

Let's continue. If you remember, we said that **vegetables** are any food that comes from any part of the plant other than the **fruit**. Technically, **fruits** that we consume (apples and oranges, for example) are the **fruiting** body of the plant. **Fruits** are formed from the fertilized ovule (**seeds**) and the ovary walls of the female part of the **flower**. The **fruit** protects the **seed** and assists in the dispersal of **seeds** (by attracting animals that may consume the **fruit** and disperse the **seed**). Edible **fruits** include: apples, oranges, and strawberries. Although they are often called **vegetables**, tomatoes and cucumbers are also the **fruit** of the plant! And, believe it or not, ketchup is a **fruit** product because it is derived from the **fruit** of a tomato plant.

All right, you should have your chart completed by now. What questions are there about where these foods came from?

Pause for 10-15 minutes to allow time for students to express any questions or "muddy" areas still left in the lesson.

I am so proud of you for working so hard today. As a reward, let's enjoy our delicious salad of plant parts!

Provide dressing as requested.

Allow students to eat the salads you have prepared for them. After about five minutes, begin reviewing by using a Show-What-You-Know e-Moment®.

Review/Summary

OK class, continue to enjoy your salads but focus your attention to the front of the room for a quick review to allow you to show me what you know. As I ask a question, raise your hand if you remember the answer. The first student to raise their hand and answer the review questions correctly will receive two bonus points.

You may choose an award based on what is most appropriate for your class.

Ask a series of review questions. Call on one student at a time for the answers.

What part of the plant is lettuce?

Leaves

Is a cucumber a fruit or vegetable?

Fruit

Name an example of a **vegetable**.

Lettuce, carrots, turnips, lima beans, etc.

Is ketchup a **fruit** or **vegetable** product?

Fruit because it derived from tomatoes which are the fruit of the tomato plant.

Great class! Today we learned so much. I hope you have a better understanding of the difference between **fruits** and **vegetables** and where your **fruits** and **vegetables** actually come from. I encourage each of you to share at least one interesting fact you learned today with your parents or friends this afternoon.

Have a great day.



Salad Investigation

Application

Extended classroom activity:

As an extension to this activity, have the students complete the Complete Salad Plant activity on **MS.PS.1.3.AS.B**. Students are to draw a plant whose parts are made of the seven food components discussed in the lesson (carrots, lettuce, celery, broccoli, sunflower seeds, mandarin oranges, and cucumbers). Students will label each plant part with the name of the food and which of the six basic plants it is (for example: lettuce-leaves). Have students share their drawings with their neighbors. Post these in the classroom as a fun reminder of where their salad comes from.

FFA activity:

Students who enjoy this lesson may be interested in the floriculture FFA CDE which requires students to have extensive knowledge of plant parts, functions, needs, and uses as well as to be able to identify common floriculture plants. For more information visit: ffa.org.

SAE activity:

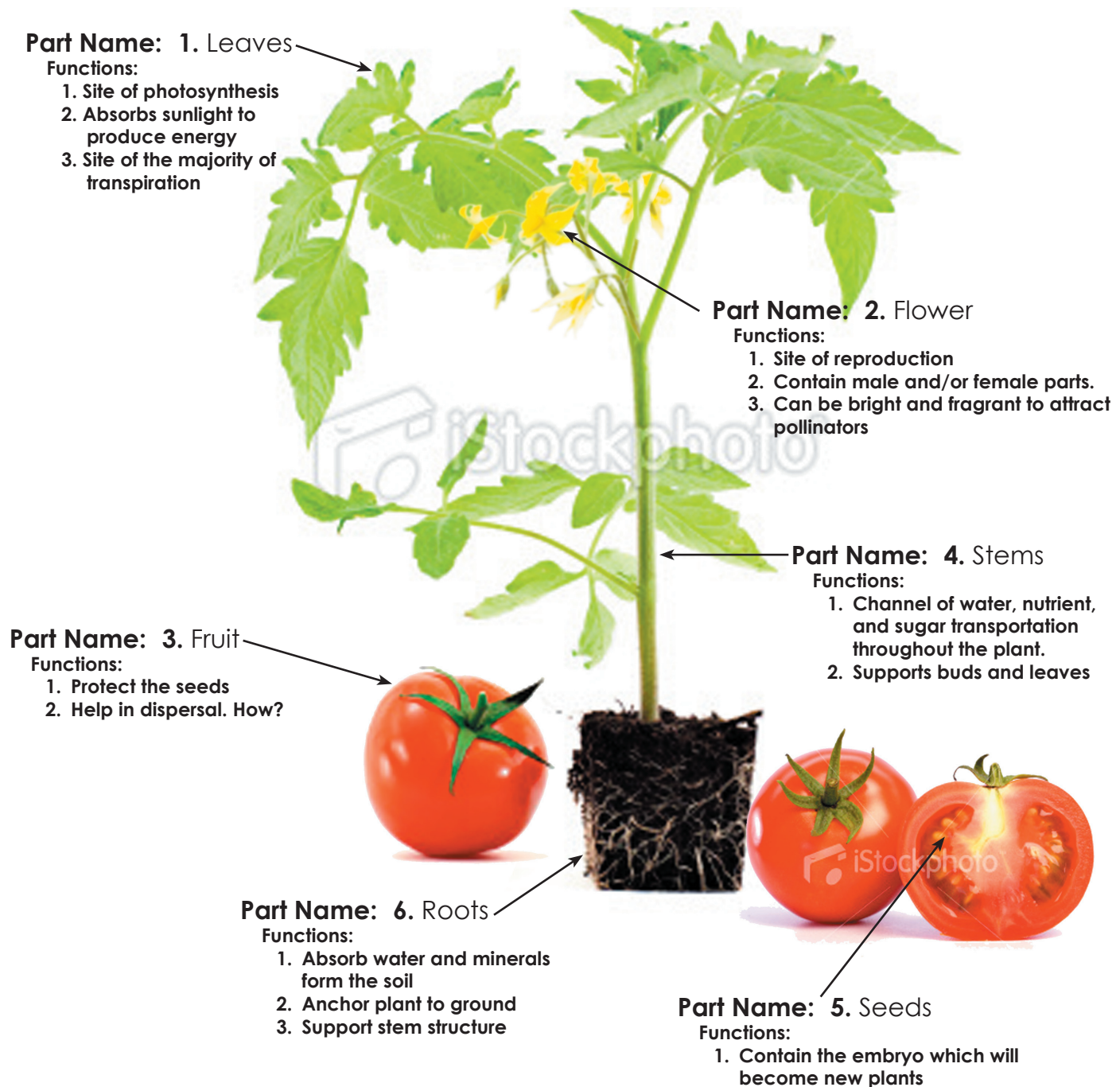
This lesson can be used to introduce the many opportunities students have to pursue a Supervised Agricultural Experience Program in plant science. Students may wish to conduct an experimental SAE to explore consumers' perceptions of fruits and vegetables. For example, determine what percentage of consumers understands the difference between fruits and vegetables. Also, students who are interested in this lesson may wish to participate in entrepreneurship SAEs in nursery production, crop science, or greenhouse management or in a placement SAE at a local nursery, greenhouse, or lawn care store.

Evaluation

MS.PS.1.3.ASSESS.A

Answers to Evaluation

1. Vegetable
2. Leaf
3. Vegetable
4. Root
5. Vegetable
6. Seed
7. Fruit
8. Fruit
9. Vegetable
10. Stem
11. Vegetable
12. Flower





Edible Plant Parts

- A. Plants are the most important source of food in the world (both for humans and animals). The fruits, vegetables, and starches we enjoy each day come from different parts of the plants. These foods are all one of the six main plant parts: roots, stems, leaves, flowers, seeds, and fruits. Edible plant parts are classified as either vegetables or fruits.**
- B. Vegetables – Vegetables are any edible part of the plant that is not the fruit. This includes foods that are leaves, roots, stems, flowers, and seeds.**
- 1. Roots:** Roots are used to collect water and minerals from the soil. Roots are also used for energy and food storage for some plants. Examples of edible roots include: carrots, beets, turnips, and rutabaga.
 - 2. Stems:** Stems transport water and minerals from the roots to the rest of the plant and transport the energy created by photosynthesis from the roots to the rest of the plant. Commonly eaten stem parts include celery, onions, and potatoes (potatoes are actually modified stems that plants use to store energy which is why they are such a great source of energy).
 - 3. Leaves:** Leaves are the primary site of photosynthesis in plants. They are also the site of transpiration. Leaves are a great source of many vitamins needed for healthy humans and animals. Commonly consumed leaf foods include: lettuce, kale, spinach, cabbage, collards, and mustard greens.
 - 4. Flowers:** Flowers are the reproductive structure in plants and can contain male (stamen) and/or female (pistil) structures. Flowers are usually the flashiest part of the plant in order to attract pollinators. Interestingly, many flowers are common foods for humans including: broccoli and cauliflower.
 - 5. Seeds:** Seeds are the mature ovules which are originally found in the female part of the flower and are usually housed in a type of fruit or cone. Seeds contain the embryo which will germinate and become a new plant. Common edible seeds include: lima beans, peas, sunflower seeds, green beans, and pinto beans.
- C. Fruit – Technically, fruits that we consume (apples and oranges, for example) are the fruiting body of the plant. Believe it or not, ketchup is a fruit product because it is derived from the fruit of a tomato plant.**
1. Fruits are formed from the fertilized ovule (seeds) and the ovary walls of the female part of the flower. The fruit protects the seed and assists in the dispersal of seeds (by attracting animals that may consume the fruit and disperse the seed). Edible fruits include: apples, oranges, and strawberries. Although they are often called vegetables, tomatoes and cucumbers are also the fruit of the plant.



Salad Component	Fruit or Vegetable?	Part of Plant	Other Foods from this Plant Part
Lettuce	Vegetable	Leaf	Turnips, cabbage, spinach, collards
Carrots	Vegetable	Roots	Beets, turnips
Broccoli	Vegetable	Flower	Cauliflower
Sunflower Seeds	Vegetable	Seed	Lima beans, peas, pinto beans
Celery	Vegetable	Stem	Onions and potatoes
Mandarin Orange	Fruit	Fruit	Apples, strawberries, cucumbers
Tomato	Fruit	Fruit	Apples, strawberries, cucumbers



Salad Investigation Report

Name _____

Directions: Students, as we explore the components of our salads, fill in the following chart. First, list the seven components. Secondly, determine whether the food is a vegetable or fruit. Next, name what part of the plant it is (root, stem, leaves, flowers, fruit, or seeds). Finally, list 1-5 examples of other plant foods that are the same part of the plant as the component.

Salad Component	Fruit or Vegetable?	Part of Plant	Other Foods from this Plant Part



Name _____

Directions: In the space provided below, use the information discussed in class to create a “complete salad plant.” This plant should have all seven of the salad components listed on your student activity sheet. Each food component should be placed correctly on the part of the plant from which we get our food (root, stem, leaf, flower, fruit, or seed). Then, label each of the components with its name and plant part. For example: lettuce/leaf.

The Complete Salad Plant



Name _____

Directions: Determine whether each food is a fruit or vegetable. In the third column, name the part of the plant the food is. Use the list of basic plant parts below.

Plant Parts:					
Root	Stem	Leaves	Flower	Seed	Fruit

Name of Food	Fruit or Vegetable	Plant Part
Turnip Greens	1.	2.
Carrots	3.	4.
Lima Beans	5.	6.
Tomato	7.	8.
Celery	9.	10.
Broccoli	11.	12.