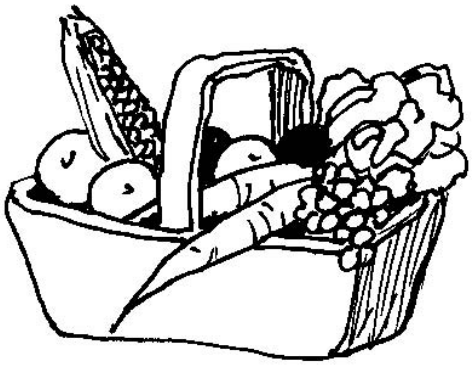
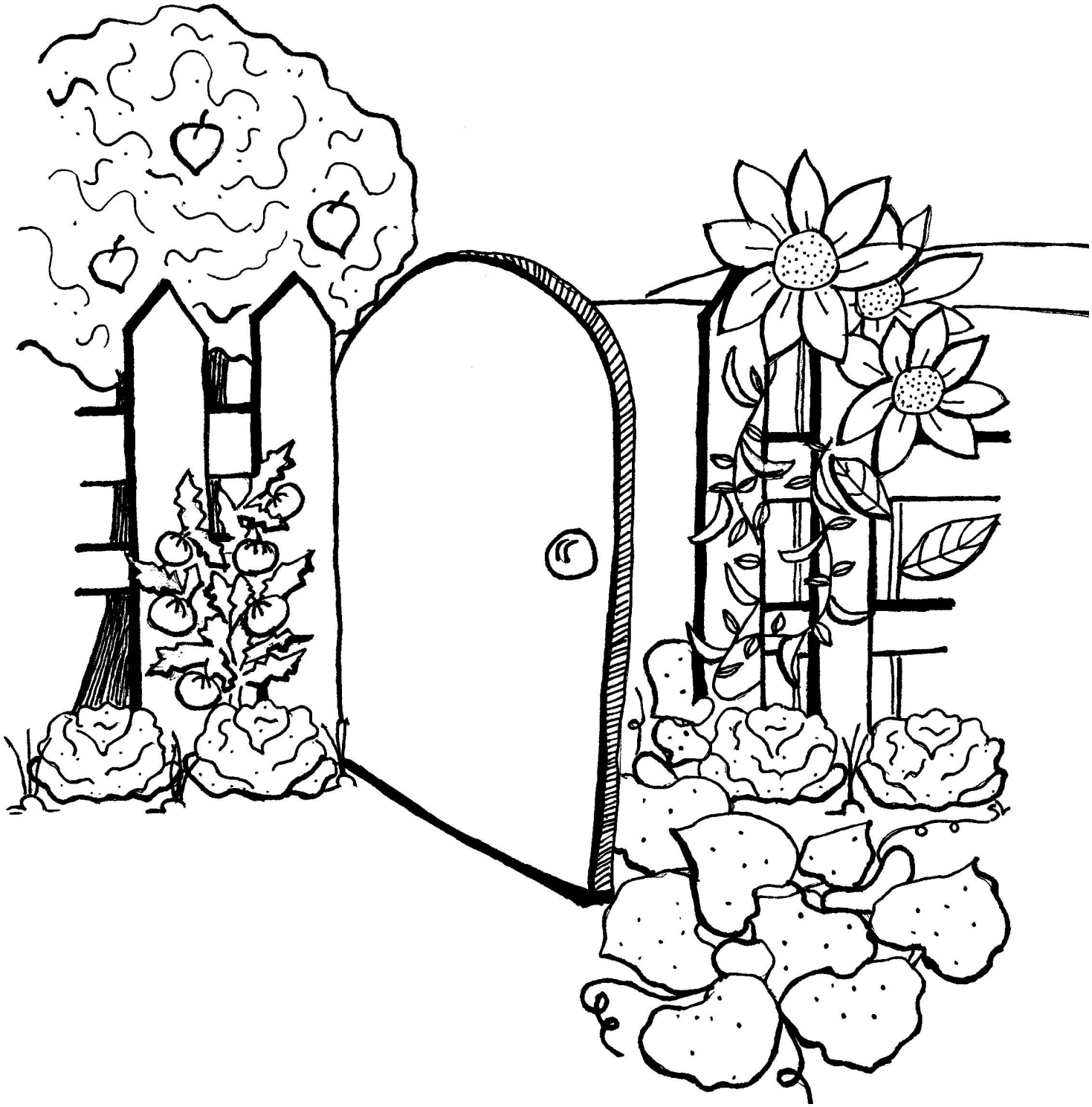
Nutrition In the Garden Workbook





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Nutrition in the Garden Workbook

Teaching Healthy Living Through Horticulture

Sarah Lineberger
Jayne Zajicek

Because of its impact on growth, development and the ability to learn, nutrition plays a key role in a child's life. Learning about different foods and practicing healthy eating habits can greatly affect a child's achievement, success and overall contentment. Because eating habits are adopted early in life, childhood is a good time to learn about nutrition. Since children spend much of their time in the classroom, schools can play a significant role in the adoption of healthy lifestyles.

Teachers have many ways to present nutrition education, including using school gardens and horticultural activities. The Produce for Better Health Foundation campaign, "Fruits & Veggies More Matters," encourages people to eat more vegetables and fruits. A school garden is an excellent teaching tool to support this message.

Gardening can help children learn how to grow their own food. Gardens can also serve as a site to teach food safety and preparation. Although children are often timid about eating new foods, the excitement of eating something they produced in a class garden may overcome questions and fears. Exposure to fruits and vegetables may encourage them to eat more of these beneficial foods.

This activity and curriculum guide is designed to help teachers integrate nutrition education into a horticulture program. Six lessons provide information and activities about plants and human nutrition. Each lesson has an objective and background information to increase the teacher's knowledge about the subject. The teacher can then decide the amount and level of information to deliver to students. The lessons conclude with at least three activities combining horticultural and nutritional concepts. The activities can be conducted with or without a garden.

Garden Instructor Training Packet:

Introduction

Nutrition in the Community Garden (NICG) is a curriculum designed to show the increase in children's knowledge of gardening and nutrition facts. This program has been designed for children 9-12 years old. It has also shown some improvement in the children's eating habits related to fruits and vegetables. This tool kit uses the background information and activities from NICG and adds materials to allow volunteers to readily implement the program. Items added to the original curriculum include activity cards for the gardener to take into the garden as teaching aids and forms to assist in documenting and evaluating the children's and gardener's experience. These materials include a key points reminder, attendance form, pre and post test and a gardener tracking sheet for comments and satisfaction form. These additional materials aid the community gardens in creating a program that is easy to implement and evaluate.

Tool Kit

1) **Curriculum:** Contains the basic science concepts and blends horticultural facts with nutrition facts along with suggested activities to teach children. The original curriculum was designed to be taught in the classroom. Working with local community gardens and an elementary school science teacher, this tool kit has added some fun activities, guidance for working with children (especially low-income children) and lesson sheets to take into the garden. This easy-to-read component provides the gardener with basic facts in a user-friendly format.
   a) Background Information
   b) Key Concepts Reminders
   c) Suggested Activities

2) **Monitoring Forms: Assists** the gardener in the process of implementing the program**.**
   a) Attendance Form
      Each student may be assigned an identification number, which can be used to track participation and sequence of learning. The gardener marks the appropriate box for each student for the week that particular lesson is taught.
   b) Gardener's Tracking Form
      This form identifies the lesson and activities completed each day and the gardener's insight into the actual lesson along with the number of students who participated.

3) **Evaluation Forms:** May be used to measure the impact of the program on the children**.**
   a) Nutrition Screener for Students
      Should be administered at the beginning of the garden program and at the end of the garden program. The screener identifies changes in children's eating behavior. The tool identifies the frequency of fruit and vegetable consumption, which determines if the program has encouraged the students to eat a greater variety of fruits and vegetables. Children complete the screener before or during the first class and repeat it during the last session of the garden program.
   b) Pre and Post Test Assessment (key included)
      These tests measure the children's increase in knowledge. The pre-test is to be given on the first day of class by one of the following methods of administration:
      i) The garden site instructor may read the questions to the students and provide some examples.
      ii) Children can self-administer the test and receive individual help from the gardener for questions.
         (a) Do not assume that all students' reading skills are adequate to complete the test. Be sure to monitor their answers and assure they are completing the test.

      Administer the post-test at the end of the program in a similar manner that was used for the pre-test.

"Nutrition in the Garden: Teaching Healthy Living Through Horticulture"

Nutrition in the Garden was written to help teachers use their school gardens to teach nutrition. The guide has six lessons that emphasize horticulture and nutrition. Each lesson contains clear objectives, teacher background information and activities for the classroom.

Summary of Lessons:

1. Going To The Market

This lesson teaches students how to be informed consumers of fruits and vegetables. Activities recommended for this lesson include session about the importance of gardening, processing and exploring the packaging and marketing and judging fruits and vegetables.

2. Plant ABCs

The objective of this lesson is to identify the main parts of a plant and explain their functions. It also highlights the fact that our foods come from different plant parts. Activities recommended for this lesson include charting the different plant parts that we consume creating your own plant, making a root view box.

3a. Plants at Work and 3b. Origins of New Plants

With these lessons students learn about some of the key processes of plants and about their importance in our world. They also teach students how to start their own plants and gives them more practical knowledge about growing plants. Activities recommended for this lesson include making a seed viewer, watching water movement in plants, observing the different stages of plant growth and transplanting. This lesson also teaches students how to start their own plants and gives them more practical knowledge about growing plants.

4. Plants Eat, Too!

This lesson serves to introduce students and teachers to the things that plants need to grow. All of the activities explore elements needed for plant growth, pesticides, good and bad bugs and soil testing and amending.

5a. MyPyramid for Kids and 5b. Six Essential Nutrients for Life

To learn about MyPyramid for Kids, the six major themes of MyPyramid, general daily intake requirements of the five food groups, and the nutrients provided by each food group. Activities recommended for this lesson include creating a meal, learn to read food labels, learn about the many nutrients that are found in common foods, test for fats, and discussing whole grains.

6a. Food Safety and 6b. Tasting up a Storm

Safety is very important for gardening and food preparation. The objective of this lesson is to teach students how to safely harvest fruits and vegetables and how to properly handle and store foods. The lesson also includes hand washing tips. Activities include harvesting techniques, hand washing demonstration, cleaning produce, and learning about good and bad bacteria.

Lesson **6b** serves to teach students some basics about food preparation and lets them participate in some hands-on experiences. It gives them the opportunity to taste various fruits and vegetables. Activities recommended for this lesson include creating a class recipe book, tasting uncommon fruits and vegetables and cooking with fruits and vegetables.

Appendix and Resource Information

Contains the Instructor Forms and Guide for Working with Elementary Students. Also, includes resource information and Acknowledgements.

1

Teacher background information:

It is important to learn how to select the right foods. The Food and Drug Administration requires packaged foods to have informational labels explaining:

- What the food is
- Name and address of the manufacturer
- Packer and distributor
- Weight of the product
- Ingredients, listed in order of weight
- Dietary information.

Going to the Market

Objective: *To learn how to be an informed consumer of fruits and vegetables.*

Learning how to read and understand these labels help consumers be more informed and make smarter eating choices. Labeling guidelines have been evaluated and revised continually since they were first established in 1938. Remind students that because advertisements do not always give complete information, they need to be careful about their choices and not be swayed by fancy packages and wrappers.

Shopping for fruits and vegetables is a little different from shopping for other foods. You select produce based not only on content but also on quality. Although produce has standards, it is not standardized; for example, all apples in a stack are not exactly alike, unlike manufactured products. The Greengrocer, Curtis Aikens, offers four criteria for buying produce:

Look: Color can indicate the ripeness of fruits and vegetables. To determine this, you must know what color it should be. Also check for bruises and scars. Most fruits and vegetables have some type of protective cover or peel. Any cut in a peel is a site for insects, microorganisms or pesticides to enter. Do not buy produce with scars or bruises.

Smell: As fruit ripens, the sugar content rises and the smell increases; the stronger the smell, the more ripe the fruit. This can be helpful with fruits such as cantaloupes, which have a thick outer shell. If a fruit smells too sweet or a vegetable smells sour, it may be too ripe.

Touch: Ripe fruits and vegetables should be firm to the touch but give a little too slight pressure. If it is too hard, it probably is not very ripe; if it is mushy soft, it is too ripe.

Season: Have you ever noticed that grocery stores have fruits and vegetables during the winter when nothing is growing outside? Much of our produce is imported from other countries or southern states (California, Texas, and Florida) in order to offer the same products year-round. The freshest vegetables and fruits are those in season. Find out where the produce in your local grocery store was grown. Do you have a farmers' market nearby? Where does the produce originate for the market?

The road to your store

Fruits and vegetables usually move through many hands before they appear on your table. They first are grown on farms. Farmers sell them to manufacturers or wholesalers, who then process the produce or send it to grocery stores, where consumers buy them. To get the full effect of this process, follow an orange from tree to juice to see how many hands it goes through before it reaches the consumer.

Farmer → Manufacturer → Slicer → Juicer →
Blender → Package → Labels → Truckers →
Stores → You

Fruits and vegetables are moved through this process as quickly as possible to keep them fresh.

Foods differ in how much they are processed. Foods requiring little or no processing are called "natural" foods. Many fruits and vegetables fall into this category, such as fresh lettuce, carrots or apples. Others are minimally processed, such as whole-wheat flour or precut fruits and vegetables. We also have foods that are highly processed, having been combined with other ingredients including chemical additives and preservatives, such as fruit jellies and juices. Food travels an average of 1200 miles to you yet farmers receive only 25% of food cost.

Key Points — Lesson 1

- All of our food originates from plants and animals.
- Fruits and vegetables move through many hands before you eat them.
- Gardening and growing some of your food is cheaper, safer, healthier and better for the environment.

Activity 1 — 20 minutes

Shippers Game

Objective: To understand why gardening is important

Farm to table relay:

Have students in teams of four to six, standing in rows. Each person has a specific job.

- **Farmer:** Pick a piece of fruit up with your elbows
- **Shipper:** Take the fruit from the farmer with your elbows and drop it into the shirt/bag of processor
- **Processor:** Catch fruit in bag and take to shipper 2
- **Shipper 2:** Move fruit to elbows from processor and pass to the elbows of the grocer
- **Grocer:** Remove fruit from bag and spin around 3 times
- **Customer:** Take fruit from grocer (May be the teacher)

Walk through the game using a piece of fruit to solidify roles
Race using one pear, orange or apple and the first team wins

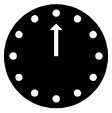
Next: The winning team gets to change into Farmers
- Farmers: Pick up a piece of fruit with your elbows
- Customer: Take fruit from farmer

Discussion Points: What is the difference between the two?
- Farmers: May have one or two crops, large yields, large machinery, sell in stores, lengthy processing
- Gardeners: Many types, smaller yields, hand tools or small machinery, small plot, eat food themselves

(1) What is the easiest? Why?
(2) What is the safest? Why?
(3) What is the healthiest? Why?

Key Points Lesson 1

- All of our food originates from plants and animals.
- Fruits and vegetables move through many hands before you eat them.
- Gardening and growing some of your food is cheaper, safer, healthier and better for the environment.
- Food travels an average of 1200 miles to you yet farmers receive only 25% of food cost.

Activity 2  20 minutes

Fresh Test

Objective: To understand types of food processing

Conduct a taste test of carrots in their various forms to compare the different types, including fresh samples from your garden or a farmers' market. Carrots are sold whole, prepackaged into strips, prepackaged into baby strips, prepackaged into horizontal chips, canned and frozen. Discuss flavor and texture differences.

Activity 3 40 minutes

How Does Your Market Grow?

Objective: To understand how fruit and vegetables are marketed

Visit a local grocery store or farmers' market or bring in a guest speaker from one of these locations. Have an expert teach students about marketing fruits and vegetables.

Activity 4 30 minutes

Judging Fruits and Vegetables

Objective: To understand difference in quality

Bring in different fruits and vegetables (from your garden or grocery store) and judge them by quality. You may set up a contest with vegetables from your school garden for categories such as biggest, tastiest, funniest looking, etc.

2

Plant ABCs

Objectives: *To identify the main parts of a plant and explain their functions. To learn that our foods come from different plant parts.*

Teacher background information:

There are millions of types of plants, including trees, shrubs, perennials and annuals. While differing in appearance and function, they all have similar structural components, including roots, stems (trunks), leaves, flowers, fruits and seeds. One major difference among plants is whether or not they produce true flowers. To account for this difference, plants are divided into two categories:

One major difference among plants is whether or not they produce true flowers. To account for this difference, plants are divided into two categories:

- Gymnosperms, which lack true flowers and fruits and usually bear their seeds in cones (example: pine trees); and
- Angiosperms, which include true flowering plants that bear their seeds in fruits

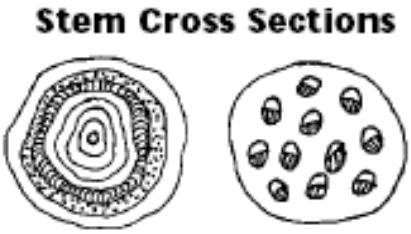
All important food crops are angiosperms. In studying fruits and vegetables, we will focus our attention on angiosperms.

Our diet consists of foods taken from a variety of these parts, so it is important to be able to identify them and understand what they do for the plant.

Roots

Roots are vital to plants. A plant cannot grow above ground without healthy roots below the ground. There are three types of plant roots, but will discuss two types: tap and fibrous. Tap roots have one large primary or tap root with a few smaller secondary roots. Carrots, beans and radishes have tap roots. Fibrous roots have many similar-sized roots. Lettuce, broccoli and tomatoes have fibrous roots.

Stems



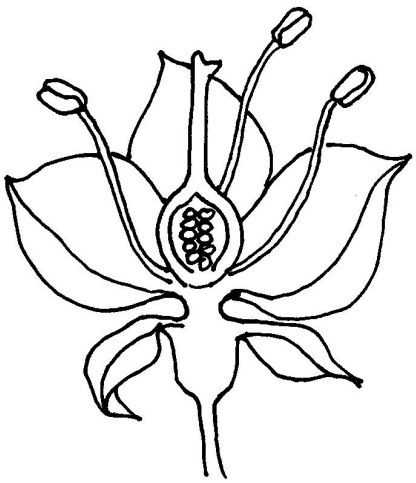
Plant stems contain a transport system that allows water and nutrients to move from the roots to the leaves, where the plant produces needed food and vitamins. Food produced in the leaves is moved to other parts of the plant through the stems. *Xylem* cells in the stem transport water and *phloem* cells transport food. In addition to its important transportation system, the stem also supports the plant and is the backbone of its growth.

Leaves

Leaves contain a plant's food factories. Plants have the special ability to produce their own food through a process called *photosynthesis.* Inside the plant cells are *chloroplasts,* which use carbon dioxide, water, chlorophyll and sunlight to make sugars/carbohydrates (plant food). A plant without leaves does not have the energy to continue living unless it is dormant or has enough food stored in other parts. Leaves also *transpire* or lose water (similar to human sweat), which helps the plant maintain its temperature and encourages the roots to continue absorbing water.

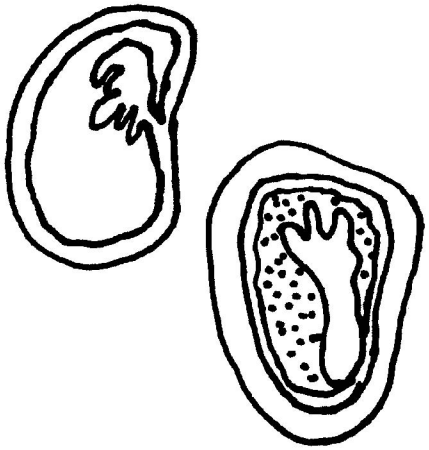
Leaves are highly specialized for their environment. Most have mechanisms to help conserve water, such as a waxy surface, small size or the ability to store water. Some plants have very large leaves to help capture more sunlight. Many adaptations can be found in various plants. Look at some leaves on your school yard to see if any are specially adapted to your environment.

Flowers



Flowers are the sexual organs of plants. Their sole purpose is to make the seeds and fruits needed to produce more plants and to ensure the species' survival. Most flowers contain a female organ, the *pistil* (usually one), and male organs, the *stamens* (usually more than one). If separate flowers on the same plant contain the male and female parts, the plant is considered to be *monoecious.* If a species has male flowers and female flowers on separate plants, it is called dioecious.

Like leaves, flowers are also highly specialized. They are specialized in order to attract pollinators. *Pollination* and *fertilization* are the two processes by which female pistils are fertilized by pollen from male stamens; they lead to the creation of seeds. To help move the pollen from the stamens to the pistils, often organisms such as insects or birds are needed. These organisms are called pollinators. To attract pollinators, flowers have adapted special fragrances, nectar, colors, patterns and shapes. Study flowers in your school yard and list reasons pollinators should visit specific flowers.

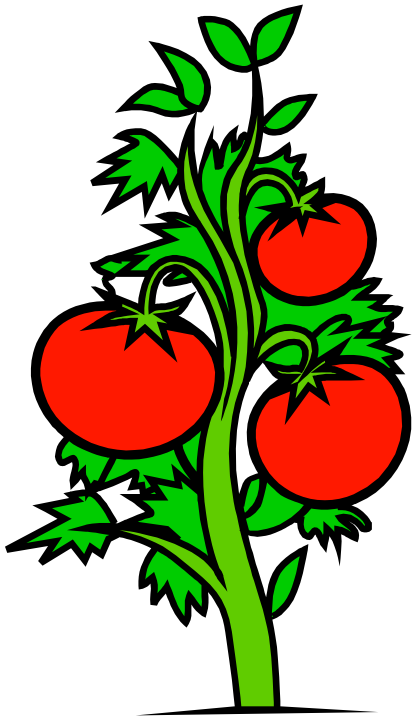


Seeds

Seeds grow into a new plant. Like leaves and flowers, they also have adaptations for their environment. Seeds have different mechanisms to help them be transported — to ensure survival, they need to move away from the parent plant and spread to new areas. For example, maple seeds have wings to help them glide through the air; coconuts can float in water. Each seed has a *seed coat* and an *embryo* containing young leaves, a stem and roots. Find and study seeds from your school yard.

Fruits

Seeds are usually found in fruits, which are nature's special packages for seeds. They begin to develop after the flower is pollinated. The fruit can protect the seed as well as aid in transportation. Animals transport seeds by eating the fruits and then leaving the seeds in their droppings.



The true definition of a fruit, then, is the structure that is formed by the pollinated flower and that contains the seeds. This definition may be confusing, because many items we call vegetables are actually plant fruits (tomatoes, cucumbers, and squash). By strict definition, vegetables are foods that come from plants' vegetative parts: stems, roots and leaves. However, these strict definitions are not used in our everyday life; some items are called vegetables (even though they are truly fruits) if they are commonly eaten with the main course of a meal.

Key Points Lesson 2

- There are six main plant parts.
- Roots-absorb water and minerals from the soil
- Stems-transfer water and food (highway) between parts and hold plants up
- Leaves- turn sunlight into plant food using chlorophyll (that's why they are green)
- Flowers- attract bees and bugs so that pollen can be transferred. All fruits come from pollinated flowers. All tomatoes or cherries etc. must be flowers first.
- Fruits- structure that contains and protects seeds
- Seeds- contain materials for starting new plants

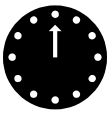
Activity 1 20 minutes

Edibles Demonstration

Objective: To understand the six main parts of a plant

Bring different fruits and vegetables to class. Have students make a chart classifying them as roots, stems, leaves, flowers, fruits or seeds. Use the following chart as a suggested guide.

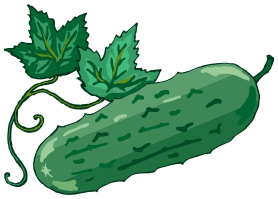
REFER TO THE CLASSIFICATION CHART

Activity 2  20 minutes

Create Your Own Plant

Objective: To understand the six main parts of a plant

Create your own plant. Have students create a plant, requiring that it include each of the discussed parts — roots, stems, leaves, etc. These creations can be drawn or made of such art materials as pipe cleaners, construction paper, etc.
[A GREAT rainy day activity.]



Key Points Lesson 2

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- Fruits- structure that contains and protects seeds
- Seeds- contains materials for starting new plants

Activity 3 20 minutes

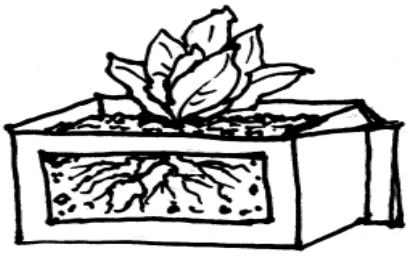
Root View Box

Objective: To understand what roots look like and how they develop

Plant seeds in a box with one clear side so that children can see what roots look like. Use plants with tap (carrots) and fibrous (lettuce) roots. It would also be interesting to grow legumes (discussed in the chapter on plant nutrition) such as peas, alfalfa or peanuts.

There are many ways to build a view box. You can make a window box with one clear side, use an empty aquarium, or make a small root view box out of an old 1/2-gallon paper milk or orange juice container. To make a box from 1/2-gallon containers, follow these steps:

- Lay the milk container on its side or stand it straight up and cut off the top.
- Cut a window out of one of the sides, leaving 1/2 inch of carton around the edges.
- Place a piece of glass or plastic (you can use an overhead transparency sheet) in the box against the window.
- Secure the plastic with a waterproof seal (waterproof glue or strong tape).
- Add soil and plant your seeds close to the window. Because the box has no drainage holes, be careful not to over water. Tilting the box forward helps the roots grow against the clear side making them more visible.



CLASSIFICATION CHART

Roots	Carrots, Sweet Potatoes, Turnips, Beets, Parsnips, Jicama, and Radishes
Stems	Asparagus and Celery
Leaves	Lettuce, Spinach, Cabbage, Kale, Onion, and Parsley
Flowers	Broccoli, Cauliflower
Fruits	Tomatoes, Cucumbers, Bell Peppers, Squash, Apples, Oranges, Pears, Plums Cherries, Strawberries, and Mangoes
Seeds	Corn, Peas, Dry Beans, Rice, Barley, Oats, Nuts, Coconuts, and Sunflower Seeds

CLASSIFICATION CHART

Roots	
Stems	
Leaves	
Flowers	
Fruits	
Seeds	

3a

Plants at Work

Objective: *To learn about some of the key processes of plants and to recognize their importance in our world.*

Teacher background information

Along with knowing the basic plant structures, it is also important to understand some of the plant processes. We will look at *pollination, fertilization, germination, photosynthesis* and *transpiration,* as well as the *plant life cycle.*

Pollination and fertilization

Flowers contain female (the *pistil*) and male (the stamen) parts. The *pistil* resembles a vase, with a sticky opening called a *stigma*, a long tube called a style and a rounded base known as the *ovary*. The stamen is made up of a long *filament* that supports the pollen-producing *anther*. The female *ovary* contains an ovule that, when fertilized with pollen, becomes a new embryo or seed. After the pollen matures, it is released from the anther. Pollen then travels to the pistil and is collected by the sticky stigma. This process is called *pollination*. Then the pollen forms a pollen tube that grows down the style to the ovary. Once the pollen comes in contact with the egg, the flower begins to produce its seed and fruit. This process is called *fertilization*.

An important aspect of pollination is the pollen's traveling to the stigma. Pollen can be transported by wind, but often it needs more help from organisms known as pollinators. Insects and birds can be pollinators. For example, a bee collects nectar (sugary substance produced by a flower) and pollen from a flower to make honey. While it is collecting, small bits of pollen may stick onto its legs or body. When the bee moves to the next flower, it may brush against the stigma and leave some of this pollen, and therefore pollinate the flower. Flowers have special adaptations to attract pollinators, including fragrance, color, patterns and shapes.

Germination

Germination is the process by which a seed begins to grow into a plant. To grow, each seed needs certain environmental conditions. Seeds wait until the environment is favorable for growth so that bad conditions do not hinder their growth. Most seeds require moist soil, oxygen (which helps them to turn their stored food into usable energy) and warm temperatures (68º to 85º F). Contrary to what some people believe, seeds do not need sunlight for germination. Available light may or may not be an important factor.

The first step in growth is the removal of the protective seed coat. Some seed coats are removed merely by being exposed to water. Others need a cold period (*stratification*) or a mechanical or chemical treatment (*scarification*) to break the seed coat. Once the seed coat is broken, the seed soaks up water, then sends out its roots and a shoot.

Each shoot has a *cotyledon* or seed leaf (not a true leaf) that helps provide initial energy. Seeds with one cotyledon are called monocots (corn); those with two cotyledons are called *dicots* (beans). Sometimes cotyledons stay below ground, but other times they break the surface in early stages of growth. Beans are good plants to use to show students cotyledons.

The seed grows using stored energy, which is eventually depleted. By the time the seed has used all of its energy, the plant should be able to produce its own food through photosynthesis.

3b

Origins of New Plants

Objective: *To start your own plants and gain more workable knowledge about growing plants.*

New plants can be produced in two ways: through *sexual* or *asexual* propagation. Sexual propagation involves planting seeds in soil. It is called sexual propagation because seeds result from pollination and fertilization. To start plants from seeds, remember to supply the right environmental conditions to meet the needs for germination (moisture, oxygen and warm temperatures).

You can sow seeds directly into a garden or start them in other containers (trays or peat pots) inside, then transplant them outside. An advantage to starting plants inside is that you can plant them earlier in the season and have them ready to move outside when weather permits. This is especially important in the spring. Transplanting can also protect seedlings from adverse weather conditions and animal consumers.

When planting seeds, take note of their spacing requirements. Plants need room to grow both above and below ground. If seeds are very small and hard to space when planted, you may plant many, but then thin them (pick out some of seedlings) once they sprout. Make sure to thin in early growth stages so that plants are not affected by overcrowding.

The second type of propagation is asexual, in which new plants arise from the vegetative parts (roots, stems and leaves) of old plants. Examples include *cuttings, layering, division* and *tissue culture.*

Key Points Lesson 3

- Like people, plants have a specific life cycle.
- Seeds open up or germinate when the right conditions are present; water, soil, warmth, and oxygen.
- Plants develop 3 of the 6 major parts; roots, stems and leaves:
  - ·Roots absorb the water and minerals
  - ·Stems transfer the water, minerals and food
  - ·Leaves make food through photosynthesis.
- Plants flower and attract bees and other bugs to their pollen and move it from plant to plant so that a seed can be produced.
- Flowers are pretty and fragrant in order to attract pollinators. After the flowers are pollinated they produce seeds.
- Seeds can grow in fruit, pods, cones and berries.
- Lastly the plant dies and decomposes and the cycle begins anew.

Activity 1 20 minutes

Seed Viewers

Objective: To understand how seeds germinate

There are several different types of seed viewers. Choose the one that best fits your needs.

First:

- Give students packets of seeds and show them how to read the directions.

Next:

- Use a clear plastic glove. Have students put a wet cotton ball in each of the fingers. Push a seed beside the cotton balls- use 5 different kinds of seeds to see the differences in germination.
- Another method you can roll a piece of construction paper and place in a clear plastic cup so that the paper touches all sides of the cup. Stuff crumpled paper towels into the center so that the paper is firm against the sides of the plastic cup. Place 3 to 4 seeds (dried bean or corn seeds from the grocery store work well) between the plastic cup and the construction paper. Moisten the paper towels. The seeds should sprout in 4 to 5 days.
- Or you can simply place seeds on top of wet paper towels inside a closed plastic sandwich bag. They should begin to germinate in 4 to 5 days.

Key Points — Lesson 3

- Like people, plants have a specific life cycle.
- Seeds open up or germinate when the right conditions are present; water, soil, warmth, and oxygen.
- Plants develop 3 of the 6 major parts; roots, stems and leaves:
  - Roots absorb the water and minerals
  - Stems transfer the water, minerals and food
  - Leaves make food through photosynthesis.
- Plants flower and attract bees and other bugs to their pollen and move it from plant to plant so that a seed can be produced.
- Flowers are pretty and fragrant in order to attract pollinators. After the flowers are pollinated they produce seeds.
- Seeds can grow in fruit, pods, cones and berries.
- Lastly the plant dies and decomposes and the cycle begins anew.

Activity 2 — 10 minutes

Plant Plumbing

Objective: To understand water movement in plants

Put celery or white carnations in containers with water dyed with food coloring. As the plants take up this water, students can see how quickly water moves up the stems and where it goes.

Activity 3 — 20 minutes

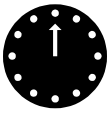
Starting and Transplanting Tomatoes

Objective: To teach students proper plant care

Start seeds in small pots to be transplanted later in your garden. Teach students to thin extra seedlings. Not all seeds germinate, which is why you often plant more than one seed in each space container. Thinning is the process by which you remove excess seedlings to provide proper space for seedlings to grow. When seedlings are mature (have two sets of true leaves), plant them in a garden. If you do not plan to have a garden, the students can take the plants home.

Key Points Lesson 3

- Like people, plants have a specific life cycle.
- Seeds open up or germinate when the right conditions are present; water, soil, warmth, and oxygen.
- Plants develop 3 of the 6 major parts; roots, stems and leaves:
  - Roots absorb the water and minerals
  - Stems transfer the water, minerals and food
  - Leaves make food through photosynthesis.
- Plants flower and attract bees and other bugs to their pollen and move it from plant to plant so that a seed can be produced.
- Flowers are pretty and fragrant in order to attract pollinators. After the flowers are pollinated they produce seeds.
- Seeds can grow in fruit, pods, cones and berries.
- Lastly the plant dies and decomposes and the cycle begins anew.

Activity 4  20 minutes

Making Baby Plants

Objective: To teach students how to propagate

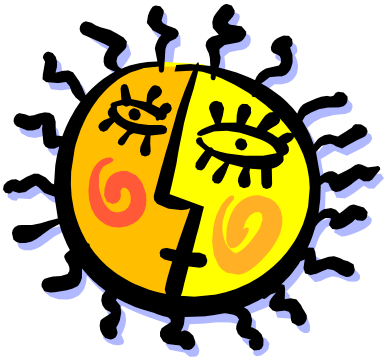
•Buy a stock plant, such as a spider plant, philodendron or coleus and have the students take cuttings. To root cuttings in water, fill clear plastic cups with water and cover them with clear plastic wrap. Secure the wrap with a rubber band. Stick the spider plant or the philodendron cutting into the cup through the wrap. Make sure no leaves are in the water.

•To root cuttings in soil, make a mini greenhouse out of a sandwich bag filled with soil. The bag will keep moisture in while new roots grow... Simply cut the top off a coleus plant and include at least 2 sets of leaves. Pinch off the bottom set and place in the soil and zip the baggie closed.

4

Plants Eat, Too!

Objective: *To learn what plants need for growth.*



Teacher background information:

To grow, plants need air, water, sunlight and nutrients from the soil.

Air

Plants need carbon dioxide and oxygen from the air in order to perform important processes (see Plants at Work).

Water

Plants take up nutrients from the soil through water. Water is also important to plants, as can be seen when plants wilt on hot, dry days. Plants are about 80 percent water.

Sunlight

Sunlight is needed for photosynthesis. A plant cannot produce its food without sunlight.

Nutrients

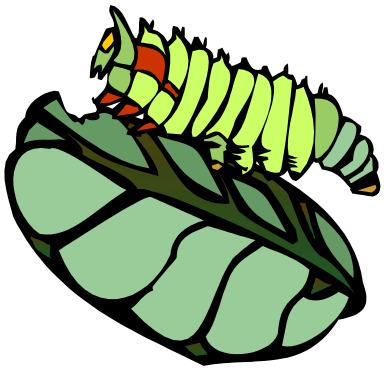
It is easy to understand that plants need water, air and sunlight. But the need for nutrients is sometimes more difficult to comprehend. There are two types of nutrients: *macronutrients,* which plants need in larger quantities, and *micronutrients,* which are needed in smaller quantities. Macronutrients include nitrogen, phosphorus, potassium, magnesium, calcium and sulfur. Micronutrients include iron, manganese, copper, zinc, boron, molybdenum and chlorine.

The most important nutrients are *nitrogen, phosphorus* and *potassium*. Nitrogen helps keep the plant green and encourages growth. Phosphorus promotes root growth and improves flowering and fruiting. Potassium is important for root development, overall growth and disease resistance. Plants take in these nutrients from the soil through their roots. Usually the soil contains the necessary nutrients, but sometimes people need to add nutrients to poor soil. Nutrients can be added through man-made *fertilizers* (solid or liquid), *compost* (decaying plant material) or *mineral additives* (lime).

A special group of plants called *legumes* can help return nitrogen to the soil. They are sometimes called green fertilizers. Legumes include beans, peas and clover. Legumes have a type of bacteria called *Rhizobium* growing on their roots. These Rhizobia can take in nitrogen from the air, bring it into the soil and fix it into the form of nitrogen that plants can use. In return for the nitrogen, the Rhizobia get carbohydrates from the plant. In farming practices, legumes are often planted as cover crops when other crops are not being grown. Legumes are planted on unoccupied land and allowed to grow until they begin to flower. Then the stems and leaves are cut off but the roots are left in the soil to decompose. The legumes leave behind a good supply of nitrogen for new plants to use

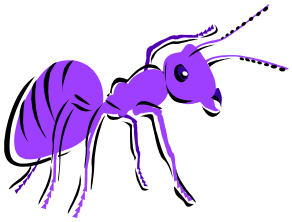
These additives can improve the nutrient content in soil or compost:

Additive	Nutrient supplied
Slow-release fertilizers	Check labels; usually nitrogen, phosphorus, potassium
Lime	Calcium
Compost	Nitrogen (perhaps more, depending on the compost)
Bonemeal	Phosphorus
Fallen leaves	Nitrogen, phosphorus, potassium
Grass hay	Nitrogen, phosphorus, potassium
Legume hay	Nitrogen, phosphorus, potassium
Egg shells	Calcium
Sawdust	Nitrogen, phosphorus, potassium
Straw	Nitrogen, potassium
Corn stalks	Nitrogen, phosphorus, potassium
Nut shells	Nitrogen
Pine needles	Nitrogen, phosphorus, potassium, iron



COMPOSTING

Composting involves mixing yard and household organic waste in a pile or bin and providing conditions that encourage decomposition. The decomposition process is fueled by millions of microscopic organisms (bacteria, fungi) that take up residence inside your compost pile, continuously devouring and recycling it to produce a rich organic fertilizer and valuable soil amendment.



Decomposition, or the composting process, occurs constantly and gradually around us everyday. The dark, rich soil covering the forest floor is an excellent example of this. When we compost, all we're really doing is speeding up Mother Nature. Organic waste is the best raw material to make compost from. This can come from your garden, your kitchen and even your home at large.

According to the United States EPA, yard trimmings and food residuals together constitute 23 percent of the U.S. municipal solid waste stream. That's a lot of waste to send to landfills when it could become useful and environmentally beneficial compost instead!

Soil

Soil is an incredibly complex, biologically and chemically active substance. While we often tend to think of it as "just dirt"—inert, lifeless stuff—soil is literally alive! It is estimated that there are more microbes in a teaspoon of soil than there are people on earth.

Roughly speaking, soil is made up of minerals, air, water, and organic matter. The majority of soil is made up of rocks that have been pulverized over time into sand, silt, or clay. This mineral portion of soil can vary with different percentages of these three components.

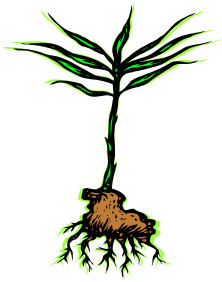
The organic portion of the soil is the result of the decomposition of grass clippings, bits of leaves, and dead bugs. **Humus** is the generic term for this substance, whose characteristics can vary widely depending on what the original material was and how it decomposed. Humus is the main component of compost and is generally dark brown, porous, spongy, and pleasantly earthy-smelling. This decaying matter provides nutrients to the living microscopic organisms which have the primary responsibility of maintaining the balance of soil's chemical and ecological properties.

Soil pollution is all around! Toxic pesticides are spread on lawns and farms. Industries empty sludge and pollutants into the air, soil, and water. Atomic, toxic, and hazardous waste is dumped into landfills. Lead may reach potentially toxic levels in soils close to busy streets and highways or near old buildings where lead-based paint has peeled or been stripped off. Plants generally do not absorb or accumulate lead in quantities that would be of concern. The greatest danger of lead toxicity from soil is direct consumption of lead-contaminated soil or dust.

Key Points — Lesson 4

- To grow plants need air, water, sunlight and nutrients from the soil.
- A plant cannot produce its food without sunlight.
- Sometimes people need to add nutrients to poor soil.
- Nutrients can be added through man-made fertilizers or compost.
- Pesticides can be toxic and can be harmful to humans.

Activity 1 — 15minutes



Nutrient Game

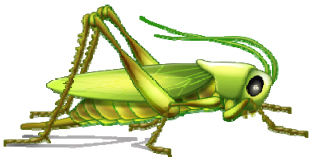
Objective: To understand what plants need for growth

- Take small pieces of colored paper cut into 2 x 2 inch pieces.
    - Blue represents water
    - Red is herbicide
    - Yellow is sunlight
    - Green is nutrients
- Have students stand in one place in the classroom or garden and pretend that they are plants. •Plants can't move! Tell the students that they have to stay where they are and if your feet move or you fall over – you have just died!
- When you say '**GO**' the plants pick up as many of the colored paper pieces surrounding them as they can in 15 seconds
  (**remind them they can't move their feet**)
- When you say '**STOP**' have the students count their colored pieces.
- If they found 4 Blue pieces they got enough water and get to live.
- If anyone picked up a Red one, they were sprayed with a herbicide and they were
- killed.
- If they found 6 Yellow pieces they got enough sunlight for photosynthesis.
- If they found 3 Green pieces they received enough nutrients.
- Ask the students what happens when they are too close to another plant?
- Ask the students did they get enough water or nutrients?

Key Points Lesson 4

- To grow plants need air, water, sunlight and nutrients from the soil.
- A plant cannot produce its food without sunlight.
- Adding pesticides
- Pollinator information

Activity 2 30 minutes



Grady's Garden

Objective: That the students will better understand the difference between good bugs and bad bugs

- **Read through 'Grady's Garden' to familiarize your self with the story. Photo copy and cut out the different action cards and let the students choose who they would like to play.**
- **Read through the story to the students and let the students act out their parts.**

Activity 3 30 minutes

Soil Testing and Amending

Objective: To understand your schools or gardens soil needs

•Analyze your garden or the school's soil. You can buy soil-testing kits at your local gardening store. Another source is the Let's Get Growing Co., 1-800-408-1868. Or contact your County Extension Service for information on soil testing. There is a $10 to $50 fee for soil testing at the state Extension lab.
• Once you have analyzed your soil, determine as a class what the soil needs. Next, let the students' research different additives and come up with their own recipe to improve the soil.

Grady's Garden Script

Grady's Garden is a beautiful, peaceful place where the bright pink flowers of Zo and Zeta Zinnia sway back and forth on their long, straight, slender stems in the golden sunshine. The Zinnias' leaves occasionally flutter in the breeze. Fruitilda's long, twisted vines hold a small, green fruit growing near some fading blossoms. The plants enjoy each day out in the sun or in the gentle rain. They smile while Grady the Gardener works in the garden. Grady stands back and admires the beautiful garden. Then Grady takes the tools and walks toward the house. Grady is a hero for caring for the plants in the garden. *(Hold up the "Applause" sign.)*

Here comes a honeybee buzzing and flying toward the flowers. The honeybee flaps its little wings hard and fast. It's on a journey to visit more than 600 flowers before returning to its hive. The honeybee flies close to Zo Zinnia's flower to collect nectar from deep inside. The flower's antennae-like stamens rub against the honeybee's body and leave a very fine dusting of pollen. The honeybee leaves Zo Zinnia and flies over to Zeta Zinnia to collect more nectar and pollen. It flies back to Zo Zinnia. The honeybee has pollinated Zo and Zeta. Now, they can produce seeds. The honeybee is a hero for helping the plants. *(Hold up the "Applause" sign.)*

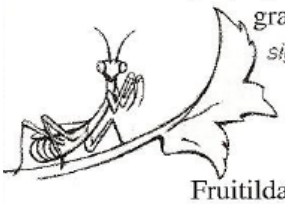
Just as the plants are enjoying the sunny day, along comes an aphid. An aphid is a tiny, hungry insect. Aphids move around on stems and leaves and suck out their juices. That makes an aphid a villain. *(Hold up the "Boo" sign.)* Because it sucks food instead of chewing, the aphid doesn't leave holes. It causes the leaves to turn yellow and brown. Wait, here comes a cute, little red lady beetle, or ladybug, with black spots. As she flies and crawls around, she spots the aphid and eats it. What a hero! Lady beetle saved the plants! *(Hold up the "Applause" sign.)* The Zinnias and Fruitilda nod thank you while the lady beetle flies off with a full stomach.

Even smaller than aphids are teeny-tiny organisms called viruses, bacteria, and fungi. We can't see them, but they are working away in the garden. Viruses, bacteria, and fungi can be heroes when they help plants grow healthy and beautiful. *(Hold up the "Applause" sign.)* They also can be villains when they make plants feel sick and unhappy. *(Hold up the "Boo" sign.)*

What's that tunneling through the soil around the plants? It's a big, long, slippery earthworm. The earthworm crawls around and creates tunnels for air and water to reach the plants' roots. Zo and Zeta Zinnia and Fruitilda now can wiggle their roots to take in more air and water. They look at the earthworm to thank it while it squirms away. The earthworm is a hero for making the soil better for the plants to grow strong and healthy. *(Hold up the "Applause" sign.)*

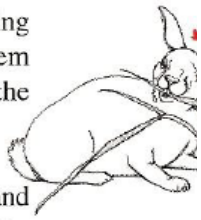
As the earthworm squirms away, a dirty yellow bean leaf beetle with black spots lands on Zeta Zinnia's flower. It looks around and sneers like a villian. *(Hold up the "Boo" sign.)* Then it flies to the ground to look for bean or pea plants. Bean leaf beetles, cucumber beetles, tomato hornworms, and slimy slugs chew holes in the leaves and fruits of plants. The squash bug flies to Fruitilda and starts chewing the fruit on the vine. A squash bug's favorite foods are pumpkins and squash. You can't see it, but there's also a squash vine borer eating away inside Fruitilda's stem. These insects are villains because they destroy plants. The plants look as if they are in pain. *(Hold up the "Boo" sign.)*

Here comes a long, slender praying mantis stepping smoothly and slowly into the garden. It looks like a dinosaur standing on its back two legs with its hands folded together like it's praying. When the bean leaf beetle gets too close, the praying mantis quickly reaches out and grabs it to eat. The praying mantis is a hero for saving the plants. *(Hold up the "Applause" sign.)* Garden creatures such as the praying mantis, lady beetle, lacewing, and spider are called predators. They are good predators because they eat insects that damage plants. They are heroes. *(Hold up the "Applause" sign.)*



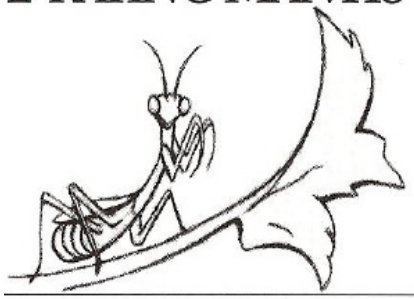
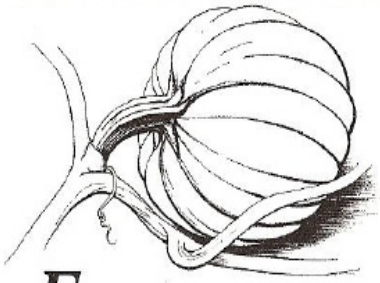
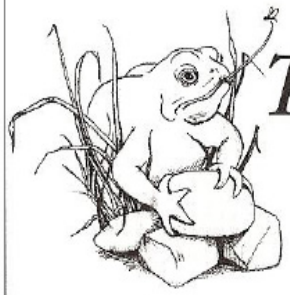
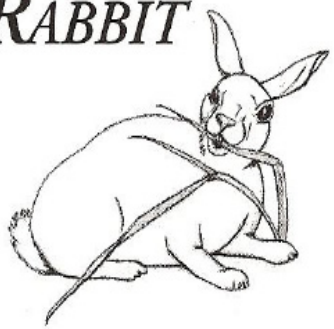
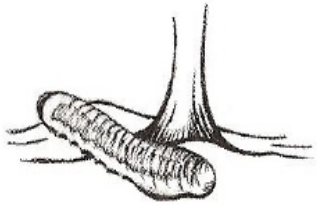
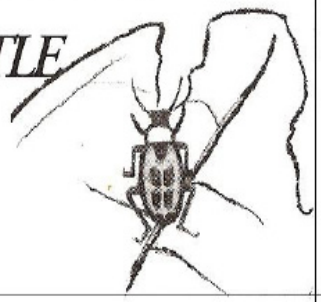
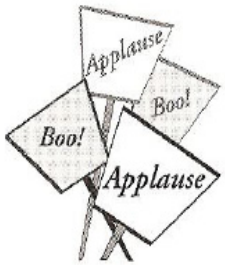
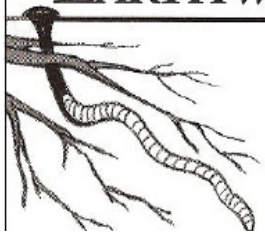
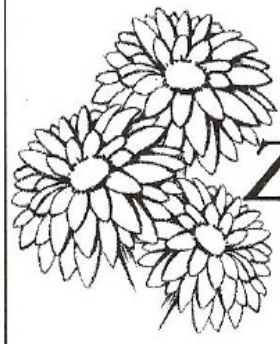
Fruitilda is still crying for help because the squash bug is sucking juice out of the fruit. Out hops a toad, right next to the squash bug. The toad sticks out its tongue, grabs the squash bug, and eats it. The toad is a hero for saving the fruit. *(Hold up the "Applause" sign.)* Turtles and birds such as wrens and robins also eat insects that eat garden plants.

The sun has set and the Zinnias and Fruitilda are looking tired. They nod off to sleep. During the dark and dreary night, a cutworm crawls to the top of the soil. It chews off Zo Zinnia's stem right next to the soil. The villain cutworm looks up and grits its teeth as it watches Zo fall to the ground. *(Hold up the "Boo" sign.)* The cutworm takes a few more bites, then crawls away.



The animals come out of the forest for a nighttime garden party. The rabbit wiggles its nose and hops to the garden. The raccoon and deer also are invited. These animals think gardens are like "potluck picnics" with an assortment of tasty foods. Animals are fun to watch, but they can be villains in the garden. *(Hold up the "Boo" sign.)* The rabbit starts nibbling on the leaves in the garden. Just in time, Grady the Gardener runs out of the house and over to the garden to chase away the rabbit. Grady is a hero for saving the plants from the animals that eat them. *(Hold up the "Applause" sign.)* Grady smiles and picks up Zo Zinnia. *(by the hand)* Grady takes Zo into the house, puts Zo in a pretty vase with water, and sets the vase on the windowsill. Zeta Zinnia, Fruitilda, and Grady feel happy and content. They know that the creatures and people will work together another day to find peace and harmony in the garden.

THE END

PRAYING MANTIS 	LADY BEETLE	 FRUITILDA	 TOAD
RABBIT 	APHID	GRADY	CUTWORM 
NARRATOR	BEAN LEAF BEETLE 	HONEYBEE	ZO ZINNIA
PRODUCER 	SQUASH BUG	EARTHWORM 	 ZETA ZINNIA

Producer – Hold up the "Applause" sign when you hear the narrator say "Hero." Hold up the "Boo" sign when hear the narrator say "Villain."	**Squash bug** – The squash bug flies to Fruitilda and starts chewing the fruit on the vine. These insects are villains because they destroy plants. Out hops a toad, right next to the squash bug. The toad sticks out its tongue, grabs the squash bug, and eats it.	**Earthworm** – What's that tunneling through the soil around the plants? It's a big, long, slippery earthworm. The earthworm crawls around and creates tunnels for air and water to reach the plants' roots. They *(the plants)* look at the earthworm to thank it while it squirms away. The earthworm is a hero.	**Zeta Zinnia** – *(Onstage in the garden as the melodrama begins)* The bright pink flowers of Zo and Zeta Zinnia sway back and forth on their long, straight, slender stems in the golden sunshine. The leaves of the Zinnias occasionally flutter in the breeze. *(Exaggerate the motions that the narrator reads as the creatures come and go in the garden.)*
Narrator – Read the script loudly, slowly, and with expression.	**Bean leaf beetle** – As the earthworm squirms away, a dirty yellow bean leaf beetle with black spots lands on Zeta Zinnia's flower. It looks around and sneers like a villian. *(Hold up the "Boo" sign.)* Then it flies to the ground to look for bean or pea plants.	**Honeybee** – The honeybee flaps its little wings hard and fast. It's on a journey to visit more than 600 flowers before returning to its hive. The honeybee flies close to Zo Zinnia's flower to collect nectar from deep inside. The flower's antennae-like stamens rub against the honeybee's body and leave a very fine dusting of pollen. The honeybee leaves Zo Zinnia and flies over to Zeta Zinnia to collect more nectar and pollen. It flies back to Zo Zinnia. The honeybee is a hero for helping the plants.	**Zo Zinnia** – *(Onstage in the garden as the melodrama begins)* The bright pink flowers of Zo and Zeta Zinnia sway back and forth on their long, straight, slender stems in the golden sunshine. The leaves of the Zinnias occasionally flutter in the breeze. *(Exaggerate the motions that the narrator reads as the creatures come and go in the garden.)*
Rabbit – The rabbit wiggles its nose and hops to the garden. The rabbit starts nibbling on the leaves in the garden. Animals can turn out to be villains in the garden. Grady the Gardener runs out of the house and over to the garden. He raises his hands and chases away the rabbit.	**Aphid** – An aphid comes along. An aphid is a tiny, vicious insect. Aphids move around on stems and leaves and suck out their juices. That makes an aphid a villain.	**Grady** – *(Onstage in the garden as the melodrama begins)* They *(the plants)* smile when Grady the Gardener works in the garden and watches them grow. Grady smiles back at the garden as he takes his tools and walks toward the house. Grady is a hero for caring for the plants in the garden. *(Grady returns to chase away the rabbit, smile at the garden, pick up Zo, take Zo to the house, and put the flower in a vase.)*	**Cutworm** – During the dark and dreary night, a cutworm crawls to the top of the soil. It chews off Zo Zennia's stem right next to the soil. The villain cutworm looks up and grits its teeth as it watches Zo fall to the ground.
Praying mantis – Here comes a long, slender praying mantis stepping smoothly and slowly in the garden. It looks like a dinosaur standing on its back two legs with its hands folded together like it's praying. When the tomato hornworm gets too close, the mantis quickly reaches out and grabs it to eat.	**Lady beetle** – Wait, here comes a cute, little red lady beetle, or ladybug, with black spots. As she flies and crawls around, she spots the aphid and eats it. What a hero!	**Fruitilda** – *(Onstage in the garden as the melodrama begins)* Fruitilda's long, twisted vines hold a small, green fruit growing near some fading blossoms. *(Exaggerate the motions that the narrator reads as the creatures come and go in the garden.)*	**Toad** – Out hops a toad, right up to the squash bug. The toad sticks out its tongue, grabs the squash bug, and eats it. The toad is a hero for saving the fruit.

5a

MyPyramid for Kids & 6 Essential Nutrients for Life

Objective: *To learn about MyPyramid for Kids, the six major themes of MyPyramid, general daily intake requirements of the five food groups, and the nutrients provided by each food group. By the end of this lesson participants will be able to demonstrate how plants are integral to all areas of MyPyramid for Kids.*

Teacher background information:

MyPyramid for Kids was developed by the U.S. Department of Agriculture specifically for children ages 611 to provide guidance in implementing the 2005 Dietary Guidelines for Americans into their daily diet. There are 6 major themes for *MyPyramid for Kids* and each of these themes is visually depicted on the pyramid.

Activity - **Be physically active every day.**
MyPyramid for Kids shows a child running up the side of the pyramid to demonstrate the importance of physical activity.

Variety - **Eat variety of color every day.** *MyPyramid for Kids* is not complete without all of the sections of the pyramid present. It is important to eat a variety of foods from all the food groups for a complete diet.

Proportionality - **Eat more of some foods** (fruits, vegetables, whole grains, and low fat or fat free milk products) **and less of others** (foods high in saturated fats, salt and added sugar.) The different widths of the food group bands show proportionality on the pyramid.

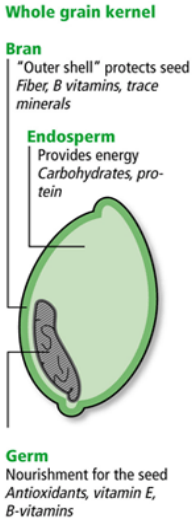
Moderation - **Choose healthier foods from each food group.** Healthier forms of foods are located at the bottom or widest portion with less healthier choices located in the upper or smaller portion of the food group band (an apple would be located in the widest portion of the fruit band with an apple pie being located at the top of smallest portion of the fruit band.)

Gradual Improvement - **Make healthy behavior changes overtime.** The child moving up the pyramid shows gradual improvement.

Personalization - **Make choices that are right for you**.
The name My Pyramid shows personalization.

The five food groups as well as oils are represented on *MyPyramid for Kids*. The foods within the five food groups as well as oil provide the specific requirements that humans need to live and grow. There are 6 essential nutrients that people need to sustain life they are carbohydrates, protein, fat, minerals, vitamins, and water. No single food contains all the necessary nutrients, so we need to eat a variety of foods to have a balanced diet. Below is an outline of each food group identifying specific foods that fit within this group, which nutrients are present, and the health benefits that the nutrients provide.

The orange band of *MyPyramid for Kids* represents the grain group. Foods that are included in this group are; breads, pasta, cereal, rice, tortillas, etc. There are two different types of grains; whole and refined grains. Whole grains include the bran, endosperm and germ of a kernel. Examples of these types of foods include; whole wheat flour, bulgur, oatmeal, whole cornmeal, and brown rice.
Refined grains have been milled, which is a process that removes the bran and germ of the kernel. This is done to help improve the shelf life of the product, but it removes dietary fiber, iron and many B Vitamins. Some examples of refined grains are; white flour, degermed cornmeal, white bread, and white rice. Most refined grains are then enriched, which means certain B Vitamins and iron are added back into the product after processing.



The major nutrient represented in the grain group is carbohydrates. Carbohydrates should be consumed often because the body relies on them for energy. There are 3 types of carbohydrates; sugars, starches and fiber. Sugars are the simplest form of carbohydrates. Starches are found in roots, legumes, grains, and some vegetables. Fiber is found only in plant foods and can't be digested by humans. Sources of carbohydrates other than grains include fruits and vegetables.

The vegetable group is represented on *MyPyramid for Kids* with a green band. Any vegetable or 100% vegetable juice is included in this food group. Vegetables can be raw or cooked, fresh, frozen, canned, or dried/dehydrated. The vegetable group is organized into 5 subgroups based on their nutrient content: 1) dark green (broccoli, spinach, collard greens, etc.); 2) starchy (corn, green peas, potatoes, etc.); 3) orange (carrots, pumpkin, sweet potatoes, acorn squash, etc.); 4) other vegetables (artichokes, cauliflower, cucumbers, vegetable juice, etc.); and 5) dry beans and peas (black beans, kidney beans, soy beans, tofu, lentils, etc.)

The human body is roughly 70 percent water while plants are 80-95 percent. Water is an important component for both. Water helps with digestion, helps lubricate bones and joints and regulates body temperature. Water is found in vegetables as well as almost all foods and beverages.

The fruit group is represented on *MyPyramid for Kids* with a red band. Any fruit or 100% fruit juice is included in this group. Fruits can be fresh, canned, frozen or dried, and may be whole, cut or pureed. Some examples of fruits are apples, strawberries, grapes, watermelon, and plums.

Vitamins are organic compounds that help the body in many ways. There are two types of vitamins; fat-soluble and water-soluble. Fat-soluble can be stored in the body where as water-soluble can not. Vitamin C is one of the many important vitamins in our bodies. It helps our body fight infections and heals wounds. It also aids in the absorption of iron and calcium. Vitamin C is found in many fruits including oranges, citrus fruits, cantaloupe and strawberries to name a few. Vitamins are also found in vegetables like broccoli, cabbage, green peppers and other green leafy vegetables.

The blue band on *MyPyramid for Kids* represents the milk group. All fluid milk products and many foods that are made from milk are considered part of this food group. However, there are certain foods that are made from milk, but have little or no calcium in them such as cream cheese, cream and butter and are not considered part of this food group. Some examples of commonly eaten foods within this food group are; milk, cheese and yogurt.

Minerals, one of the 6 essential nutrients for life, are non-organic substances that the body needs to function properly. Calcium is a mineral. Calcium is needed for strong bones, help with blood clotting and muscle and nerve function within our bodies. Foods found in the milk group are good sources of calcium. Both boys and girls ages 9-13 years old need 3 cups of dairy each day to meet their calcium needs. Other foods that contain the mineral calcium are leafy dark green vegetables and broccoli.

The final food group represented in *MyPyramid for Kids* is the meat and bean group, which is the purple band. All foods made from meat, poultry, fish, dry beans or peas, eggs, nuts and seeds are considered part of this group. Dry beans and peas are a part of this group as well as the vegetable group. Examples of some commonly eaten foods within this group are; beef, chicken, eggs, navy beans, salmon, and tuna. Most Americans eat enough food from this food group however; we need to choose leaner choices of these foods.

Proteins, another one of the six essential nutrients for life, help our bodies build and repair tissues, provide energy, regulate body functions, and help transport nutrients and oxygen. Sources of protein come from either animal or plant sources. Examples of protein from animals are meat, fish and poultry. Example of plant sources are beans and lentils.

The Oil Group
Oils are represented on *MyPyrmaid for Kids* by a yellow band. Oils are not a food group. Oils are fats that are liquid at room temperature. Oils come from many different plants and from fish. Common oils are; canola oil, soybean oil, corn oil, and olive oil. Solid fats are fats that solid or hard at room temperature. Common solid fats are butter, lard, stick margarine and shortening.

Fat is an essential nutrient. Although fats can be viewed negatively they are actually vital for our body to function properly. Moderation is the key to proper fat intake. Our body uses fat as a source of energy, to help absorb and transfer specific vitamins, to cushion our vital organs and to insulate our body. Sources of fat in our diet include butter, cheese, mayonnaise, olives, avocados, coconuts, nuts, margarine, vegetable oils, and bacon just to name a few.

Wrap Up:
The five food groups are; grains, fruits, vegetables, milk, and meat and beans. Oils are not a specific food group, but are essential to our diet in proper amounts. The amount of food that a person needs daily from the five food groups depends on many things including age, sex, and level of physical activity. Below is an example of the suggested daily servings for a 9-13 year boy versus a 9-13 year old girl.

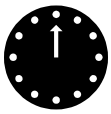
	Grains	**Vegetables**	**Fruit**	**Milk**	**Meat and Beans**
9-13 Year Old **Boy**	6 Ounces	2.5 Cups	1.5 Cups	3 Cups	5 Ounces
9-13 Year Old **Girl**	5 Ounces	2 Cups	1.5 Cups	3 Cups	5 Ounces

The six nutrients that are essential for life are carbohydrates, protein, fat, water, vitamins, and minerals. No single food contains all of the necessary nutrients so we need a variety of foods to have a balanced diet. Certain foods contain more than just one of six essential nutrients, these foods are considered nutrient dense. Nutrient dense foods (fruits, vegetables, low fat milk) should be consumed more often than non-nutrient dense foods (chips, candy and sugar sweetened beverages).

Key Points Lesson 5a

- The 5 food groups (fruit, vegetable, grain, dairy, and meat and beans) and oils make up the different foods that we eat every day.
- Within each food group there are foods that we should chose to eat more often (whole grain breads) and foods that we should chose less often (white bread).
- *MyPyramid for Kids* helps to show you how much of the food groups you need to eat in a day to be healthy.
- All of our food originates from plants and animals.

Activity 1



20 minutes

Create a Meal

Objective: To understand the caloric content of certain foods and their nutritional value

- Discuss the origin of a typical meal, such as a cheeseburger and French fries. Then let the child analyze the parts of his or her favorite meal.
- Use a menu from a fast food restaurant like McDonalds to show the students the amount of calories in a fast food meal and the nutritional value of that food item.
- Have the student create their own meal, list the name of the food item and list the caloric content.

For Example: Burger → Beef → Cow → Feeds on hay or grain

<u>Origins of some common foods:</u>

Hamburger – cow (which eat plants)

Spaghetti – wheat

Crackers – wheat

Peanut Butter – peanuts

French Fries – potatoes

Ketchup – tomatoes, sugar cane, spices

Cornflakes – corn

Grape Jelly – grapes, sugar cane

Pickles – cucumbers

Key Points Lesson 5a

- The 5 food groups (fruit, vegetable, grain, dairy and meat and beans) and oils make up the different foods that we eat every day.
- Within each food group there are foods that we should chose to eat more often (whole grain breads) and foods that we should chose less often (white bread).
- *MyPyramid for Kids* helps to show you how much of the food groups you need to eat in a day to be healthy.
- All of our food originates from plants and animals.

Activity 2 20 minutes

Grain Tag

Objective: To understand the nutrient content in a typical meal

- Pick one child to be the "**Whole Grain Giant**," which can save a child from being tagged out.

- Pick one child in each group to be the "**White Bread Bully**." Children that are tagged by the "**White Bread Bully**" are frozen until the "**Whole Grain Giant**" comes along and unfreezes them.

- Discuss with children that we should choose more food that the "**Whole Grain Giant**" would eat. Examples would be whole grain breads, tortilla, brown rice, barley, bulgur, etc.

Activity 3 20 minutes

Reading Food Labels

Objective: To understand the importance of food labels

- Give each student a copy of a nutritional label, point out each section and explain what it tells about the product. Remember that the daily requirements listed are for average adults and may need to be changed for children and youths.

- Let them bring in a label from their favorite food and analyze it on their own. Also, look at ingredient labels. Many products might be interesting to compare, such as fruit juices and fruit drinks. Many fruit drinks actually contain no real fruit juice.

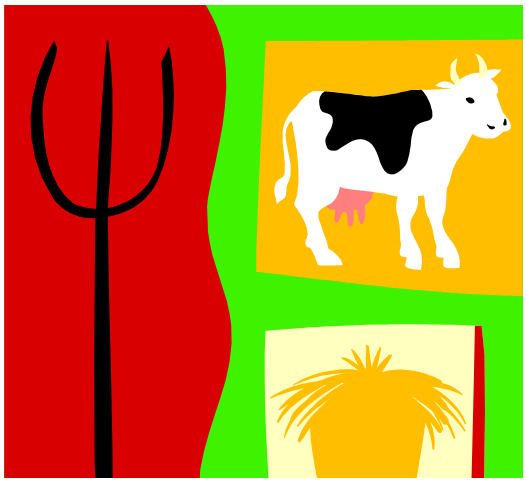
Burger → Beef → Cow → Feeds on hay or grain

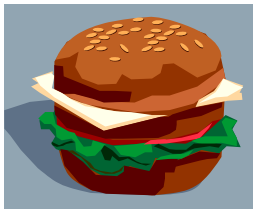
Origins of some common foods:

Hamburger – Cow

Spaghetti – wheat

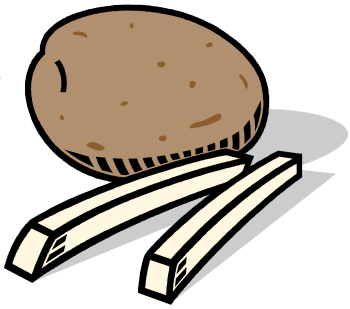
Crackers – wheat





Peanut Butter – peanuts

French Fries – potatoes

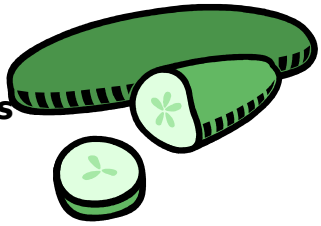


Ketchup – tomatoes, sugar cane, spices

Cornflakes – corn

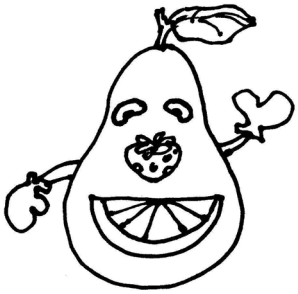
Grape Jelly – grapes, sugar cane

Pickles – cucumbers



Teacher background information:

5b



You Are What You Eat

Objective: *To learn about the necessary vitamins and nutrients for proper nutrition and relate vitamins and nutrients to fruit and vegetable intake.*

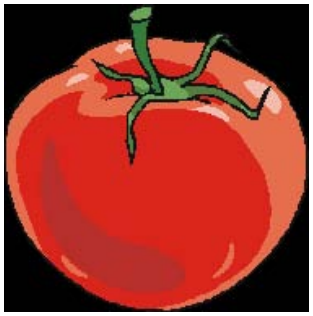
Just as plants have certain needs to live and grow, people also have specific requirements. Humans need proteins, fats, carbohydrates, water, minerals and vitamins. No single food contains all the necessary nutrients, so we need a variety of foods to have a balanced diet. We will look at each one of the nutrients needed in depth and explain what they are, what they do in the body and how we can get them. **Examples of plants that are key to each group are in bold type.**

Protein

Description: Proteins are made up of chemical compounds called amino acids. Our bodies need 22 different types of amino acids. Our bodies can manufacture 13 of these amino acids, but we must consume food containing the other nine "essential amino acids." A food containing all nine of the essential amino acids is classified as a complete protein. Protein from animal sources such as meat, fish and poultry are usually complete. A food that does not contain all nine is classified as an incomplete protein. Most plant foods, such as beans, rice and corn are incomplete proteins, but when eaten in the right combinations can supply all essential amino acids. **Functions:** Protein helps the body build and repair tissue; provides energy; regulates body functions; helps transport nutrients and oxygen. **Sources:** Meat, fish, poultry, eggs, dairy products, **nuts, dried beans, peanut butter.**

Fats

Description: Although many people view fats negatively, and the new trend is to eat fatfree or lowfat foods, fats are actually vital for our body to function properly. As long as no more than 30 percent of our daily intake comes from fat, we will get our daily requirements and perhaps decrease the risk for heart disease and obesity. Once again, moderation is the key. There are three types of fats in foods: saturated, monounsaturated and polyunsaturated. Fats are classified by how solid they are at room temperature. The least solid fats are best for your body. Polyunsaturated fats are the least solid, and are found in some cooking oils, peanut butter and soft margarine. Monounsaturated fats are a little more solid at room temperature and are found in some cooking oil, olive oil and some peanut butter. Saturated fats should be restricted in a diet. They are found in butter, chocolate, egg yolks, lard and shortening. **Functions:** Fats are a source of stored energy; help absorb and transport specific vitamins (fatsoluble vitamins A, D, E and K); cushion vital body organs; supply essential fatty acids; insulate the body; protect nerves and blood vessels. **Sources:** Butter, cheese, mayonnaise, **olives, avocado, coconut, nuts,** margarine, **vegetable oils,** bacon.



Carbohydrates

Description: Carbohydrates should be consumed most frequently because the body relies on them for energy. There are three types of carbohydrates: **sugars, starches** and **fiber. Sugars** are the simplest form found in the body and the easiest to use. They can be consumed to provide quick bursts of energy. Sugars are divided into two groups, monosaccharides (glucose, fructose, and galactose) and disaccharides (sucrose, maltose and lactose). Monosaccharide means "one sugar." It has the simplest molecular structure. Dissaccharide means two sugars; it is made up of two monosaccharides combined. Simple sugars are found in fruits, milk, and table sugar. The other two types of carbohydrates, starch and fiber, are considered polysaccharides. Polysaccharides are made up of more than two sugars and have the most complex molecular structure. **Starch,** found in roots, legumes, grains and vegetables, is changed into a simple sugar to be used by the body. **Fiber,** also called cellulose, is found only in plant foods and cannot be digested by humans. Sources include whole grain cereals, fruits and vegetables. Fiber is an important aid in moving food through the digestive system and out of the body.

Functions: Carbohydrates are our main source of energy. They also aid with digestion.
Sources: **Breads, cereals, rice, pasta, corn, fruits, potatoes, and vegetables**

Water

Description: Water is an important component for both plants and people. The human body is 70 percent water. Plants are 80 to 95 percent water. **Functions:** Helps with digestion; helps lubricate bones and joints; regulates body temperatures. **Sources:** Found in almost all foods and beverages.

Minerals

Description: Minerals are nonorganic substances the body needs to function properly. Those needed in large quantities are called macrominerals (calcium, phosphorus, magnesium, sodium, potassium, chloride); those needed in smaller quantities (iron, iodine, zinc, fluorine) are called microminerals or trace elements.
Functions: See chart.
Sources: See chart.

Macrominerals

Mineral	Function	Source
Calcium	Needed for strong bones; helps with blood clotting; muscle use and nerve functions	Milk, milk products, added to orange juice, **leafy dark green vegetables, broccoli**
Phosphorus	Helps build strong bones and teeth	Meat, poultry, liver, fish, eggs, milk, dairy products, **whole grains, nuts, legumes, potatoes, wheat flour**
Magnesium	Helps regulate temperature, the nervous system and muscles helps the body use carbohydrates, fats and proteins	**Dark green leafy vegetables, and nuts, legumes, whole-grain cereals,** cheddar cheese
Sodium, chloride and potassium	Work together to regulate body fluids, the nervous system, muscle functions and nutrient absorption	Sodium and chloride: table salt; potassium: meats, milk, **bananas, leafy green vegetables, citrus fruits**

Microminerals

Mineral	Function	Source
Iron	Important for hemoglobin, the protein that carries oxygen in the blood	Liver, egg yolks, **dried legumes, leafy green vegetables, dried fruit, enriched breads**
Iodine	Necessary for the thyroid	Gland iodized salt, ocean fish, milk
Zinc	Helps lungs release oxygen; helps the immune system	Oysters, egg yolks, organ meats, milk, **wheat bran**
Fluoride	Prevents tooth decay; contributes to healthy bones	Drinking water, seafood, tea, toothpaste

Vitamins

Vitamins are organic compounds that help the body in many ways. Fat-soluble vitamins are consumed in various foods and then stored in body fat until needed by the body. Water-soluble vitamins dissolve in water and therefore cannot be stored in the body; they need to be consumed every day.

Functions: See chart ***Sources:*** See chart

Water-soluble vitamins

Vitamin	**Function**	**Source**
Vitamin C (Ascorbic acid)	Help fight infection and heal wounds; helps the body to absorb iron and calcium	**Oranges, citrus fruits, cantaloupe, strawberries, dark leafy green vegetables, broccoli, cabbage, green peppers**
B Vitamins:		
Thiamin (B1)	Helps body use carbohydrates and release energy from foods	**Whole-grains, peas, potatoes,** pork, liver
Riboflavin (B2)	Helps body use carbohydrates	Cheese, eggs, **enriched breads, leafy green vegetables,** lean meats, **legumes**
Niacin (B3)	Important to the nervous system and digestive tract	Liver, lean meats, **whole grains, nuts, legumes**
Folate	Helps with production of red blood cell	**Broccoli, wheat germ, wheat bran,** yeast, **leafy green vegetables,** liver, **legumes**
Biotin	Helps use carbohydrates, fats and proteins	**Bananas, grapefruit, watermelon, straw-berries, mushrooms, tomatoes**
Pantothenic Acid	Helps body use fat and helps in production of hormones and cholesterol	Meats, poultry, egg yolk, **wheat germ, rice germ, tomato paste, sweet potatoes, oatmeal,** milk
Pyridoxine (B6)	Helps nervous system function; maintains healthy skin and red blood cells	Liver, meats, **cereals, bran, oatmeal, vegetables,** milk
Cyanocobalamin (B12)	Necessary for normal growth	Liver, muscle meats, eggs, chicken, milk

Fat-soluble vitamins

Vitamin	**Function**	**Source**
Vitamin A (retinol)	Helps with night and color vision; contributes to growth of bones and teeth; helps to produce healthy skin	**Carrots, sweet potatoes, spinach, broccoli, apricots, cantaloupe, peaches,** whole milk, liver, butter
Vitamin D (calciferol)	Development of bones and teeth; helps body absorb and use calcium and phosphorus	Sunlight, added to milk products, egg yolks, liver
Vitamin E (alpha tocopherol)	Helps to protect cells and tissues and keep them strong	**Vegetable oils, wheat germ, whole-grain bread, cereal products, green leafy vegetables**
Vitamin K	Needed for blood clotting	Green leafy vegetables, broccoli, **, peas vegetable oil, soybean oil,** liver, cheese and eggs

Key Points Lesson 5b

- The six essential nutrients for life are carbohydrates, protein, fat, minerals, vitamins, and water.
- No single food contains all the necessary nutrients so it is very important to eat a balanced diet.
- All of our food originates from plants and animals.

Activity 1 5 minutes

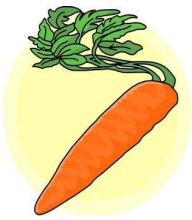
Potato Chip Game

Objective: To provide a visual understanding of fat in common snack foods

- You can use an assortment of potato chips or to simplify the process you can use regular potato chips and baked potato chips.
- Place the different chips on separate paper towels and let them set until the end of class time.
- The students can see the difference in the fat content by the amount oil that has soaked into the paper towels from the chips.

Activity 2 30 minutes

Vegetable Spotlight Bulletin Board



Objective: To find out what nutrients are found in common Foods

- Study a vegetable in depth with a special "Vegetable Spotlight Bulletin Board." An example spotlight for carrots as follows:

Origin of Carrots
Carrots originated about 3,000 years ago in Middle Asia. Traders and travelers spread them quickly to the Mediterranean region. The first carrots looked very different from today's carrots. Their edible roots were white, purple and yellow, not orange. The orange carrot was not developed until the 1600s by the Dutch.

Nutritional Benefit
Carrots have many benefits. They are high in beta carotene, which gives them the orange/yellow color. Beta carotene is used in our bodies to make Vitamin A, which we need for healthy skin, bones and teeth. It also helps our night and color vision. Studies have shown that beta carotene may also help lower the risk of cancer and other diseases. Eating one carrot can satisfy our daily requirement of Vitamin A. Carrots are also a good source of fiber, potassium and Vitamin C.

Varieties
Carrots can be found in may shapes and sizes: long, short (a popular variety used for mini-peeled carrots is called "Caropak"), and even maroon carrots. Texas A & M University has just developed a carrot called "Betasweet" that is orange on the inside and maroon on the outside. These new carrots have more beta carotene and a sweeter flavor than regular carrots.

Packaging
Carrots come in a variety of packages. You can buy them whole with their leaves attached, prepackaged into strips, prepackaged into baby strips, prepackaged into horizontal chips, canned and frozen.

Key Points — Lesson 5b

- The six essential nutrients for life are carbohydrates, protein, fat, minerals, vitamins, and water.
- No single food contains all the necessary nutrients so it is very important to eat a balanced diet.
- All of our food originates from plants and animals.

Activity 3 — 30 minutes

Testing Nutrients in Foods

Objective: To find out what nutrients are found in common foods

Test common foods for carbohydrates, fats, sugar, protein, etc. In all experiments, have students hypothesize which nutrients they think they will find in the foods, collect data and then analyze the results.

Test for Vitamin C

Make a Vitamin C indicator: Stir a teaspoon of cornstarch into a cup of boiling water. Cool the liquid. Next add drops of iodine until the mixture turns blue. Pour a small amount of the Vitamin C indicator into a few test tubes or small clear glasses. To use the indicator, add drops of substances containing Vitamin C (fresh or frozen orange juice, or other drinks claiming to contain Vitamin C). Adding drops of Vitamin C will slowly make the blue color disappear. Record the number of drops it takes to cause the blue color to completely disappear, so that you can compare the Vitamin C content of the different substances. The more drops it takes for the color to disappear, the less Vitamin C is present. Chart the results and discuss your findings. Look for answers on product nutrition labels.

DANGER

Iodine is poisonous and should not be ingested

Simple carbohydrates (Sugars):

Test foods for sugars with an indicator called Tes-tape.™ Tes-tape™ is a chemically treated paper used frequently by diabetics who have to limit their sugar intake. It is available at pharmacies. Gather a collection of foods (milk, sugar dissolved in water, flour dissolved in water, fruits, vegetables, soft drinks, etc.)

Have students hypothesize, which products they think will contain sugar then perform the experiment. Let students dip 1inch strips of Tes-tape™ in different liquids or juices of different foods. Interpretation of the indicator will be given when purchased. Chart the results and discuss your findings.

Complex carbohydrates (Starch):
Test food samples to see if they contain starch (a type of carbohydrate) by putting a drop of iodine on the food. If the drop results in a purple or a blue-black color, then it contains starch. The darker the color, the more starch it contains. Check the results with product nutrition labels.

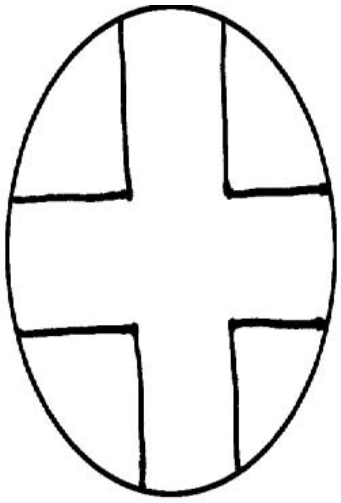
Test for fat
Test for fat by rubbing a piece of food on a square piece of brown paper until it leaves a wet spot (or just add a drop if it is a liquid). Let the square dry. To test if the food contained fat, hold the dry square up to the light. If it left a greasy, translucent spot, then the food had fat in it. Before beginning, have students write down predictions and then compare with the results.

Test for proteins
To test for protein, fill a jar with /4 inch of sodium hydroxide solution. Add a small crumbled food sample (carefully, without splashing). Add a few drops of copper sulfate solution. A pinkish-blue color indicates that protein is present. Repeat with other foods. Chart and discuss the results.

DANGER:

This experiment uses poisonous solutions and should be conducted carefully.
Prepare a sodium hydroxide solution by putting one layer of sodium hydroxide pellets on the bottom of a 1quart jar. Add one pint of water and stir with a stirring rod until pellets are dissolved. Prepare a copper sulfate solution. Dilute 20 grams of copper sulfate in 62 milliliters of water.

6a



Safety First

Objective: *To teach students how to safely harvest fruits and vegetables and how to handle and store foods properly.*

Teacher background information:

Food manufacturers and grocery stores are careful to provide the appropriate environmental conditions for your foods and are required to do so by law. Therefore, it is important to know how to keep food safe once you bring it home.

Eating food that has been handled improperly can result in a food-borne illnesses caused by microorganisms. Microorganisms are small organisms that can be seen only with a microscope. The types of microorganisms affecting foods are molds, yeast and bacteria.

Many microorganisms are in the air, soil and water; we usually have some in our bodies. Unless many are present, they do not affect our health. Microorganisms thrive in environments that have food, moisture and warm temperatures. They can be carried by insects, animals, people or unclean objects (like dirty utensils). To prevent food spoilage by microorganisms, consumers should store their food for the right amount of time (food does not last forever) and at the right temperature (temperature varies by the food). Also, wash hands and utensils with soap and hot water and dry them before they come into contact with food.

Temperature is a big factor in food safety. Cold slows the growth of microorganisms, which is why we need refrigerators. Keep refrigerators at 36 to 40 degrees F. This temperature does not kill microorganisms, but does slow their growth. Microorganisms can be killed at temperatures higher than 140 degrees F, which is why we often boil objects to sterilize them. Most are killed in the cooking process. However, once the food cools, microorganisms return.

Most fruits and vegetables can be stored at room temperature without spoiling, but they last longer if kept in a refrigerator. Fruits and vegetables continue to mature or die after being harvested. Grocery stores often wax fruits and vegetables to improve their appearance and slow down the loss of water. Before eating fruits and vegetables, wash them to remove any dirt, insecticide residue or display wax.

To harvest fruits and vegetables, use a clean harvest knife or clippers to cut ripe fruits and vegetables off the plants. Be very careful with sharp harvest equipment. Collect produce in a harvest basket or container. Discard (place in compost) vegetables or fruits with insect holes or rotting spots. Damaged areas are places where microorganisms may be able to enter. Thoroughly wash the produce to remove any dirt or chemicals that may have been used in the garden.

Some tips to keep food safe:

Keep cold foods cold and hot foods hot.
Always check the "Sell By" date
Wash all utensils before use with hot, soapy water.
Keep stored food covered in tight containers, foil or plastic wrap to limit air exposure.
Oxygen increases decay time.
Wash hands before touching food (make sure to scrub the whole hand with soap and warm water – even under fingernails).

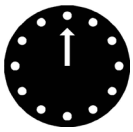
Hand Washing Tips:

WET your hand with water SOAP on your hands WASH your hands for 20 seconds (back of palms, wrists, between your fingers, thumbs, and under your nails) RINSE off the soap on your hands with water. DRY your hands TURN OFF WATER with a paper towel.

Key Points — Lesson 6a

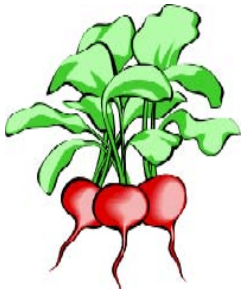
- Keep cold foods cold and hot foods hot
- Always check the "Sell By" date
- Wash all utensils before use with hot, soapy water
- Keep stored food covered in tight containers, foil or plastic wrap to limit air exposure
- Wash hands before touching food

Activity 1



20 minutes

Harvesting produce



Objective: To understand food safety precautions

Demonstrate harvesting in your garden and have students practice washing fruits or vegetables or visit a local grocery store to learn about their safety precautions

Activity 2

15 minutes

Hand Washing Fun

Objective: To understand the proper method for washing hands

Ask three students to volunteer for the experiment.

For the student volunteers:

- Rub 1 tablespoon of cooking oil all over your hands until completely coated. Sprinkle 1 teaspoon of cinnamon on hands and rub it around until it's evenly distributed. The cinnamon will be like bacteria. It's all over!
- Wash hands as follows, **rubbing them briskly for 20 seconds**:
  Student #1: wash hands with **cold water** and **no soap**
  Student #2: wash hands with **warm water** and **no soap**
  Student #3: wash hands with **warm water** and **soap**

For the rest of the class:

- Observe the three hand washing methods.
- Record the results.

Key Points — Lesson 6a

- Keep cold foods cold and hot foods hot
- Always check the "Sell By" date
- Wash all utensils before use with hot, soapy water
- Keep stored food covered in tight containers, foil or plastic wrap to limit air exposure
- Wash hands before touching food

Activity 3 — 10 minutes

Potato Washing

Objective: To understand food safety precautions

Wash a potato or any produce in a clear glass bowl by first dipping it in the water and ask the class if they think it is clean.

Next, return it to the water and scrub with a brush and show the students the dirty water. This should demonstrate the importance of cleaning food thoroughly. [Good Rainy Day Activity]

Activity 4 — 20 minutes

Food Safety Poster

Objective: To understand food safety precautions

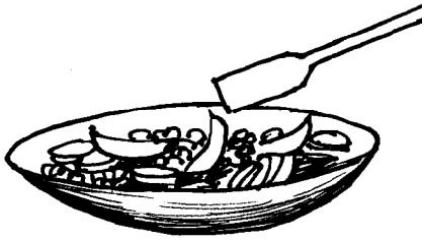
Good Guys/Bad Guys

Not all bacteria are bad! Have student's research good bacteria and bring in three kinds of food or pictures of food that have good bacteria (like yogurt or cheddar cheese).

Ask children to research the purpose of good bacteria in food.

Encourage them to use a variety of sources: Internet, library, the school nurse, etc. Have students create a poster to take home to help remind them of safety tips.

6b



Tasting Up A Storm

Objectives: *To learn some basics about food preparation and participate in hands-on experiences. To have the opportunity to taste various fruits and vegetables.*

Teacher background information:

Preparing and cooking healthy foods is an important activity that teaches children good nutritional behavior. It gives students an enjoyable way to apply their knowledge about food selection and safety. If you have a garden, you can plant unusual plant varieties such as maroon carrots, black lettuce, blue corn, yellow watermelon, lemon cucumbers, burgundy beans, yellow pear tomatoes, chocolate green peppers, gold potatoes or white eggplant.

If you have a class garden, one of the students' greatest rewards is eating fruits and vegetables they have cared for lovingly. With or without a garden, the classroom can be a place for children to taste fruits and vegetables they may or may not have tried before. Children often dislike produce items because they have never had the opportunity to taste them. However, if you give them the chance to try new foods, they may find out that they actually like healthful foods.

It is also good to demonstrate how quick and easy healthful cooking can be. Many adults complain that they do not have time to cook healthful food and, therefore, have poor diets. If kids learn early the benefits of cooking, they may not consider food preparation a habit rather than a hassle.

Preparation can vary. Many fruits and vegetables are eaten in their raw or natural forms. However, they can also be tasty cooked. When cooking fruits and vegetables, be careful not to overcook and destroy important vitamins and minerals. The best forms of cooking for nutrient retention include microwaving, steaming and stir frying. Boiling and frying often leach nutrients and lower the nutritional value of the fruits and vegetables.

Some tips for nutrient retention:

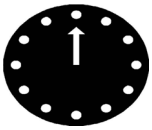
Avoid overcooking. Increased exposure to heat increases the loss of vitamins. Cut fruits and vegetables in large pieces and chop immediately before eating to avoid overexposure to oxygen. Refrigeration usually reduces nutrient loss. Rinse in cold water, but do not soak (soaking can cause loss of water soluble nutrients). Use raw fruits and vegetables.

The most important thing is to keep it fun. Make cooking an activity kids will enjoy for the rest of their lives.

Key Points — Lesson 6b

- Many fruits and vegetables are eaten in their raw or natural forms.
- Avoid overcooking. Increased exposure to heat increases the loss of vitamins.
- Rinse in cold water, but do not soak (soaking can cause loss of water-soluble nutrients.)
- Children often dislike produce items because they have never had the opportunity to taste them. However, if you give them the chance to try new foods, they may find out that they actually like healthful foods.

Activity 1



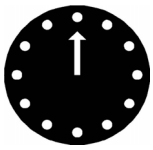
30 minutes

Classroom Cookbook

Objective: To encourage kids to cook at home with their families

Make a classroom cookbook with the recipes that students bring from home

Activity 2



30 minutes

Let's Eat!

Objective: To sample different foods from the garden

Cook and taste unique fruits and vegetables. Have students come up with an advertisement to entice people to try an unusual fruit or vegetable. Examples include kiwifruit, mango, blackberries, papaya, rutabaga, kohlrabi and sprouts.

Key Points Lesson 6b

- Many fruits and vegetables are eaten in their raw or natural forms.
- Avoid overcooking. Increased exposure to heat increases the loss of vitamins.
- Rinse in cold water, but do not soak (soaking can cause loss of water-soluble nutrients.)
- Children often dislike produce items because they have never had the opportunity to taste them. However, if you give them the chance to try new foods, they may find out that they actually like healthful foods.

Activity 3

20 minutes

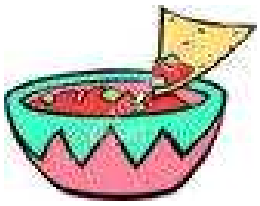
Making Salsa

Objective: To encourage kids to eat more fresh produce

Make some easy recipes. Recipes can be found in special cookbooks kids, in magazines and on the Internet. Here are a few ideas to get you started:

Salsa

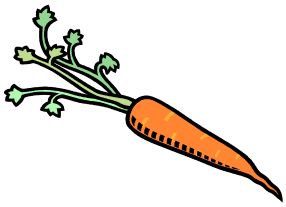
3 cups fresh of Tomatoes peeled
1/2 cup finely chopped Red Onion
2 tablespoons finely chopped fresh Coriander
1 or 2 Jalapeño Peppers finely chopped
Salt and Pepper to taste



Blend Tomatoes in food processor or electric blender until they are coarsely chopped. Place into bowl with other ingredients and mix well. Serve with chips.

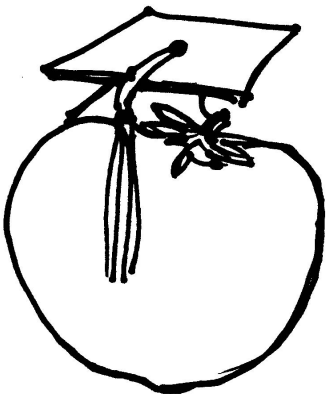
Carrot Salad

6 medium grated and peeled Carrots
1 cup of Raisins
¾ cup of Sesame Seeds
¾ cup of Sunflower Seeds
1 to 2 Cloves of diced Garlic
2 tablespoons Lemon Juice



Mix all ingredients together and let the salad sit for at least an hour for the flavors to blend

Appendix and Resource Information



Instructor Forms:

1. **Attendance Sheet**
2. **Pre and Post Test with Key**
3. **Nutrition Screener**
4. **Tracking Sheet**
5. **Working with Elementary Students**

In today's world, where available information can double in the blink of an eye, it is important for educators to provide students with a strong base of knowledge. Equally important is to show students how to find necessary resources, to answer additional questions and to keep up to date with the latest information. Following is a list of local, state, national and international nutrition information sources. Take time to teach kids how to teach themselves.

Nutrition sites

http://aggie-horticulture/nutrition/index/index.html This site was developed to accompany the Nutrition in the Garden Guide.

http://www.dole5aday.com/ A site sponsored by Dole for the Five-A-Day campaign. It has excellent nutritional information about a variety of fruits and vegetables in a child-friendly format (students can learn from Bobby Banana).

http://www.kidsfood.org/index.html

This site is called the Kids Food Cyber Club and is sponsored by the Connecticut Association for Humans Services and Kaiser Permanente. It has information for students, teachers and parents and even includes interactive nutritional quizzes. Children will enjoy browsing through the "Kids Only" section.

http://www.cspinet.org/

This site is by the Center for Science in the Public Interest, which publishes the Nutrition Action Healthletter. It also has a section just for youths and is a place to find recent nutrition information.

Gardening sites

http://www.nmnh.si.edu/garden/

This attractive site was developed for a special gardening project called Seeds of Change that combines gardening and history. It was created by New Mexico State University's College of Agriculture and Home Economics and sponsored by the Smithsonian. It is an excellent place for ideas and information.

http://aggie-horticulture/kindergarden/index.html

This site developed at Texas A&M University provides general garden information and links to other useful sites.

Hundreds of other web sites may be used by your class. These are just a few to start you exploration. You may even decide to create your own site, based on your classroom experiences.

Write a letter requesting information from or asking a specific question to a local or national organization.

Local Organizations

Food Services/ Cafeteria Staff Dietitians (hospitals, health care centers, school districts) County Health Department Local Extension Service

Special Thanks To the Authors who have provided us with a wealth of knowledge and are the authors of "Teaching Healthy Living Through Horticulture"

Sarah Lineberger and Jayne Zajicek

EVALUATION

Orientation and Training for Nutrition in the Community Gardens

CURRICULUM	Agree	Neutral	Disagree
The training met my expectations.			
Were the hands-on activities effective.			
I will be able to apply the knowledge learned.			
The curriculum content was organized and easy to follow.			
Others in my organization, community, church, etc. will be able to benefit from the knowledge I gained.			

INSTRUCTORS	Agree	Neutral	Disagree
The presenters were knowledgeable.			
The quality of instruction was good.			
The presenters were interesting and practical.			
Class participation and interaction were encouraged.			

TRAINING SPECIFIC QUESTIONS	Yes	No	Unknown
The training was worthwhile and I will be able to use it to be an advocate teaching children in the community?			
Will you use the materials in your garden programs?			

How do you rate the training overall?

Excellent ◯ Good ◯ Average ◯ Poor ◯ Needs Improvement ◯

ADDITIONAL COMMENTS

What items, information or activities would you like to see added to this training?

_____

_____

_____

What are three most important things or topics you learned during this training?

_____

_____

_____

Other Suggestions or Comments:

_____

_____

_____

Nutrition in the Community Gardens

ATTENDANCE SHEET

LOCATION:_____ DATES:_____ INSTRUCTOR(S):_____

ID #	Name [Please Print]	Male or Female	Race*	Week 1	Pre-Test Score	Week 2	Returned Nutrition Screener #1	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Post-Test Score	Returned Nutrition Screener #2
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															

* Race: AA = African American W = White H = Hispanic O = Other

Please make a separate sheet for each class

Student ID #_____

Nutrition in the Community Gardens – *Pre Test*

Date:_____ **Site:_____**

I. Choose the answer that best describes you.

1. I am a
   A) Girl B) Boy Your Age:_____

2. Have you ever worked in a garden?
   A) Yes B) No

3. If you have worked in a garden, where was the garden?
   A) home
   B) school
   C) a relative's house (grandparent, aunt, etc.)
   D) neighbor's house
   E) community garden

II. Garden - Please circle the response that you think best answers the question.

1. All the food that we eat can be traced back to:
   A) animals
   B) people
   C) plants
   D) machines

2. The major functions of roots are: (1) storage of water and nutrients for growth and (2) support by anchoring the plant body to the ground.
   A) True B) False

3. The main purpose of a flower is?
   A) to attract people
   B) to make seeds and reproduce
   C) to be pretty
   D) to smell good

4. The best location for a vegetable garden is a place that receives at least 6-8 hours of sun each day.
   A) True B) False

5. If you want to improve the soil and help plants grow, you add:
   A) crickets
   B) grub worms
   C) earth worms
   D) lady bugs

6. After you garden, but also throughout the day, hand washing is the single most effective way to prevent the spread of germs.
   A) True B) False

7. To grow, plants need all of these except:
   A) air
   B) water
   C) sunlight
   D) a flower pot

8. Soil usually contains nutrients for good plant growth, but sometimes we can add any of these **except**:
   A) fertilizer
   B) compost
   C) sugar
   D) mineral additives

9. The stems on a plant contain their own transportation system that allows water and nutrients to move up from the roots and up to the leaves.
   A) True B) False

III. Nutrition - Please circle the response that you think best answers the question.

10. According to MyPyramid, you should **not**:
   A) Be physically active every day.
   B) Choose healthier foods from each food group.
   C) Eat more candy and drink more pop.
   D) Make healthy behavior changes over time.

11. The five food groups are the vegetable group, fruit group, milk group, meat & bean group, and grain group.
   A) True B) False

12. When you go to the store to buy your fresh fruits or vegetables they should **not** have?
   A) Good color
   B) A smell that is not too sweet or sour
   C) Cuts, bruises or scars
   D) Firm feeling, but gives a little when you touch it

13. Oils are **not** a food group but you need some to be healthy?
   A) True B) False

14. Breads, pasta, cereal, and tortillas are part of what group?
   A) dairy
   B) grains
   C) fruit
   D) meat and beans

15. Wheat, rice and corn are plant sources of:
   A) protein
   B) fats
   C) carbohydrates
   D) minerals

16. Our body uses fat as a source of:
   A) water
   B) food
   C) vitamin
   D) energy

17. Advertisements about food that are on the television always give complete and healthy information about your food choices.
   A) True B) False

18. Plants are 80 to 95 percent water.
   A) True B) False

Nutrition in the Community Gardens – *Pre Test - KEY*

II. Garden - Key

1. **C** - All the food that we eat can be traced back to plants.

2. **A** - The major functions of roots are: (1) storage of water and nutrients for growth and (2) support by anchoring the plant body to the ground. True

3. **B** - The main purpose of a flower is to make seeds and reproduce.

4. **A** - The best location for a vegetable garden is a place that receives at least 6-8 hours of sun each day. True

5. **C** - If you want to improve the soil and help plants grow, you add earth worms.

6. **A** - After you garden, but also throughout the day, handwashing is the single most effective way to prevent the spread of germs. True

7. **D** - To grow, plants need all of these except a flower pot.

8. **C** - Soil usually contains nutrients for good plant growth, but sometimes we need to add all of these **except**: sugar

9. **A** - The stems on a plant contain their own transportation system that allows water and nutrients to move up from the roots and up to the leaves. True

III. Nutrition - Key

10. **C** - According to MyPyramid, ~~you~~ should **not** eat more candy and drink more pop.

11. **A** - The five food groups are the vegetable group, fruit group, milk group, meat & bean group and grain group. True

12. **C** - When you go to the store to buy your fresh fruits or vegetables they should not have? Cuts, bruises or scars

13. **A** - Oils are not part of a food group but you need some to be healthy? True

14. **B** - Breads, pasta, cereal, and tortillas are part of what group? Grains

15. **C** - Wheat, rice and corn are plant sources of carbohydrates.

16. **D** - Our body uses fat as a source of energy.

17. **B** - Advertisements about food that are on the television or radio always give complete and healthy information about your food choices. False

18. **A** - Plants are 80 to 95 percent water. True

Student ID #_____

Nutrition in the Community Gardens – *Post Test*

Date:_____ **Site:_____**

I. Choose the answer that best describes you.

1. I am a
   A) Girl B) Boy Your Age:_____

2. Have you ever worked in a garden?
   A) Yes B) No

3. If you have worked in a garden, where was the garden?
   A) home
   B) school
   C) a relative's house (grandparent, aunt, etc.)
   D) neighbor's house
   E) community garden

II. Garden - Please circle the response that you think best answers the question.

1. All the food that we eat can be traced back to:
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3. The main purpose of a flower is?
   A) to attract people
   B) to make seeds and reproduce
   C) to be pretty
   D) to smell good

4. The best location for a vegetable garden is a place that receives at least 6-8 hours of sun each day.
   A) True B) False

5. If you want to improve the soil and help plants grow, you add:
   A) crickets
   B) grub worms
   C) earth worms
   D) lady bugs

6. After you garden, but also throughout the day, hand washing is the single most effective way to prevent the spread of germs.
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7. To grow, plants need all of these except:
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   B) water
   C) sunlight
   D) a flower pot

8. Soil usually contains nutrients for good plant growth, but sometimes we can add any of these **except**:
   A) fertilizer
   B) compost
   C) sugar
   D) mineral additives

9. The stems on a plant contain their own transportation system that allows water and nutrients to move up from the roots and up to the leaves.
   A) True B) False

III. Nutrition - Please circle the response that you think best answers the question.

10. According to MyPyramid, you should **not**:
   A) Be physically active every day.
   B) Choose healthier foods from each food group.
   C) Eat more candy and drink more pop.
   D) Make healthy behavior changes over time.

11. The five food groups are the vegetable group, fruit group, milk group, meat & bean group, and grain group.
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   A) Good color
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   C) Cuts, bruises or scars
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13. Oils are **not** a food group but you need some to be healthy?
   A) True B) False

14. Breads, pasta, cereal, and tortillas are part of what group?
   A) dairy
   B) grains
   C) fruit
   D) meat and beans

15. Wheat, rice and corn are plant sources of:
   A) protein
   B) fats
   C) carbohydrates
   D) minerals

16. Our body uses fat as a source of:
   A) water
   B) food
   C) vitamin
   D) energy

17. Advertisements about food that are on the television always give complete and healthy information about your food choices.
   A) True B) False

18. Plants are 80 to 95 percent water.
   A) True B) False

Nutrition in the Community Gardens – *Post Test - KEY*

II. Garden - Key

1. **C** - All the food that we eat can be traced back to plants.

2. **A** - The major functions of roots are: (1) storage of water and nutrients for growth and (2) support by anchoring the plant body to the ground. True

3. **B** - The main purpose of a flower is to make seeds and reproduce.

4. **A** - The best location for a vegetable garden is a place that receives at least 6-8 hours of sun each day. True

5. **C** - If you want to improve the soil ~~and~~ help plants grow, you add earth worms.

6. **A** - After you garden, but also throu~~ghout the day, handwashing~~ is the single most effective way to prevent the spread of germs. True

7. **D** - To grow, plants need all of these except a flower pot.

8. **C** - Soil usually contains nutrients for good plant growth, but sometimes we need to add all of these **except**: sugar

9. **A** - The stems on a plant contain their own transportation system that allows water and nutrients to move up from the roots and up to the leaves. True

III. Nutrition - Key

10. **C** - According to MyPyramid, you should **not** eat more candy and drink more pop.

11. **A** - The five food groups are the ~~vegetable~~ group, fruit group, milk group, meat & bean group and grain group. True

12. **C** - When you go to the store to buy your fresh fruits or vegetables they should not have? Cuts, bruises or scars

13. **A** - Oils are not part of a food group but you need some to be healthy? True

14. **B** - Breads, pasta, cereal, and tortillas are part of what group? Grains

15. **C** - ~~Whea~~t, rice and corn are plant sources of carbohydrates.

16. **D** - Our body uses fat as a source of energy.

17. **B** - Advertisements about food that are on the television or radio ~~always~~ give complete and healthy information about your food choices. False

18. **A** - Plants are 80 to 95 percent water. True

Nutrition in the Community Gardens

Nutrition Screener for Students

Student's Name (Identifier): _____ **Male** ____ **Female** ____ **Age:**_____

How many servings of fruits, vegetables, fruit and/or vegetable juices and soups do you eat?

Circle the amount on the chart below for breakfast, lunch, dinner and snacks.

	Fruits A serving is equal to: 1 medium piece of fresh fruit, ½ cup of fruit salad, ¼ cup of raisins, apricots or other dried fruit	**Vegetables** A serving is equal to: 1 medium carrot or other fresh vegetable, 1 small bowl of green salad, ½ cup fresh or cooked vegetables	**Juices** A serving is equal to: 6 ounces or 100% orange, apple, grapefruit or any other fruit juice as well as vegetable juice (Do not count fruit punch, lemonade, Gatorade, Sunny Delight or fruit drinks)	**Soups** A serving is equal to: ¾ cup of vegetable soup
Breakfast	0 1 2 3 4 or more	0 1 2 3 4 or more	0 1 2 3 4 or more	0 1 2 3 4 or more
Morning Snack	0 1 2 3 4 or more	0 1 2 3 4 or more	0 1 2 3 4 or more	0 1 2 3 4 or more
Lunch	0 1 2 3 4 or more	0 1 2 3 4 or more	0 1 2 3 4 or more	0 1 2 3 4 or more
Afternoon Snack	0 1 2 3 4 or more	0 1 2 3 4 or more	0 1 2 3 4 or more	0 1 2 3 4 or more
Dinner	0 1 2 3 4 or more	0 1 2 3 4 or more	0 1 2 3 4 or more	0 1 2 3 4 or more
Night Time Snack	0 1 2 3 4 or more	0 1 2 3 4 or more	0 1 2 3 4 or more	0 1 2 3 4 or more

Nutrition in the Community Gardens
Gardener Tracking Sheet

Instructor's Name: _____ **Site:** _____

No. of children attending session:_____ **Date:** _____

No. of parents attending session: _____

Lesson Topic: (*Please check all that apply*)

- ☐ Going to the Market - Lesson 1
- ☐ Plant ABCs – Lesson 2
- ☐ Plants at Work and Origins of New Plants – Lesson 3
- ☐ Plants Eat, Too! – Lesson 4
- ☐ MyPyramid for Kids & Six Essential Nutrients for Life 5
- ☐ Safety First and Tasting Up A Storm – Lesson 6

1. **Brief description of how the topic was presented:** _____

_____

_____

_____

2. **What activities were done during this lesson?** _____

_____

_____

_____

3. **Please record your perception of the children's knowledge and satisfaction of the topic(s) presented: (***i.e. how well did the children understand the information presented, enjoy the lesson, etc.)* _____

_____

_____

_____

Additional Comments:

_____

_____

_____

Working With Elementary Students

*If you arrive unprepared, don't expect the students to take you seriously. If education appears to be important to you, it will have increased importance to them.

*Be clear about your behavioral expectations and when possible, have the kids help you identify the rules that are important. Talk with the kids about WHY each rule is important. For example, the students will always come up with the idea that a person should raise their hand before speaking. Why? Post the rules in the room. It is good to have a plan for 1st offense, 2nd offense. (Color change). Compliment good resolutions (it takes maturity to ignore someone that is annoying).

*Don't use food as a reward. Rewards should happen soon.

*Use positive discipline – tell them what they are doing correctly. If you focus on the kids that are misbehaving, you probably won't sleep well. Even if most of the class is acting up, compliment the one kid that is behaving correctly. When students come into my room, I thank them for sitting in their seat, folding their hands on their desk and facing forward because what I have to share with them is important. (It takes 15 positives to neutralize one negative – if you say something negative to a kid, try to remember to say some positives.) If a student thinks you do not like them, they will make you miserable.

*Never argue with a student about discipline – they will find a way to win.

*If you must call a parent, be sure to start the conversation with positives – no one wants to hear someone else dog their kid. Parents can offer assistance in solving problems as long as they are approached with a helpful attitude.

*No double standards, kids are just too sophisticated – if they can't do it, neither can you.

*Tell the students what they are good at (singing story) – everyone is good at something your task is to find something positive to say to every child. Avoid telling them what they are not good at – they've probably heard it all before.

*Explain the difference between stories and questions. However, when you ask for questions they will tell stories and then every kid suddenly has a story they just have to tell. Let them know you are interested in their stories but you need to make sure there is time for the activity (or whatever). Don’t interrupt the child.

*You are seen as the person who knows it all so if you tell them there are space aliens living in area 51, they will believe it. If they ask you a question about a controversial question, ask them what they already know on the topic – do not give your opinion – they need to learn to think for themselves.

*If a child needs to use the restroom, let them – unless you want to provide dry clothes because they do not always think ahead.

*Don't touch a kid anywhere as it can sometimes be seen as threatening (information specialist tap).

*Stereotypes, whether positive or negative, are damaging. In some cultures (Asian and Native American), looking up and making eye contact with an adult is disrespectful ("Look at me when I speak to you." – they were being respectful.) Native American concept of time. Lying and culture, gang signs (flagging, tagging and sagging). Grandma often head of African American family.

*The sitting and listening attention span is about 30 minutes no matter how interesting you are (lots of visuals).

*Do not expect the students to remember multi-step directions – give them a few at a time.

*Need something passed out - ask the kid that can't sit still.

*Don't leave the students unsupervised -- EVER.

*Report any abuse – you are legally required to do so. Don't have lengthy conversations – "I'm sorry this happened to you, let's find someone who can help." "Researchers estimate that, in our country, about 10% of boys and 25% of girls are sexually abused." www.ncptsd.va.gov/ncmain/ncdocs/fact_shts/fs_child_sexual_abuse.html

*If a child gives you grief, think about what they may be going home to. Children, who act as though they are angry with the world, often have a reason – they deserve our understanding. Kids, who need to control the classroom, usually have chaos at home. 5 steps of grieving.

*Cooperative learning ideas:

http://edtech.kennesaw.edu/intech/cooperativelearning.htm
http://projects.coe.uga.edu/epltt/index.php?title=Cooperative_Learning

*Be selective and ask yourself, "Is this the hill I want to die on."

*Help the students fit in and feel important.