

FOOD CHEMISTRY



FOOD CHEMISTRY



CAMP

Created in Partnership with the Laurie M. Tisch Center for Food, Education & Policy
at Teachers College Columbia University

FOOD CHEMISTRY

AUTHORS

Hiershenee Bhanabhai

Erin Gordon

Anna Rickards

PROJECT ADVISOR

Pamela Koch

Special thanks to Ana Islas who assisted
with the development of the food science content.

Cover image adapted from 123rf.com Prudencio Alvare photo # 25564015



CAMP

Contents

Introduction	5
Combining Science Eating Healthfully	6
Overview of <i>Food Chemistry</i>	7
How to Use this Book	8
Tips for Successful Classroom Cooking	11
Making Field Trips Meaningful	12
Advanced Planner	14
Master Material List	15
“Detective Notes” Sheet	19
Creating Posters	21
DAY 1: EAT REAL	23
Case 1: From Farm to Plate	25
Case 2: Hidden Ingredients	89
Case 3: All About Worms	111
Case 4: Cooking 101	127
Case 5: Cooking to Eat Real	135
DAY 2: EAT MORE PLANTS	159
Case 6: Learning in the Garden	161
Case 7: Gardening in the Classroom	181
Case 8: Cooking to Eat More Plants	205
DAY 3: LESS PROCESSED	229
Case 9: Portion Distortion	231
Case 10: Processed Food Overload	239
Case 11: Finding Balance	269
Case 12: Cooking to Eat Less Processed	279
DAY 4: NAVIGATE THE ENVIRONMENT	307
Case 13: Farmers Market Exploration	309
Case 14: Marketville	319
Case 15: Cooking to Eat Local	367
DAY 5: MAKING CHANGE	389
Case 16: Advertising Healthy Habits	391
Case 17: Cooking for Change	395
Optional Cases (Food Miles, The Lost Steps, Seasonality Wheel)	423
References	438

Introduction

Welcome to *Food Chemistry*! During this week, campers will discover connections between science and food, thinking about today's complex food system and the challenging health and social issues we face. Our daily choices impact the world around us, often in ways we do not personally see or even think about. The science and technology involved in growing, transporting, processing, packaging, and storing our food exists in the background of every meal and our choices impact both the health of our bodies and our planet.

Within this complex global food system, we are exposed to more food choices than ever before. We eat many times a day, but rarely think about the science and technology involved in preparing the foods we consume. By taking the time to cook whole foods from scratch the worlds of chemistry, biology, and botany converge. In this course, campers explore the structural and functional properties of food through hands-on experiments and cooking labs. Campers observe the life cycle of plants from seed to compost through sprouting their own seeds in the classroom and creating their own compost box in order to utilize food scraps. By the end of this course campers will be nutritionists and food chemists who have the skills to critically analyze our food system and know how to make food choices that will keep their bodies – and the planet – healthy.

We hope *Food Chemistry* teaches your campers to reflect and think before they eat, to make more healthful and ecologically sustainable food choices now and long into the future.

Hiershenee Bhanabhai
Erin Gordon
Pamela Koch
Anna Rickards

Goals of *Food Chemistry*

Campers who participate in *Food Chemistry* will:

- **increase knowledge and conceptual understandings** about how our food is produced, transported, processed, packaged, cooked and how these processes affect our health and the health of the natural environment.
- **develop skills in science inquiry** through the use of logical reasoning, scientific design, and experiences that allows room to develop their own ideas or theories, clearly explain them, and justify their statements.
- **develop scientific habits of mind** that allow them to be flexible, open-minded, and critical thinkers.
- **increase their beliefs** that their personal food choices impact their own health and the health of the natural environment.
- **increase their confidence that they can cook healthful foods** for themselves and their families and be able to describe the chemical processes involved in cooking.
- **increase their confidence to make food choices** that will sustain their own health and be good for the health of the planet.
- **deepen their commitment** to apply what they learn in public debates of issues related to food systems, health, and the natural environment.

Combining Science and Eating Healthfully

This camp experience is developed out of the belief that if we truly understand the science behind our food system — from production all the way to consumption — people can become engaged and active food citizens. As food citizens we are called upon to make difficult decisions about food and the food industry. From what kinds of foods to produce, to whether or not to develop more localized food systems, from what materials to use for packaging, to whether or not to compost food scraps, these are tough choices that require critical thinking.

Cooking, the hands-on experience of transforming raw ingredients into a delicious meal, is the perfect combination of science and culture. By learning how to cook and engaging with food in its most basic form, the world of chemistry comes to life in our kitchens. As chefs we become more aware of the time, energy, and effort that goes into transforming food grown on a farm to the meal on our plate. This knowledge enhances our ability to act as food citizens while shaping how we make daily food choices.

Very often we think of science as learning facts and being able to design, conduct, and interpret experiments. Yet, science can also be so much more. Through inquiry-based science experiences youth, as well as adults, can learn to be more curious and

critical about the world around them. This analytical approach can then be applied to everyday decisions, such as deciding what to eat.

Instead of taking the traditional nutrition education approach, where students learn about food groups and serving sizes, this curriculum takes campers on a journey through the food system and the world of food chemistry in order to better understand what really happens between farm and plate. By focusing on process and utilizing the natural partnership between food, cooking and science, campers gain not only analytical and practical skills but also conceptual understandings that together will hopefully motivate campers to take a critical look at their own food choices.

Ultimately, this curriculum uses science to teach campers why caring about the food system and caring about our food choices is important for not just our own personal health but for the health of all people and the planet. By fusing nutrition education, — provides motivation and food skills — and scientific inquiry — provides a sense of wonder and discovery — we hope to teach campers the kind of knowledge they need to make healthy and ecologically sustainable food choices now and into the future.

Overview of Food Chemistry

This five day curriculum sequentially help campers develop a deeper understanding about how our food system works while learning about what food choices promote personal and environmental health. Throughout the five days, campers also learn how to navigate the food environment to seek out healthy options. A large part of each day is devoted to cooking, where campers prepare healthful recipes and learn about food science in the kitchen as well as practical and transferable cooking skills.

Through this curriculum, campers become food detectives. Each day is divided into several “cases” where campers collect the clues that they will synthesize on the final day of camp.

Day 1: Eat Real begins with *Case 1: From Farm to Plate* where campers exploring what happens to food from the time it is produced until it gets to our plate, and then what happens to the waste. In *Case 2: Hidden Ingredients* campers learn about hidden ingredients in foods by analyzing the ingredient lists of mystery foods. In *Case 3: All About Worms* campers make a vermiculture compost box to learn about the process of decomposition and the practical application of composting the food scraps generated during the cooking sessions. *Case 4: Cooking 101*, campers are introduced to the cooking component of **Food Chemistry**. Campers learn how to manage their minds and their bodies in the kitchen and learn kitchen safety. In *Case 5: Cooking to Eat Real* campers experience their first cooking case and explore the culinary role of binders in order to make Quinoa and Bean burgers.

Day 2: Eat Mostly Plants introduces campers to the world of biology and what plants need to grow. How we can effectively grow the plants we eat is the focus of *Case 6: Learning in the Garden* in which campers take a field trip to a local growing space. In *Case 7: Gardening in the Classroom*, campers learn how to grow their own sprouts. In *Case 8: Cooking to Eat More Plants* campers experiment with emulsifiers in order to make salad dressings for a plant part salad.

Day 3: Less Processed exposes campers to the tricks of “Super Sizing.” Campers discover ways to avoid eating too much of foods that have excessive amounts of fat, sugar, and salt and are typically served in large portion sizes. In *Case 9: Portion Distortion* campers experiment with portion sizes of popcorn in order to recognize how serving size influences how much we eat. In *Case 10: Processed Food Overload* campers learn about how much fat and sugar is in various popular foods and drinks as well as learning about the impacts of food advertising. *Case 11: Finding Balance* introduces campers to pedometers and the importance of physical activity. In *Case 12: Cooking to Eat Whole Foods* campers explore food preservation and learn how to pickle their own vegetables.

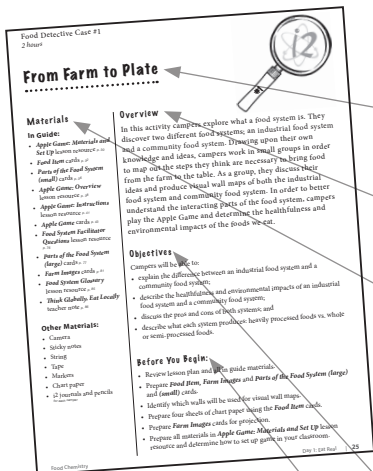
Day 4: Navigate the Environment focuses on food availability and where campers can access healthy foods in their neighborhoods. In *Case 13: Farmers Market Exploration* campers visit a farmers market and learn why and how shopping at farmers markets can help us make healthy food choices. Campers buy local, seasonal ingredients to use in a later case. Through role-playing in *Case 14: Marketville*, campers explore the geographical and economical barriers to healthy eating. In *Case 15: Cooking to Eat Local* campers learn about protein coagulation and it’s role in cheese making. Campers apply this knowledge and make their own ricotta using local dairy.

Day 5: Making Change is the final day. Campers synthesize what they have learned and discuss how they will make changes in their own lives. In *Case 16: Advertising Healthy Habits* campers reflect on marketing techniques they have learned in order to create healthy advertisements for a food or recipe they have eaten during the week. *Case 17: Cooking for Change* is the most extensive cooking session. Campers apply the culinary skills they have learned in order to make a full menu including homemade ravioli, sauces, salad and dessert.

NOTE: This curriculum and all materials has been designed for 20-24 campers. If you have a smaller or larger group, please adapt accordingly.

How to Use this Book

The curriculum spans five days. Every day is divided into two or more cases. Each case comes with a **lesson plan** as well as appropriate resources for the teacher and campers. We recommend that you review all materials in a case as you prepare to lead it. The descriptions below highlight the type of information you will find in each lesson plan.



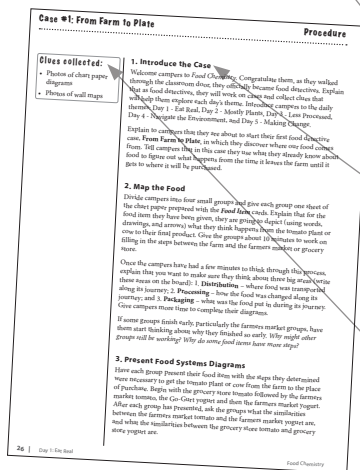
Header: This tells you the name of the case and approximately how much time it will take to complete this case.

Overview: This section provides a description of the case and details about what campers will do and learn during the case.

Materials: This list includes everything you need for the case. The list is divided by what is included in the *Food Chemistry* guide and other materials you will need. Materials listed in **bold italics** are paper resources provided within this book. Some additional printing of these resources will be necessary and will be indicated on the resource sheet.

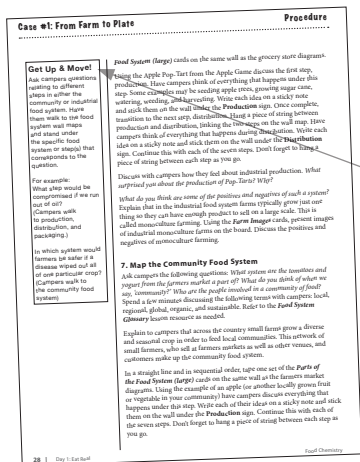
Objectives: These highlight what you can expect campers to know and be able to do at the end of the case.

Before You Begin: These bullets tell you what you need to do to get ready for the case. You may need to make copies of resources, gather materials, set up stations, and review teaching materials or background information.



Case Procedure: This section breaks down the case into step-by-step instructions on how to execute the activities. Each step provides details about what to do as well as which resources are needed for both teacher and campers. These resources are always in **bold italics**.

Clues collected: As detectives, campers collect “clues” during each case. Clues may be activity sheets, photographs, notes, or other tangible items that campers will refer to throughout the week. The clues for each case are listed on the first page of the procedure.



We also have some side bars that can help to broaden your campers’ experiences:

Get up and Move: This box provides tips on how to engage campers physically during a case.

Go Deeper: This box provides guidance on how to explore a topic further. This may be helpful if campers are particularly interested in a topic or if you need to adapt conversations and activities towards older campers.

Turn Up the Heat: This box is in the cooking session and provides ideas to get campers even further involved in the cooking process.

How to Use this Book (continued)

Each case come with several resources. Some of the resources are just for the teacher to use during preparation for a case others are used during the case. Resources also include visual aids and activity sheets for campers. The descriptions below highlight the type of information you will find in each additional resource.

Resources for teachers:

Teacher Notes provide background information for teachers. These resources contain general information that teachers should be comfortable with in order to guide campers through each case.

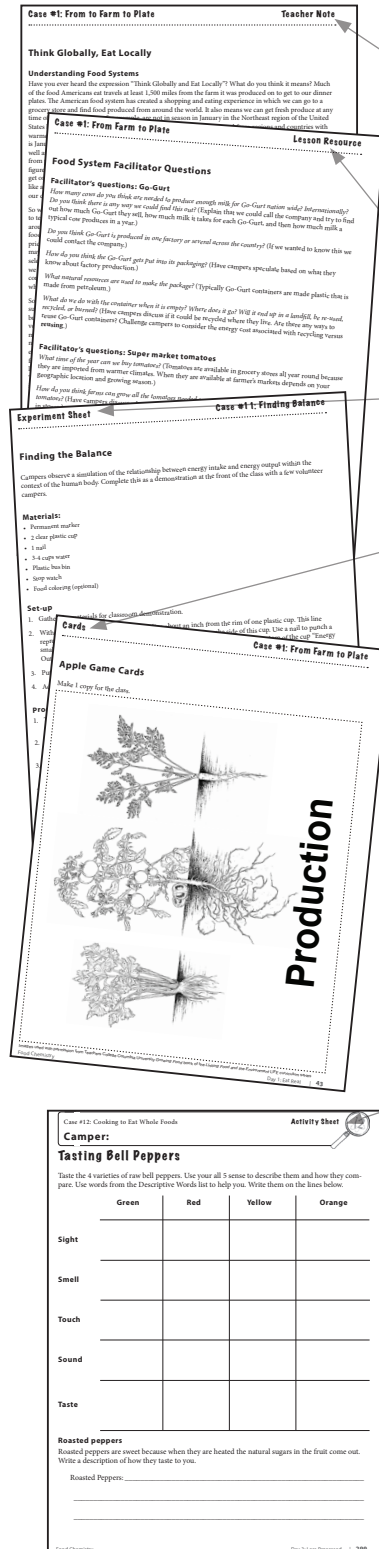
Lesson Resources contain information that supports conducting each case.

Experiment Sheets provide a detailed description of the specific materials, set-up, procedure, and guiding questions needed to execute experiments in different cases.

Cards are visual aids that support topics and activities. Cards may be projected during some cases while other cases may require cards to be printed and cut-out. Instructions for cards are listed in the **Before you Begin** section in the lesson plan as well as on the **Cards** resource sheet.

Resources for campers:

Activity sheets guide campers through their learning, thinking and reflection processes. These resources support campers as food detectives by providing space for data collection, analysis, and critical thinking.



Tips for Successful Classroom Cooking

Advanced Preparation

You can never be too prepared in the kitchen, especially when working with children. We recommend thoroughly reviewing all recipes, shopping lists, and equipment needs well in advance of actual cooking days. Make sure to take note of ingredients that need to be prepared ahead of time. Some food items may need to be soaked or even cooked the night before. Non-perishable items can be bought well in advance and stored in the classroom until need. We recommend buying fresh produce at least twice during the week, once in the beginning of the week and again after Day 3.

Time management

Nothing is more frustrating than spending time and energy on a meal and then having to rush through eating it. Make sure to keep an eye on the clock while cooking to ensure there is enough time to prepare all food items and have time to sit down and eat together. Sharing prepared foods communally is an essential component of the *Food Chemistry* curriculum and should not be rushed.

Safety and sanitation

Keeping children safe is a top priority. Make sure to spend adequate time reviewing safety in the kitchen. This includes how to properly use knives, how to navigate the “Hot Zones,” and how to properly clean up spills. Campers should never be running in the kitchen. All instructors and campers must wash their hands with warm water and soap before handling any food items. You will be using fresh produce as well as a variety of cooking equipment and utensils. All fresh produce needs to be washed before use. All cooking equipment and utensils need to be washed thoroughly with hot soapy water after use. Items may be dried with clean towels or left on a clean counter surface to air dry. Do not stack items (especially cutting boards) when leaving things to dry, this will cause water to pool and encourages mold to grow. Campers should be involved as much as possible with washing and cleaning. How much they are involved will depend on your cooking set up and your group. Identify sink access in your school before campers arrive.

Keeping campers engaged

There is always a job to do in the kitchen! Campers will have a range of cooking experiences. Some campers may cook regularly with family members while others may have never had the opportunity to cook before. All campers should be involved in the cooking process in some capacity. When campers are bored and not engaged in the kitchen that is when accidents can happen. Always monitor your campers progress. If campers seem to be moving through a recipe quickly make sure to have tasks ready for them to do when they finish. Campers can always start cleaning while they wait for others to finish.

Kitchen respect

Cooking is a fun, communal activity that we hope all campers will enjoy. Take time to talk to campers about being respectful of people’s taste preferences. We like to use the expression, “don’t yuck someone’s yum!” Children at this age are very impressionable and are subject to peer pressure. If one camper is vocally opposed to trying something, chances are other campers will choose not to try the food either. Remind campers that it often takes several exposures to a food before developing a taste for it. The important thing is to always keep an open mind. You don’t have to love everything but you do have to respect everyone and their preferences.

Making Field Trips Meaningful

Field trips are an important component of the *Food Chemistry* curriculum. By experiencing the local food environment firsthand, campers gain valuable insight into how plants are grown, how food is produced, and how local farmers grow, transport, package, and sell seasonal crops. We suggest taking two field trips. On Day 2, *Case 6: Learning in the Garden* is based on visiting a community garden. On Day 4, *Case 13: Farmers Market Exploration* is based on visiting a local farmers market. You will need to research your local garden spaces and farmers markets and may need to adjust the scheduling of these field trips to accommodate the dates and times gardens and farmers markets are open. Below we provide information on how to organize and plan for field trips as well as suitable alternatives if visiting community gardens and farmers markets is not feasible.

Community Garden Field Trip / Case 6: Learning in the Garden

Visiting growing spaces helps all people bridge the gap between what is on their plates and the living plants that provide their food. By visiting these spaces campers not only see plant science concepts in action but also make connections with people that grow food.

In researching and identifying a garden space to visit we recommend the following:

1. A knowledgeable community gardener or staff person should be on site while you are in the growing space. By meeting someone who works with the garden they can share their knowledge of crops, growing techniques, garden history and policies, and give a brief tour. This will also ensure that garden rules are understood by all campers so that all people and plants stay safe.
2. The garden should have a variety of food crops growing. Ideally crops would be labeled, but this is not a necessity if a community gardener will be there to help identify plants with campers.
3. Try to find a garden that composts garden waste and perhaps also kitchen waste. Some gardens may practice vermiculture or worm composting
4. Different gardens will have different regulations on growing practices allowed in the garden. Often times, the gardens will not allow participants to use chemical fertilizers or pesticides. Make sure the gardener or staff talk about what growing practices they allow and why.
5. The garden should welcome young people. Some gardens may have a more active sense of community than others. Some gardeners may be very protective of their garden plots. Prep the campers on appropriate behavior in the garden and how to respectfully observe other people's plants, keeping in mind accidents may happen.

If visiting a community garden is not possible we recommend visiting an outdoor space that has a variety of plant life growing. This may be a local park, botanical garden, or even simply exploring the camp's grounds.

Making Field Trips Meaningful (continued)

Farmers Market Field Trip / Case 13: Farmers Market Exploration

Farmers markets are becoming more and more common as people across the nation are increasingly interested in where their food comes from and supporting local economies. Visiting a farmers market gives campers the opportunity to explore locally produced foods, discover what foods are in season in their region, and meet the men and women who grow our food. A field trip to a farmers market is a trip to the community food system.

Many cities have a central network that organizes farmers markets in different neighborhoods throughout the week. We recommend researching online where and when farmers markets are occurring near you. Always contact farmers markets ahead of time to see what their policy is on field trips. Often times you can schedule a tour with a market employee.

If visiting a farmers market is not possible we recommend visiting a grocery store that has a produce section.

If visiting a farmers market is not possible on Day 4 it can be scheduled whenever is convenient for the group and the market. We recommend that *Case 1: From Farm to Table* is completed before this field trip.

Field Trip Safety

When travelling off site with children it is imperative that everyone stays safe. Follow all i2 camp rules and regulations pertaining to field trips. We recommend field trips to outdoor spaces which have specific safety concerns. Make sure that all campers have bottled water, sunscreen, and hats. Growing spaces attract insects. Bug bites and bee stings may happen. Make sure you have a list of camper's allergies, especially if anyone is allergic to bee stings. Campers should be told ahead of time where they are travelling to and what the schedule of the day will be. Determine a system for counting the campers consistently throughout the trip. You may decide to assign each camper a number and do a "roll-call" at various times throughout the day. A buddy system is another option. Campers must be accounted for at all times.

Advanced Planner

This curriculum is very resource intensive. Most cases require some kind of advanced preparation. The below information is organized by time sensitive preparation that **must** occur before the day of teaching and preparation that we highly recommend you do in advance, you will be happy that you did.

Time sensitive

As soon as possible

- Make arrangements to visit a community garden
- Make arrangements to visit a farmers market

7 days before camp starts:

- Prepare fava beans, radish sprouts and broccoli microgreens using *Gardening in the Classroom: Set Up* lesson resource p. 185

The night before Day 2

- Soak additional fava beans, radish sprouts and broccoli microgreens using *Gardening in the Classroom: Set Up* lesson resource p. 185
- Cook wheat berries using *Eat More Plants: Getting Ready* cooking resource p. 210

The night before Day 3

- Place 5 unwrapped slices of gum into the lining of a box of whole grain crackers for *Nose Knows Best* experiment sheet p. 258
- Roast bell peppers according to *Eat Whole Foods: Cooking Skills* cooking resource p. 295
- Cook lentils according to *Eat Whole Foods: Getting Ready* cooking resource p. 284

Other cooking preparation:

- Review the “Getting Ready” pages for each day of coking and decide what makes sense for to prepare ahead of time

Preparation you will be happy you did in advance

General

- Make copies of all camper activity sheets. You can get all sheets in one place on the Camper’s Activity Sheets file on the resource disk.
- Make copies of all cards. You can get all sheets in one place on the Cards file on the resource disk.
- ^a Make 11” X 17” copies of the “Detective Notes” sheet - 2 pages (see resource disk) for each camper

Before Day 1:

- Prepare Apple Game cards p. 43
- Prepare Apple Game materials according to *Apple Game: Materials and Set Up* lesson resource p. 30
- Collect 1/2 pound food scraps for *All About Worms* case p. 111

Before Day 2

- Prepare *Plant Needs Image* cards p. 166 and *Plant Parts Diagram* lesson resource p. 172
- Gather materials for *Nutrient Cycling Background and Skit* lesson resource p. 178

- Collect dirt and soil samples and label mason jars with “Soil” and “Dirt” for *Soil Test Demonstration* experiment sheet p. 189
- Label bucket “Super Soil Mix” for *Mixing Soil* experiment sheet p. 191
- Make flavor solutions for *Exploring our 5 Senses* food science resource p. 219
- Mince garlic and shallots for *Make it, Shake it!* activity sheet p. 219

Before Day 3

- Mark popcorn bags with ‘A,’ ‘B,’ ‘C’ markings according to *Popcorn Portion Distortion* experiment sheet p. 234
- Cut yellow straws in half and place them in three re-sealable sandwich bags for *Processed Food Overload Stations: Set Up* lesson resource p. 242

Before Day 4

- Create a “Transportation Station” funds box and store signs according to *Marketville: Set Up* lesson resource p. 322
- Prepare *Market Food* p. 324, *Family Profile* p. 354, and *Store Circular* p. 358 *Marketville Money* p. 361 cards according to *Marketville: Set Up* lesson resource p. 322

Before Day 5

- There is a lot of cooking on Day 5. Invite adult family members to come help you cook and share in the final meal and celebration.

Master Material List

The materials listed below include general materials that will be used throughout the camp and then a list of specific materials required for each Case, listed by Day.

General materials

Classroom supplies

- Chart paper
- Children's scissors
- Adult scissors
- Sticky notes
- Sticky tabs
- Colored markers
- Colored pencils
- Whiteboard/Smart Board/blackboard
- Dry erase markers/Smart Board markers/chalk
- Whiteboard/Smart Board/blackboard erasers
- Clipboards
- Name tags
- Magnifying glasses, 1 per camper
- Pencils
- Pencil Sharpener
- Paperclips
- Posterboard
- Glue sticks
- Masking tape
- 3 rolls paper towel
- 5 permanent markers
- Laptops/ipads
- Cameras
- String
- 1 ream, 8 ½ x 11 paper
- 1 ream, 8 ½ x 11 construction paper
- 3 gallon bag of organic soil
- Aluminum foil

- 3 spray bottles
- 4 5-gallon buckets
- World map poster

Food

- 32-oz. bottle olive oil
- 7 heads of garlic
- 1 1/2 cups corn meal
- Table Salt
- Kosher salt
- Black peppercorn grinder
- 1 8-oz. bag ground flaxseed
- 2-lbs. bag sugar
- 3 liters white vinegar
- 1 8-oz. jar Dijon mustard
- 16-oz. balsamic vinegar
- 16-oz. apple cider vinegar
- 1 8-oz. jar honey
- 14 lemons
- 6 limes
- 1 2-oz. jar of ground cumin
- 1 dozen eggs

Cooking Equipment

- 12 dish towels
- 1 pair kitchen scissors
- 1 quart measuring cup
- 8 sets dry measuring spoons
- 8 sets dry measuring cups
- 2 sets of liquid measuring cups (4 cup, 2, cup, 1 cup)
- 2 NuWave Induction Cook Set
- 2 6-quart induction stock pot
- 4 2-quart glass pitcher

- 1 6-inch steal strainer
- 1 food processor
- 2 can openers
- Toaster oven with baking sheet
- 25 cutting boards
- 25 child-safe knives
- 1 3-piece knife set (paring knife, chef knife, serrated knife)
- 1 wooden cutting board
- 2 potato mashers
- 2 flipping spatulas
- 2 silicon spatulas
- 6 large mixing spoons
- 2 large slotted spoons
- 2 metal whisks
- 4 sets, 4 piece stainless steel mixing bowls
- 2 lemon juicers
- 30 reusable lunch size plates
- 30 reusable cups
- 30 reusable forks
- 30 reusable knives
- 30 reusable spoons
- 30 reusable tasting spoons
- 3 serving spoons
- 4 sets of tongs
- 4 baking sheets
- Oven mitts
- 30 8-oz. mason jars
- 2 colanders
- 100 sealable sandwich bags
- 1 50-pack 8oz. clear drinking cups
- 8 timers
- 12 plastic bus bins

Master Material List (continued)

Day 1

Case 1 – From Farm to Plate

- 4 whole apples
- 1 cup of sand
- 1 small pack green pipe cleaners
- 1 small bottle of motor oil
- Scarf

Case 2 – Hidden Ingredients

- 1 fresh ear of corn
- 10 manila envelopes

Case 3 – All About Worms

- 18 gallon durable, polyethylene storage bin with lid
- 1 pair of heat resistant work gloves
- 2 square feet, fiberglass screening
- Hot glue gun with glue sticks
- Candle or gas burner
- Phillips-head screwdriver
- Heavy duty utility knife
- 1-lbs. Red Wiggler Worms
- 3-4 Newspapers
- Petri dish, 1 per camper

Case 4 – Cooking 101

General kitchen equipment only

Case 5 – Cooking to Eat Real

- 1 12-oz. box quinoa
- 2 15-oz. can pinto beans
- 1 2-oz. bottle paprika
- 1 2-oz. bottle cayenne pepper
- 2 bunches cilantro
- 24 100% Whole Wheat English muffins

- 2 bunches fresh watercress
- 2 tomatoes
- 4 ripe avocados
- 3 medium cooking onions
- 1 20-oz. jar unsweetened applesauce

Day 2

Case 6 – Learning in the Garden

- Bug boxes, 1 per camper
- Props for Nutrient Cycling Skit

Case 7 – Gardening the Classroom

- 1 cup of grey, rocky dirt
- 1 small bottle 3% hydrogen peroxide
- 2-gallon bag of vermiculite
- 3-lbs. bag of organic compost
- 2 sets of microgreen tray sets
- 1 16-oz. bag of dried fava beans
- 1 “SproutMaster” set
- 1/2 lbs. bag of radish seeds
- 1/2 lbs. bag of broccoli seeds
- Watering can

Case 8 - Cooking to Eat More Plants

- 1 32 oz. bag organic red winter wheat berries, dried
- 1 bunch celery
- 2 cups dried cherries
- 1 bunch scallions
- 1 crown broccoli
- 1 large bunch fresh parsley
- 1/2-Tsp. Instant coffee
- 4-oz. bottle of vegetable oil
- 2 shallots
- 4 large oranges

- 1 4-oz. can tomato paste
- 10 7.5-ml glass test tubes with caps
- 2 test tube racks
- 100 3-ml. dropping pipettes

Day 3

Case 9 – Portion Distortion

- Calculator
- Hot air popcorn popper
- 100% recycled brown paper lunch bags (large: 6 x 11 x 3 ¾); 1 for each camper
- 1 1-lbs. bag of high quality organic popcorn kernels

Case 10 – Processed Food Overload

- 80, 9” yellow drinking straws
- 1 2.5-oz small empty fast food french fry cup
- 1 4.1-oz. medium empty fast food french fry cup
- 1 5.4-oz. large empty fast food french fry cup
- 12 sticks of vegetable shortening
- 1 pack of mint chewing gum sticks
- 1 box of wheat crackers
- 1 package of pre-cut apple slices
- 1 whole apple

Case 11 – Finding Balance

- Pedometers, 1 per camper and teachers
- 1 large nail
- 1 bottle food coloring

Master Material List (continued)

Case 12 - Cooking to Eat Whole Foods

- 6 Kirby pickling cucumbers
- 1 lbs. yellow wax beans
- 1 lbs. green string beans
- 1 head purple cauliflower
- 1 head white cauliflower
- 1/2 lb. salad peppers
- 1 bunch fresh dill
- 1 4-oz. bottle of dill seed
- 1 2-oz. bottle celery seed
- 1 2-oz. bottle coriander seed
- 1 2-oz. bottle mustard seed
- 4 oz. jar whole black peppercorn
- 2 15-oz. cans chickpeas
- 8-oz. jar tahini paste
- 3 green bell peppers
- 3 red bell peppers
- 4 orange bell peppers
- 4 yellow bell peppers
- 2 packages 100% whole wheat pita
- 1 16-oz. bag French lentils
- 10 oz. bottle soy sauce

Day 4

Case 13 – Farmers Market Exploration

General materials only

Case 14 – Marketville

- 1 empty box

Case 15 - Cooking to Eat Local

- 3-lbs. assorted and ripe stone fruit
- 2 cinnamon sticks
- 2 2-qt. bottles of pasteurized (not UHT) whole organic milk

- 16 oz. heavy cream
- 4 oz. maple syrup
- 2 oz. pure vanilla extract
- 2 fresh vanilla beans
- 2 pints fresh blueberries
- 2 pints fresh raspberries
- 2 pints fresh strawberries
- 2 oranges
- 9 square feet of cheesecloth
- 12 wooden clothes pins
- 1 microplane
- 1 16-oz. bag toasted sunflower seeds

Day 5

Case 15 – Advertising Healthy Habits

General materials only

Case 15 - Cooking for Change

- 2 lbs. bag of 100% whole wheat flour
- 2 lbs. bag of all-purpose flour
- 6 bunches of basil
- 4 pints of cherry tomatoes
- 6 cups microgreens or sprouts from classroom garden or farmers market
- 10 pints of fresh berries
- 1 qt. of whipping cream
- 2 teaspoons Vanilla extract
- 4 15-oz. cans of mixed beans
- 1 bunch celery
- 4 scallions
- 2 red bells peppers
- 12 ears of corn
- 1 bunch of parsley

- Imperia pasta maker with fettuccine attachment
- Pastry scrapper
- Pasta fork
- 1 heat resistant funnel
- 10 corn kernel removers

*If doing any optional cases please consult specific activity for materials

Master Material List (continued)

Sourcing Garden Materials

Classroom herb garden:

We recommend you get a small variety of herb plants for the classroom. You can use these throughout the cooking cases. We recommend basil, oregano, mint, rosemary, parsley, and cilantro.

Soil:

Local garden centers and large hardware stores sell bags of potting mix, vermiculite, and compost. Bagged compost at garden stores are typically filled with manure that has been sterilized to kill any bacteria present. Ideally you would source compost or vermicompost (worm compost) from a local garden or farm that is filled with worms and beneficial fungus and bacteria. Additionally, 5-gallon buckets can be purchased at hardware stores but often restaurants and corner stores are willing to give them away, as well.

Microgreen trays may be available at a garden store or you may have to order them online. Sproutpeople.org is a great resource for sprouting and microgreen growing materials. We recommend the “Tray Set - Two Cups” which includes a 10” x 20” drip tray and four 10” x 10” trays.

Compost:

Sourcing a locally made compost is a great way to engage in the community food system. Local farms and community gardens often have. If you have access to vermicompost you might want to add it to your soil mix, or even use it instead of regular compost. It's a great natural fertilizer!

Plant & Sprout Seeds:

You can buy fava beans at your local grocery store. You may be able to find radish and broccoli seeds at a garden store but not necessarily in the quantity you need. Sproutpeople.org sells seeds by the pound. We recommend the SproutMaster - 5”x 6” Tray Sprouter. Commercial sprouters can also be found at many health food stores and garden supply stores. You can also use mesh lids on mason jars to be used in place of a commercial sprouter. Mason jars are readily available at larger chain grocery stores, kitchen supply stores, and online.

“Detective Notes” Sheet

Each day campers reflect on what they have learned. Using the clues they collect in each case, campers will fill out the “Detective Notes” making note of what they have learned, observed, and felt throughout the day.

**FOOD CHEMISTRY
DETECTIVE NOTES (PAGE 1)**

DAY 1: EAT REAL

Record something you learned about the food system.

Case 1: From Farm to Plate

Write about what you learned about the food system.

DAY 2: EAT MOSTLY PLANTS

Describe what you learned about what plants need to grow.

Case 6: Learning in the Garden

DAY 3: LESS PROCESSED

What will you do to not let large portions make you eat more?

Case 9: Portion Distortion

DAY 4: NAVIGATE THE ENVIRONMENT

Write down one thing you learned from a farmer.

Case 13: Farmers Market Exploration

DAY 5: MAKING CHANGE

Advertising Healthy Habits

What healthy habit do you want to promote? Why?

Case 16:

Case 2: Hidden Ingredients

Write about what you learned about what is hidden in our food.

Case 3: All About Worms

What kinds of food scraps can go in a worm bin?

Case 7: Gardening in the Classroom

Do you think you could grow sprouts at home? Why or why not?

	YES	NO
Can you think you could grow sprouts at home?		

Case 10: Processed Food Overload

Describe one thing you will do differently from what you learned in this case.

Case 11: Finding Balance

List three ways you can add more steps to your daily routine.

Case 14: Marketville

What could you do to make sure everyone can get enough healthy food?

And, now...

Think back on the whole week, what are you going to do differently?

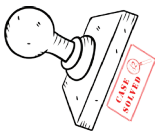
Note: The “Detective Notes” sheet is 11X17 and you can find it on the resource disk.

We recommend that you have students take out this sheet and complete the appropriate cases at the end of each day.

Since you may complete the cases in a different order than presented (due to field trip schedules etc) this sheet is not referred to within the procedure of any cases.

Page 1 (shown here) has all the cases in the order that they are presented. If you do some of the cases out of order, direct campers to the cases you completed each day.

"Detective Notes" Sheet (continued)



FOOD CHEMISTRY DETECTIVE NOTES (PAGE 2)



DAY 1: EAT REAL

Case 5:
Cooking to Eat Real

I can slice citrus fruits
I can cut an avocado
I know how binders work

YES MAYBE NO
YES MAYBE NO
YES MAYBE NO

What was fun during cooking today?

Case 5:
Cooking to Eat Real

Rate the bean and quinoa burgers:
DELICIOUS SO-SO NOT SO GOOD

What would I change?

DAY 2: EAT MOSTLY PLANTS

Case 7:
Cooking to Eat More Plants

I know safe washing practices
I can blanch vegetables
I know how emulsifiers work

YES MAYBE NO
YES MAYBE NO
YES MAYBE NO

What was fun during cooking today?

Case 7:
Cooking to Eat More Plants

Rate the plant based salad:
DELICIOUS SO-SO NOT SO GOOD

What would I change?

DAY 3: NOT TOO MUCH

Case 12:
Cooking to Eat Whole Foods

I can de-seed a pepper
I know how to roast vegetables
I know how food preservation works

YES MAYBE NO
YES MAYBE NO
YES MAYBE NO

What was fun during cooking today?

Case 12:
Cooking to Eat Whole Foods

Rate the bean dips and vegetables:
DELICIOUS SO-SO NOT SO GOOD

What would I change?

DAY 4: NAVIGATE THE ENVIRONMENT

Case 15:
Cooking to Eat Local

I can eat stone fruit
I can use fresh vanilla
I can zest a lemon
I know how protein change during cooking

YES MAYBE NO
YES MAYBE NO
YES MAYBE NO
YES MAYBE NO

What was fun during cooking today?

Case 15:
Cooking to Eat Local

Rate the stone fruit compote:
DELICIOUS SO-SO NOT SO GOOD

What would I change?

DAY 5: MAKING CHANGE

Case 17:
Cooking for Change

I can make homemade pasta
I have learned a lot about cooking processes

YES MAYBE NO
YES MAYBE NO

What was fun during cooking today?

Case 17:
Cooking for Change

Rate the homemade pasta?
DELICIOUS SO-SO NOT SO GOOD

What would I change?

EAT REAL

DAY 1:

What questions do I still have?

What am I going to tell my family?

EAT MOSTLY PLANTS

DAY 2:

What questions do I still have?

What am I going to tell my family?

LESS PROCESSED

DAY 3:

What questions do I still have?

What am I going to tell my family?

NAVIGATE THE ENVIRONMENT

DAY 4:

What questions do I still have?

What am I going to tell my family?

MAKING CHANGE

DAY 5:

What questions do I still have?

What am I going to tell my family?

Page 2 is about the cooking cases and also has general questions about each day.

Creating Posters

You may have times where the cases go faster than planned, or that the campers just need some down time. Use this time to have campers create posters that can be used to help to teach others about what they are learning in Food Chemistry. You can hang the posters up in the classroom and if you are having a final celebration with the whole camp at the end of the week, you can display the posters at that celebration. Below are some ideas for posters for each day. You and your campers can also create your own ideas!

Day 1: Eat Real

Create a poster that:

- portrays an industrial food system;
- portrays a community food system;
- compares and contrasts a community and local food system;
- describes how corn is used in our food system;
- explains composting;
- shows how to care for worms;
- shows what can go into a worm compost box;
- explains how to be safe in the kitchen;
- describes what binders to in food;
- illustrates how to make bean burgers or guacamole; or
- describes why it is important to eat whole foods.

Day 2: Eat Mostly Plants

Create a poster that:

- illustrates what you saw in the garden (this can include plants, bugs, or anything else you saw);
- describes how to mix soil;
- show how to plant seeds to make microgreens;
- illustrates that we eat roots, stems, leaves, flowers, fruits and seeds;
- describes the steps to make salad dressing;
- shows all different foods that can go in a plant based salad; or
- describes why it is important to eat mostly plants

Day 3: Less Processed

Create a poster that:

- portrays why not to eat super sizes;
- illustrates how much fat and sugar are in processed food and what they can do to our health;
- describes techniques advertisers use to trick us;
- explains the importance of physical activity;
- shows the process if making pickles;
- explains how to make bean dip;
- illustrates all different color vegetables; or
- explains why it is important to eat more whole foods and less processed foods.

Day 4: Navigate the Environment

Create a poster that:

- illustrates what you saw at the farmers market;
- describes how farmers grow different foods;
- shows what you bought at the farmers market;
- describes how some people have better access to healthy food than others;
- explains why having access to healthy food is important for everyone;
- shows different stone fruits;
- illustrates places in your community where you can get healthy foods;
- explains how to make ricotta cheese; or
- portrays why we need to navigate our environment to seek out foods that are healthy for us and for the environment

Day 5: Making Change

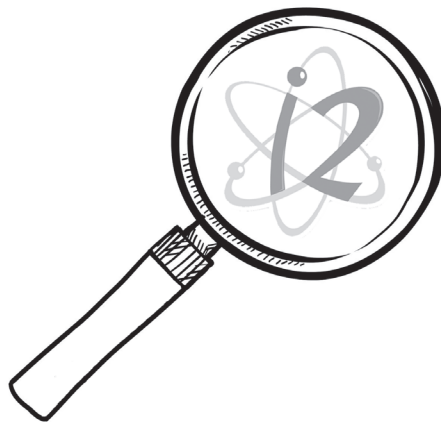
Create a poster that:

- any ideas from any of the other days;
- illustrates how to make how made pasta; or
- describes changes you are going to make as a result of camp.

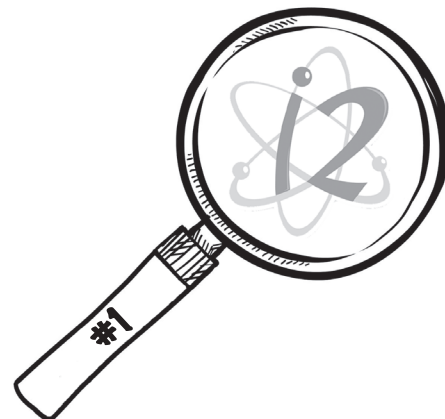
.....

Food Chemistry

Day 1



Eat Real



From Farm to Plate

.....

Materials

In Guide:

- **Apple Game: Materials and Set Up** lesson resource p. 30
- **Food Item** cards p. 32
- **Parts of the Food System (small)** cards p. 36
- **Apple Game: Overview** lesson resource p. 38
- **Apple Game: Instructions** lesson resource p. 41
- **Apple Game** cards p. 43
- **Food System Facilitator Questions** lesson resource p. 76
- **Parts of the Food System (large)** cards p. 77
- **Farm Images** cards p. 81
- **Food System Glossary** lesson resource p. 85
- **Think Globally, Eat Locally** teacher note p. 86

Other Materials:

- Camera
- Sticky notes
- String
- Tape
- Markers
- Chart paper
- i2 journals and pencils
for each camper

Overview

In this activity campers explore what a food system is. They discover two different food systems; an industrial food system and a community food system. Drawing upon their own knowledge and ideas, campers work in small groups in order to map out the steps they think are necessary to bring food from the farm to the table. As a group, they discuss their ideas and produce visual wall maps of both the industrial food system and community food system. In order to better understand the interacting parts of the food system, campers play the Apple Game and determine the healthfulness and environmental impacts of the foods we eat.

Objectives

Campers will be able to:

- explain the difference between an industrial food system and a community food system;
- describe the healthfulness and environmental impacts of an industrial food system and a community food system;
- discuss the pros and cons of both systems; and
- describe what each system produces: heavily processed foods vs. whole or semi-processed foods.

Before You Begin:

- Review lesson plan and all in guide materials.
- Prepare **Food Item**, **Farm Images** and **Parts of the Food System (large)** and **(small)** cards.
- Identify which walls will be used for visual wall maps.
- Prepare four sheets of chart paper using the **Food Item** cards.
- Prepare **Farm Images** cards for projection.
- Prepare all materials in **Apple Game: Materials and Set Up** lesson resource and determine how to set up game in your classroom.

Clues collected:

- Photos of chart paper diagrams
- Photos of wall maps

1. Introduce the Case

Welcome campers to *Food Chemistry*. Congratulate them, as they walked through the classroom door, they officially became food detectives. Explain that as food detectives, they will work on cases and collect clues that will help them explore each day's theme. Introduce campers to the daily themes: Day 1 - Eat Real, Day 2 - Mostly Plants, Day 3 - Less Processed, Day 4 - Navigate the Environment, and Day 5 - Making Change.

Explain to campers that they are about to start their first food detective case, **From Farm to Plate**, in which they discover where our food comes from. Tell campers that in this case they use what they already know about food to figure out what happens from the time it leaves the farm until it gets to where it will be purchased.

2. Map the Food

Divide campers into four small groups and give each group one sheet of the chart paper prepared with the *Food Item* cards. Explain that for the food item they have been given, they are going to depict (using words, drawings, and arrows) what they think happens from the tomato plant or cow to their final product. Give the groups about 10 minutes to work on filling in the steps between the farm and the farmers market or grocery store.

Once the campers have had a few minutes to think through this process, explain that you want to make sure they think about three big areas (write these areas on the board): 1. **Distribution** – where food was transported along its journey; 2. **Processing** – how the food was changed along its journey; and 3. **Packaging** – what was the food put in during its journey. Give campers more time to complete their diagrams.

If some groups finish early, particularly the farmers market groups, have them start thinking about why they finished so early. *Why might other groups still be working? Why do some food items have more steps?*

3. Present Food Systems Diagrams

Have each group present their food item with the steps they determined were necessary to get the tomato plant or cow from the farm to the place of purchase. Begin with the grocery store tomato followed by the farmers market tomato, the Go-Gurt yogurt and then the farmers market yogurt. After each group has presented, ask the groups what the similarities between the farmers market tomato and the farmers market yogurt are, and what the similarities between the grocery store tomato and grocery store yogurt are.

Ask campers: *Have you ever heard of the term “food system?” What do you think it means?* First ask campers to share a definition for the word system. Discuss that a system is a series of interacting parts that make a whole.

A food system is made up of all the different parts that it takes to get food from the farm to where we purchase it. This includes food production, distribution, processing, and packaging. The food system also includes purchasing and how we handle food waste (consumption and waste management). Distribute one set of the ***Parts of the Food System (small)*** cards to each group. Have campers adhere each of the seven cards above the steps on their chart paper that they think correspond to the specific part of the food system. The groups may not have included consumption and waste management since they were only instructed to think of the steps from farm to place of purchase. If time permits have campers add these steps. *What happens to the Go-Gurt packaging? What happens to the farmers market yogurt packaging? Can anything be reused?*

Once complete, take photographs of each diagram and hang them on the wall(s). Put the two farmers market diagrams in one area and the grocery store tomato and yogurt in another area.

4. Play the Apple Game

Explain to campers that they will now become apples! In this game campers will travel through the food system seeing how the different steps interact and the environmental implications of each step along the way. Using the ***Apple Game: Overview***, ***Apple Game: Instructions***, and ***Apple Game*** cards play the Apple Game.

5. Discuss the Industrial Food System

Ask campers: *Have you ever heard of the ‘industrial food system?’ What do you think of when we say ‘industrial?’ Think about the grocery store tomato, farmers market tomato, Go-Gurt, and farmers market yogurt. Which two items do you think are from the industrial food system?*

Use the ***Food System Facilitator’s Questions*** lesson resource to facilitate this discussion.

6. Map the Industrial Food System

Now that campers have had to time to think about the steps involved in the industrial food system, they will now create a wall map outlining the seven steps. A wall map is a visual diagram that will help campers see how the first step, production connects to the second step, distribution and so on. In a straight line and in sequential order, tape one set of the ***Parts of the***

Get Up & Move!

Ask campers questions relating to different steps in either the community or industrial food system. Have them walk to the food system wall maps and stand under the specific food system or step(s) that corresponds to the question.

For example:
 What step would be compromised if we run out of oil?
 (Campers walk to production, distribution, and packaging.)

In which system would farmers be safer if a disease wiped out all of one particular crop?
 (Campers walk to the community food system)

Food System (large) cards on the same wall as the grocery store diagrams.

Using the Apple Pop-Tart from the Apple Game discuss the first step, production. Have campers think of everything that happens under this step. Some examples may be seeding apple trees, growing sugar cane, watering, weeding, and harvesting. Write each idea on a sticky note and stick them on the wall under the **Production** sign. Once complete, transition to the next step, distribution. Hang a piece of string between production and distribution, linking the two steps on the wall map. Have campers think of everything that happens during distribution. Write each idea on a sticky note and stick them on the wall under the **Distribution** sign. Continue this with each of the seven steps. Don't forget to hang a piece of string between each step as you go.

Discuss with campers how they feel about industrial production. *What surprised you about the production of Pop-Tarts? Why?*

What do you think are some of the positives and negatives of such a system? Explain that in the industrial food system farms typically grow just one thing so they can have enough product to sell on a large scale. This is called monoculture farming. Using the *Farm Images* cards, present images of industrial monoculture farms on the board. Discuss the positives and negatives of monoculture farming.

7. Map the Community Food System

Ask campers the following questions: *What system are the tomatoes and yogurt from the farmers market a part of? What do you think of when we say, 'community?'* Who are the people involved in a community of food? Spend a few minutes discussing the following terms with campers: local, regional, global, organic, and sustainable. Refer to the *Food System Glossary* lesson resource as needed.

Explain to campers that across the country small farms grow a diverse and seasonal crop in order to feed local communities. This network of small farmers, who sell at farmers markets as well as other venues, and customers make up the community food system.

In a straight line and in sequential order, tape one set of the *Parts of the Food System (large)* cards on the same wall as the farmers market diagrams. Using the example of an apple (or another locally grown fruit or vegetable in your community) have campers discuss everything that happens under this step. Write each of their ideas on a sticky note and stick them on the wall under the **Production** sign. Continue this with each of the seven steps. Don't forget to hang a piece of string between each step as you go.

Go Deeper

Is it possible to only eat locally produced foods and their products? (Campers may reflect on the barriers to eating locally: geographic limitations, weather limitations, or access to local food. This question will be discussed throughout the week.)

Are there foods that we cannot produce locally? (e.g. Bananas, chocolate, coffee, etc.)

What is a food that can't be produced locally that would be very hard to give up? (e.g. Bananas, chocolate, pineapples, etc.)

Ask, *what do you think are some of the positives and negatives of such a system?* Explain that in a community food system, farms normally grow a wide variety of fruits and vegetables. *What are some of the pros and cons of this system of growing?* (food is fresher and grown closer, supports local economies and environments, some items may not be available all year round) Using the **Farm Images** cards present images of small-diversified farms on the board. Next show an image of an industrial farm next to a small local farm. *What are some of the differences you see?*

8. Photograph Wall Maps

Campers should now have two complete wall maps in the classroom. On one wall the community food system should be outlined. The farmers market food diagrams, the seven food system steps and accompanying sticky notes, and the images of small diversified farms should be on this wall. On a second wall, or in a separate area, the industrial food system should be outlined. The grocery store food diagrams, the seven food system steps with accompanying sticky notes, and the images of monoculture farms should be on this wall. Photograph each wall.

9. Close the Case

Now that campers have learned about two different food systems and the positives and negatives of each, discuss the following questions:

What are the biggest differences between the two systems? (Answers might include monoculture vs. diversified crops, differences in packaging and transportation.)

Do you think people should know about where their food comes from and how it is grown, packaged, and transported? (Campers may reflect on new things they learned about the food systems and how it made them feel.)

Congratulate campers on completing their first food detective case. We will now look more closely at the different foods produced by each system and learn the difference between whole and processed foods.

Apple Game: Materials and Set Up

NOTE: Materials listed in **bold** are those that are not included in this guide

All Materials

- Station signs (8.5" X 11") for each station (7 total)
- Station cards for apples at all stations (28 total)
 - Print each state's cards on a different color paper to make it easy for players to get their cards at each station. For example, print all New York cards on green paper or mount the cards on green paper.
- **4 whole apples**
- Picture of apples wrapped on tray
- Picture of applesauce in bowl
- Picture of apple sauce in jar
- Picture of Pop-Tarts in box
- Picture of single apple Pop-Tart
- **Sand in cup**
- **Pot of soil with balls of aluminum foil buried in it**
- **Pot with 4 paper or pipe cleaner trees (you need to make these)**
- **Small bottle of motor oil**
- **Clear plastic cups**
- 2 happy faces
- 2 neutral faces
- 2 sad faces
- 1 question mark
- **Scarf**
- 42 petroleum cards
- 40 pollution cards
- 1 sand card
- 4 tree cards
- 3 city dump cards
- 6 recycle cards
- 3 mineral cards

Apple Game: Materials and Set Up (continued)

Set up each station with the materials below

Production:

- Production Station sign (hung on wall)
- Production Station cards for each state's apple
- 4 whole apples
- 4 petroleum cards
- 4 pollution cards

Distribution:

- Distribution Station sign (hung on wall)
- Distribution Station cards for each state's apple
- 10 petroleum cards
- 10 pollution cards

Processing:

- Processing Station sign (hung on wall)
- Processing Station cards for each state's apple
- Picture of applesauce in bowl
- Picture of single apple Pop-Tart
- 6 petroleum cards
- 6 pollution cards

Packaging:

- Packing Station sign (hung on wall)
- Packaging Station cards for each state's apple
- Picture of apple sauce in jar
- Picture of Pop-Tarts in box
- Picture of apples wrapped on tray
- Sand in cup
- Soil with balls of foil buried in it
- Pot with 4 pipe cleaner trees
- Small bottle of motor oil
- 1 Sand card
- 3 mineral cards

Packaging station (continued)

- 4 tree cards
- 12 petroleum cards
- 10 pollution cards
- Plastic cups

Purchasing:

- Purchasing Station sign (hung on wall)
- Purchasing Station cards for each state's apple
- 1 happy face card
- 1 question mark card
- 1 sad face card
- Scarf
- 1 petroleum card
- 1 pollution card

Consumption:

- Consumption Station sign (hung on wall)
- Consumption cards for each state's apple
- 1 happy face card
- 2 neutral face cards
- 1 sad face card

Waste Management:

- Waste Management sign (hung on wall)
- Waste Management cards for each state's apple
- 6 recycle cards
- 3 city dump cards
- 9 petroleum cards
- 9 pollution cards

Food Item Cards

Make one copy. Cut the images out. Attach the top image to the top left of a sheet of chart paper and the bottom image to the bottom right, leaving space for campers to map the steps in between.



Food Item Cards

Make one copy. Cut the images out and attach the top image to the top of the chart paper and the bottom image at the bottom, leaving space for campers to map the steps in between.



Food Item Cards

Make one copy. Cut the images out and attach the top image to the top of the chart paper and the bottom image at the bottom, leaving space for campers to map the steps in between.



Food Item Cards

Make one copy. Cut the images out and attach the top image to the top of the chart paper and the bottom image at the bottom, leaving space for campers to map the steps in between.



Parts of Food System Cards (small)

Make 4 copies. Cut out the cards. Each small group should receive one set of cards.

Production

Distribution

Processing

Packaging

Purchasing

Consumption

Parts of Food System Cards (small)

Make 4 copies. Cut out the cards. Each small group should receive one set of cards.

**Waste
Management**

Apple Game: Overview

The purpose of the Apple Game is to introduce campers to our food system. That is, to understand the interacting parts of the system that gets our food to us; and to also explore how the various choices along the way determine the healthfulness and environmental impact of the foods we eat. In the game, campers become apples from all over the country that travel through the seven steps of the food system. For this game, campers pretend they live in New York City. Below, we introduce you to these seven steps.

Production — This is where the story of food begins, with farmers growing the plants and raising the animals that we eat. The choices of what is grown and raised, and farmers' practices determine the health and ecological impact of the production step.

Distribution — Many foods need to be transported at one or more points on their journey to us, such as from the farm to a cleaning facility, or to a factory for processing and packaging. All of the transportation throughout the system is represented in this step. How far, what type of vehicles (e.g. barge, train, truck, plane), and other factors determine the environmental impact of transporting our food. Since much of the transporting of food in the United States is by truck, this is the mode of transportation used in this game.

Processing — Some foods stay whole (just as they were grown as plants and animals) while other foods get processed. Sometimes this processing is minimal, such as peeling and cooking down an apple to make applesauce, and sometimes this processing is a lot, such as mixing an apple with many other ingredients to make an apple Pop-Tart. How much, and in what ways, foods are processed determine their healthfulness and environmental impact.

Packaging — Some foods, such as whole fruits and vegetables, do not need any packaging. Other foods need to be put into a package. Several different raw materials, are used to make food packages. What types, how much, and how many different raw materials are used determine the ecological impact of our food packages.

Purchasing — For many of us, the purchasing part of the system is where we first encounter food. We can get foods at places such as farmers markets that can help connect us to where and who produced our food. However, most Americans do the majority of their shopping at typical supermarkets. Supermarkets often disconnect us to the food system and all the steps food has to take before reaching supermarket shelves.

Consumption — This is where we can connect with the food, particularly if we prepare the food for ourselves. In this step, the food (and everything that happened to it along its journey) becomes part of us, as the saying goes, "we are what we eat!" Knowing about the journey of our food can help us determine the healthfulness and environmental impact of what we eat.

Waste management — When our leftover food or food packaging get thrown in the garbage, they break out of the cycle: those resources will go to a landfill, be incinerated, or go to other waste disposal systems in which they will not be used again. When leftover food (and sometimes even packages or utensils) are used for compost, they are fed back into the system and can help grow more food. Sometimes, we can return glass bottles and other packaging to the food manufacturer so they can be washed and used again. Some food packages can be recycled (be sure to know the recycling regulations where you live) and enables the resources to be used again.

Apple Game: Overview (continued)

Apple Game: Logistics of Game Play

Divide the group into four “teams” for each apple, or ask for four volunteers, and have these volunteers play the apples while everyone else watches. With younger children, adapt the game by having the group leader explain what happens to each apple instead of having players read the cards.

With older children you can have a deeper conversation about each station as you play the game or, at the end of the game, you can go back through and discuss each part of the food system in more detail.

Before game play:

1. Use the *Apple Game: Materials and Set Up* lesson resource sheet to gather all materials and set up the stations. Try to set up the stations all around the room starting with “Production” so that the “Waste Management” station completes the cycle and is close to the “Production” station.
2. Read through the *Apple Game: Instructions* lesson resource as well as all the apple cards, to become familiar with what happens at each station. Please note that the “apples” are given cards at each step in the food system. Depending on the card the apples receive, the apple will have to complete a specified number of laps around the room.

Note: Remember to tell campers they are pretending they live in New York City for this game. Tell campers that New York state is well known for growing apples. Alternatively, the game could be adapted for another place and could use a different food.

Going deeper into the food system:

- **Production:** In the game, we keep the producing part of the system consistent for all the farms that grew the apples. For a more in depth conversation, you might want to have farms that use different growing techniques such as organic which builds soil and uses natural inputs versus “conventional” methods that rely heavily on external inputs such as chemical fertilizers and pesticides.
- **Distribution:** In the game, trucks transport the apples. You could discuss that barges (when they can be used) are more energy efficient, as are trains. Planes are the least energy efficient, and larger full trucks are more energy efficient than smaller trucks, especially when these trucks are not full. There is also lots of work being done to create food hubs and infrastructure to make food transportation more efficient (especially for small and mid-size farms). You could look up and discuss what is going on in your area.
- **Processing:** You might want to explain that some processing changes food minimally, such as changing the form of the food. Apple sauce, peanut butter, yogurt, grilled chicken breast, white rice, orange juice, and canned tomatoes are all examples of foods that have minimal processing. Whereas, foods made with many ingredients mixed together (particularly if the ingredients are not items we would have in our homes) become dramatically changed from their original form. These foods are overly processed food products that tend to have both a negative ecological impact and also have a negative health impact.
- **Packaging:** The game tends to make people think about the fact that every package comes from something that comes from the earth. This might be a great time to launch into exploring more about

Apple Game: Overview (continued)

how much food packaging waste we create and what we can do to minimize food packaging.

- **Purchasing:** After the game, you might want to have a discussion about the different places in your community where you can get food directly from the farmer so that you can learn more about the journey the food took to get to you. We do suggest a trip to a local farmers market on Day 4 - Navigate the Environment. You might want to note that many food packages say where the food was distributed from, this does not mean this is where the food or its ingredients were grown. For example, a food item may be distributed in California but the ingredients were grown and processed in China.
- **Consumption:** Campers will be cooking and eating together throughout camp. Try to purchase as many ingredients as possible from local sources and make sure to highlight these ingredients with campers. When eating with campers, direct conversation around where the different ingredients came from, was the recipe easy to prepare, and what is nice about sharing food with friends etc.
- **Waste management:** The game uses the current (2013) waste and recycling regulations in New York City. You can change the game to make it meet your communities' regulations.

Apple Game: Instructions

These instructions guide activity at each station. The “group leader” can be a teacher, a teaching assistant, or a mature camper. Text that is in **bold** indicates a card the “apple” needs to collect.

Production:

Have all “apples” read their card. Tell everyone the mission of all the apples is, “to be good for the people they feed and good for the earth.”

The farmers who grew these apples used a pest management system. Give each group an apple, **one petroleum and pollution card.**

Distribution:

After everyone reads their cards explain to the group that the “apples” will travel around the room. For each lap pick up **1 petroleum and 1 pollution card.**

- New York: 1 lap
- Ohio: 2 laps
- Colorado: 3 laps
- Washington: 4 laps

Processing:

After everyone reads their cards tell the apples they will:

- New York and Washington: Sit back and relax!
- Ohio:
 - Do 20 jumping jacks. Take **1 petroleum and 1 pollution card.**
- Colorado:
 - Do 40 jumping jacks. Take **5 petroleum and 5 pollution cards** for each of the five main ingredients.

Packaging:

After everyone reads their cards, explain that they are going to get the natural resources used to make their packaging.

- New York: Sit back and relax!
- Ohio:
 - Uses sand to make glass. Take **1 sand card, 1 petroleum and 1 pollution card.**
 - Uses minerals to make the lid. Mine for minerals (take a foil ball out of the soil). Take **1 mineral, 1 petroleum and 1 pollution card.**
 - Cuts down tree for label and cardboard shipping box (take a pipe cleaner tree). Take **1 tree, 1 petroleum, and 1 pollution card.**
- Colorado:
 - Cuts down two trees for packaging and shipping box (take two pipe cleaner trees). Take **2 tree, 2 petroleum, and 2 pollution cards.**
 - The liner is made of plastic and metal (pour a small amount of oil into a cup) and mine for minerals (take a foil ball out of the soil). Take **2 petroleum, 2 mineral, and 2 pollution cards.**
- Washington:
 - Cut down a tree for your shipping box (take one pipe cleaner tree). Take **1 tree, 1 petroleum, and 1 pollution card.**
 - Pour a small amount of oil in a cup for your Styrofoam tray and plastic wrap. Take **4 petroleum and 2 pollution cards.**

Purchasing:

After everyone reads their cards, explain you are going to give each apple something that will show how it feels about where it is being sold.

- New York:
 - **1 happy face card**, you are in the good food hall of fame.
- Ohio:
 - **1 question mark card**, you don't know where

Apple Game: Instructions (continued)

- you fit
- Colorado:
 - 1 **sad face card**, you are in the junk food hall of shame.
- Washington:
 - You are cold in the produce section, put on a **scarf**. Take **one petroleum and one pollution card** for the refrigeration needed in the produce section.

Consumption:

After everyone reads their cards, explain that they are going to get a symbol for how they were for the people they fed:

- New York:
 - 1 **happy face card**, you were delicious and nutritious.
- Ohio:
 - 1 **neutral face card**, you were pretty good for the people you fed.
- Colorado:
 - 1 **sad face card**, you had too much added sugar and too many chemical ingredients.
- Washington:
 - 1 **neutral face card**, you were a bit mealy but pretty good for the people you fed.

Waste Management:

After everyone reads their cards, explain that they are going to see how they are disposed of or reused.

- New York:
 - Put your core in the compost bin.
- Ohio:
 - Recycle your jar, jar lid, and cardboard shipping box. Nothing goes to the dump! Take **3 recycle cards, 3 petroleum, and 3 pollution cards**.

- Colorado:
 - Recycle your 2 boxes and put your liner in the city dump. Take **2 recycle, 1 city dump, 3 petroleum, and 3 pollution cards**
- Washington:
 - Put your core in the compost bin, recycle your box, and put your Styrofoam tray and plastic liner in the city dump. Take **1 recycle, 2 city dump, 3 petroleum, and 3 pollution cards**

Final Thoughts:

Have all apples think about their journey and decide how successful they were at meeting their mission.

Apple Game Cards

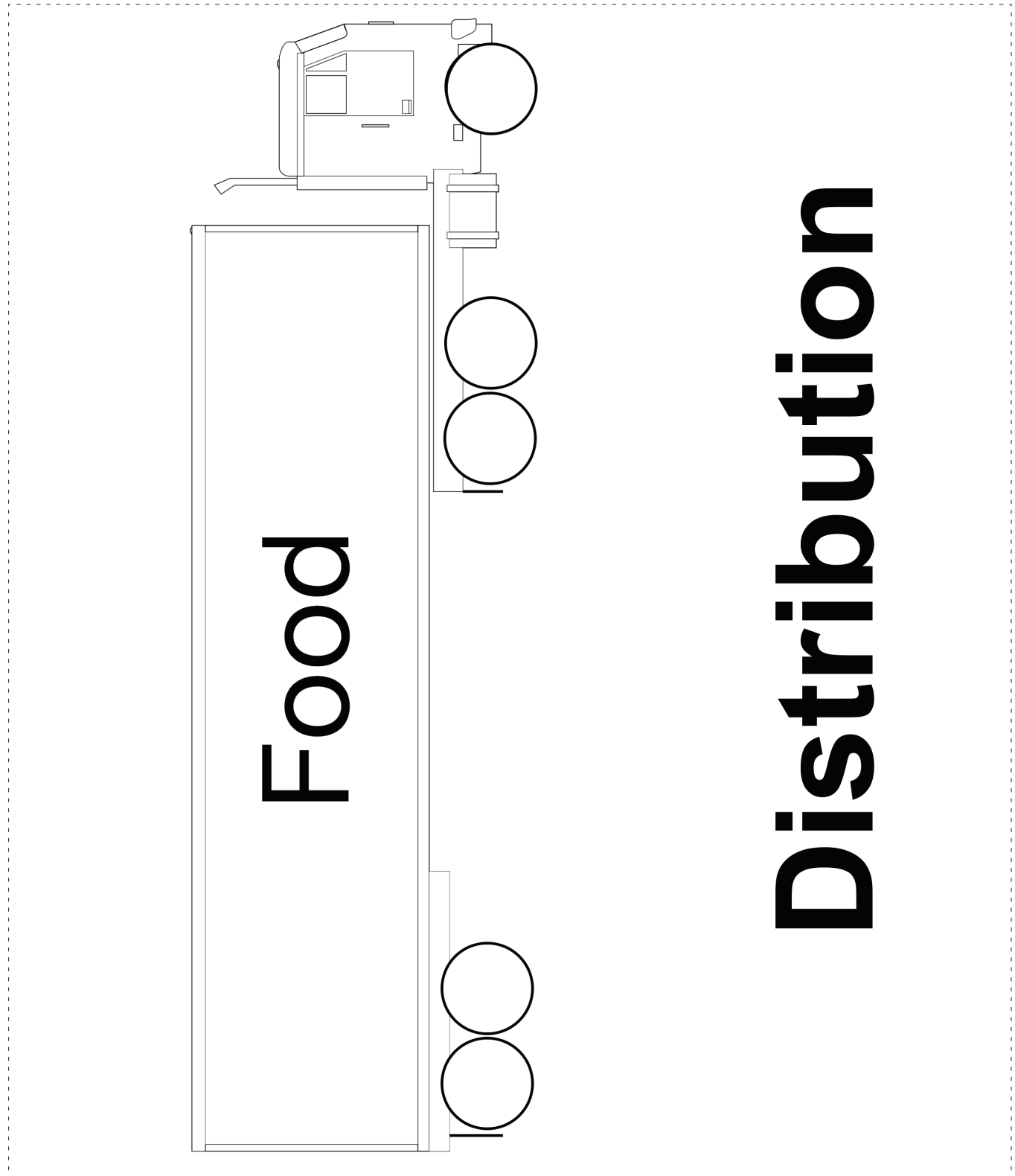
Make 1 copy for the class.



Production

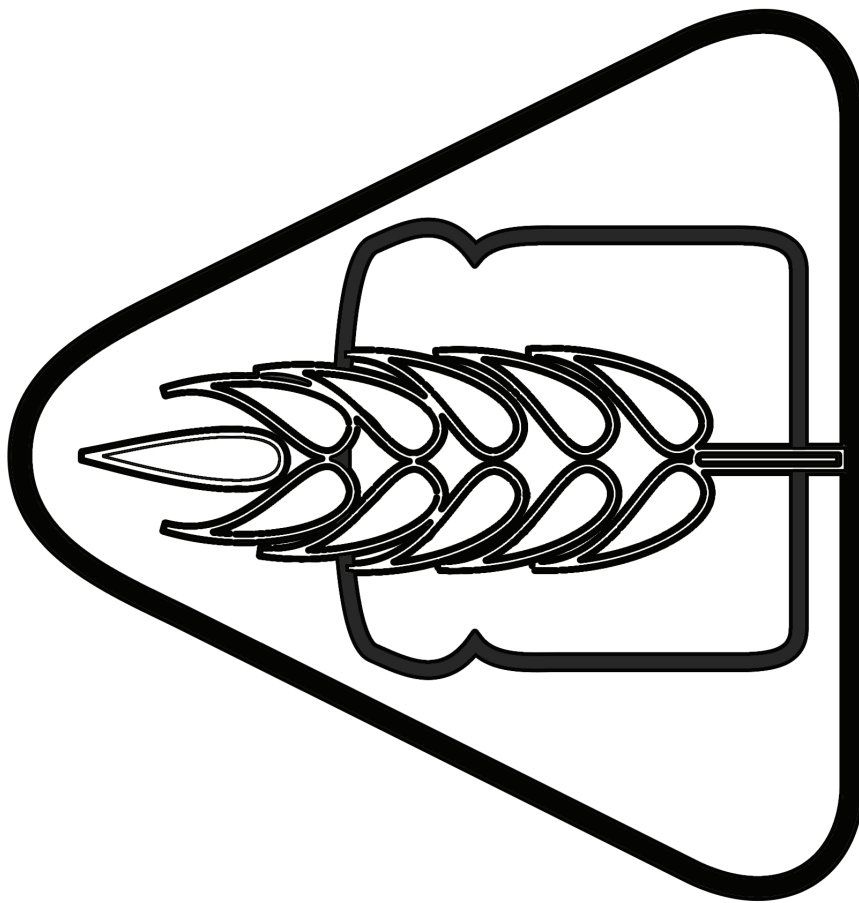
Apple Game Cards (continued)

Make 1 copy for the class.



Apple Game Cards (continued)

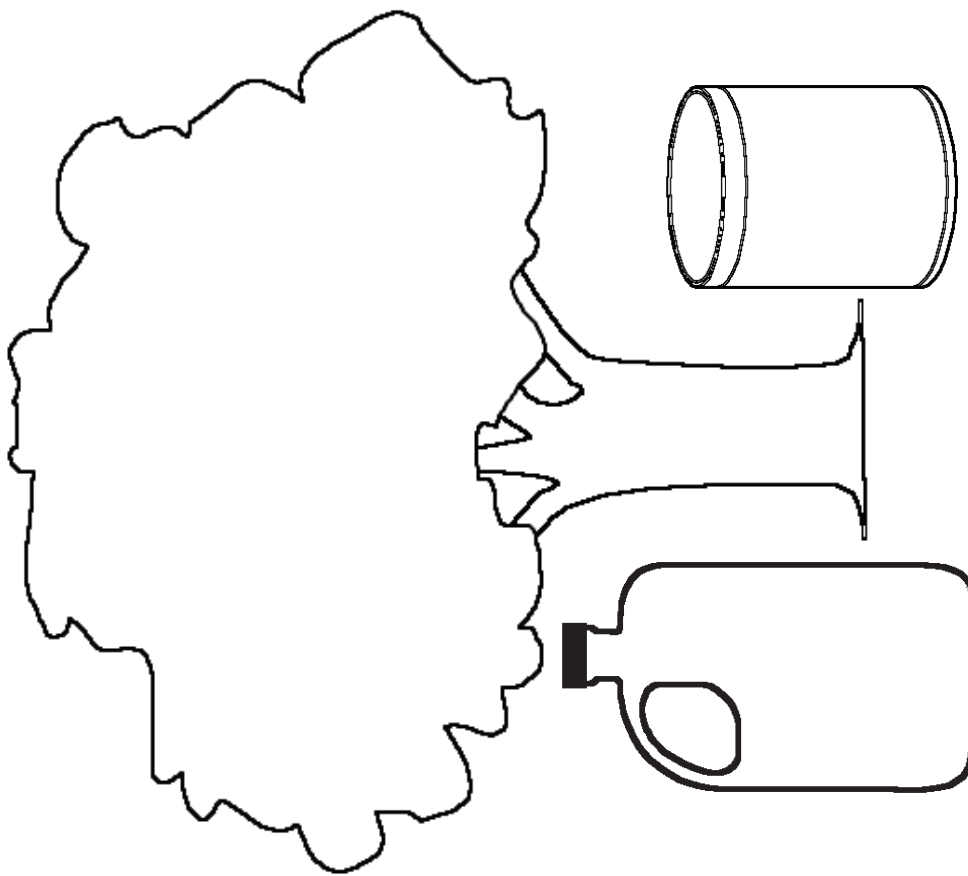
Make 1 copy for the class.



Processing

Apple Game Cards (continued)

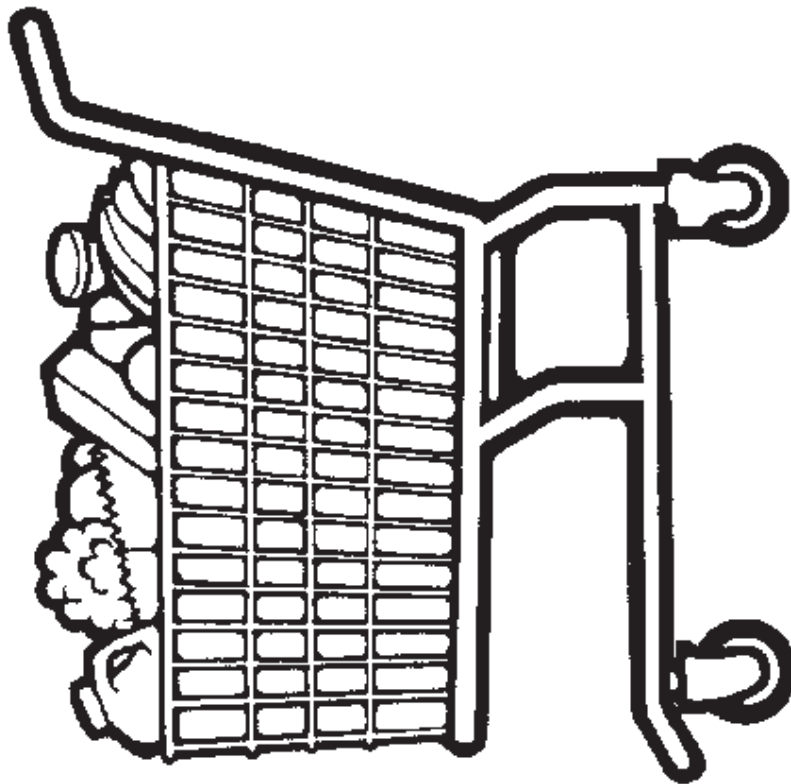
Make 1 copy for the class.



Packaging

Apple Game Cards (continued)

Make 1 copy for the class.



Purchasing

Apple Game Cards (continued)

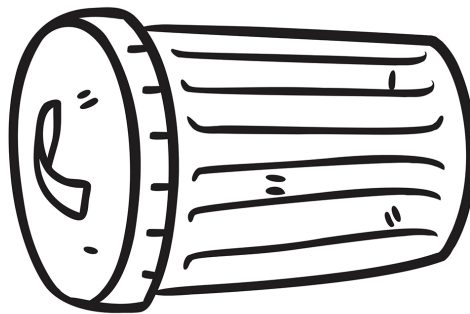
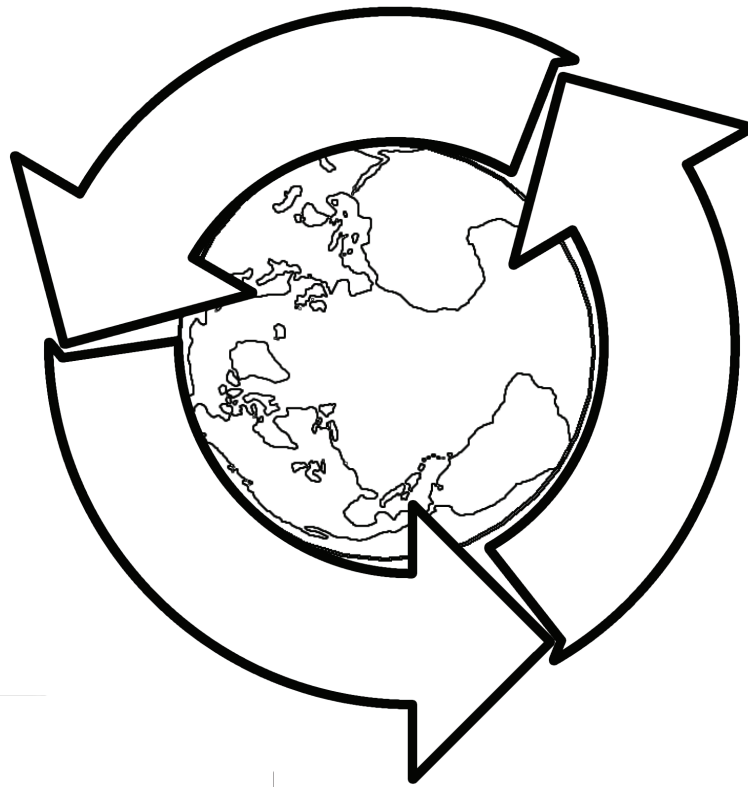
Make 1 copy for the class.



Consumption

Apple Game Cards (continued)

Make 1 copy for the class.



Waste Management

Apple Game Cards (continued)

Make one copy of each card. Cut each card out and mount them on colored paper by state. For example, all New York Apple cards are mounted on green paper. There are seven cards per state. 28 cards total.

Production

New York Apple

I am an apple that was grown in upstate New York.

Distribution

New York Apple

Because I was grown in New York, I don't have to travel very far to get to New York City.

Apple Game Cards (continued)

Make one copy of each card. Cut each card out and mount them on colored paper by state. For example, all New York Apple cards are mounted on green paper. There are seven cards per state. 28 cards total.

Processing

New York Apple

I am going to remain a fresh, whole apple, so I don't have to undergo any change.

Packaging

New York Apple

As a fresh, whole apple that was grown locally, I require no packaging. The farmer who grew me uses the same wooden crates over and over to pick and transport her apples.

Apple Game Cards (continued)

Make one copy of each card. Cut each card out and mount them on colored paper by state. For example, all New York Apple cards are mounted on green paper. There are seven cards per state. 28 cards total.

Purchasing

New York Apple

I am happy because I'm sitting in a wooden crate at the sunny farmers market with the farmer that grew me.

Consumption

New York Apple

The people I fed feel great! I tasted fresh and juicy. I gave them energy to work and play. I am very happy because I was healthy for the people I fed.

Apple Game Cards (continued)

Make one copy of each card. Cut each card out and mount them on colored paper by state. For example, all New York Apple cards are mounted on green paper. There are seven cards per state. 28 cards total.

Waste Management

New York Apple

Now that I have been eaten, all I have left is a core. This core can be composted and the compost can be used on my farm to help grow more apples.

Apple Game Cards (continued)

Make one copy of each card. Cut each card out and mount them on colored paper by state. For example, all New York Apple cards are mounted on green paper. There are seven cards per state. 28 cards total.

Production

Ohio Apple

I am an apple that was grown in Ohio.

Distribution

Ohio Apple

Because I was grown in Ohio, I will have to travel some distance to get to New York City.

Apple Game Cards (continued)

Make one copy of each card. Cut each card out and mount them on colored paper by state. For example, all New York Apple cards are mounted on green paper. There are seven cards per state. 28 cards total.

Processing

Ohio Apple

I went to the food factory and got changed into applesauce! This used energy.

Packaging

Ohio Apple

My packaging as applesauce requires a glass jar with an aluminum lid, a paper label, and a cardboard shipping box.

Apple Game Cards (continued)

Make one copy of each card. Cut each card out and mount them on colored paper by state. For example, all New York Apple cards are mounted on green paper. There are seven cards per state. 28 cards total.

Purchasing

Ohio Apple

I am being sold in aisle seven at the grocery store.

Consumption

Ohio Apple

I was good for the people I fed.

Apple Game Cards (continued)

Make one copy of each card. Cut each card out and mount them on colored paper by state. For example, all New York Apple cards are mounted on green paper. There are seven cards per state. 28 cards total.

Waste Management

Ohio Apple

**My glass jar, my metal lid, and my shipping box can
all be recycled.**

Apple Game Cards (continued)

Make one copy of each card. Cut each card out and mount them on colored paper by state. For example, all New York Apple cards are mounted on green paper. There are seven cards per state. 28 cards total.

Production

Colorado Apple

I am an apple grown in Colorado.

Distribution

Colorado Apple

Because I was grown in Colorado, I will have to travel a good distance to get to New York City.

Apple Game Cards (continued)

Make one copy of each card. Cut each card out and mount them on colored paper by state. For example, all New York Apple cards are mounted on green paper. There are seven cards per state. 28 cards total.

Processing**Colorado Apple**

I went to the food factory and got changed into an apple Pop-Tart! I was mixed with other ingredients. These ingredients came from these plants: wheat, soybeans, beets (sugar) and corn. This used a lot of energy.

Packaging**Colorado Apple**

My packaging as a Pop-Tart requires a cardboard box, a plastic liner, and a cardboard shipping box.

Apple Game Cards (continued)

Make one copy of each card. Cut each card out and mount them on colored paper by state. For example, all New York Apple cards are mounted on green paper. There are seven cards per state. 28 cards total.

Purchasing

Colorado Apple

I am being sold in aisle 14 at the grocery store.

Consumption

Colorado Apple

The people I fed thought I tasted great because I am so sweet. But, they ran out of energy very quickly and started to feel “yucky”. They also had to brush their teeth to prevent cavities.

Apple Game Cards (continued)

Make one copy of each card. Cut each card out and mount them on colored paper by state. For example, all New York Apple cards are mounted on green paper. There are seven cards per state. 28 cards total.

Waste Management

Colorado Apple

My boxes can be recycled, but since my liner is both plastic and metal it has to go to the city dump.

Apple Game Cards (continued)

Make one copy of each card. Cut each card out and mount them on colored paper by state. For example, all New York Apple cards are mounted on green paper. There are seven cards per state. 28 cards total.

Production

Washington Apple

I am an apple grown in Washington State.

Distribution

Washington Apple

Because I was grown in Washington State I will have to travel a great distance to get to New York City.

Apple Game Cards (continued)

Make one copy of each card. Cut each card out and mount them on colored paper by state. For example, all New York Apple cards are mounted on green paper. There are seven cards per state. 28 cards total.

Processing

Washington Apple

I am going to remain a fresh, whole apple, so I don't have to undergo any changes.

Packaging

Washington Apple

Because I am an apple from far away, I had to be put into a package to be transported safely.

Apple Game Cards (continued)

Make one copy of each card. Cut each card out and mount them on colored paper by state. For example, all New York Apple cards are mounted on green paper. There are seven cards per state. 28 cards total.

Purchasing

Washington Apple

I am being sold in the chilled produce section of the grocery store. I was turned away from the sunny farmers market because I was not grown by a local farmer.

Consumption

Washington Apple

The people I fed had mixed feelings. Although I looked bright and red, I just didn't taste as good as they expected.

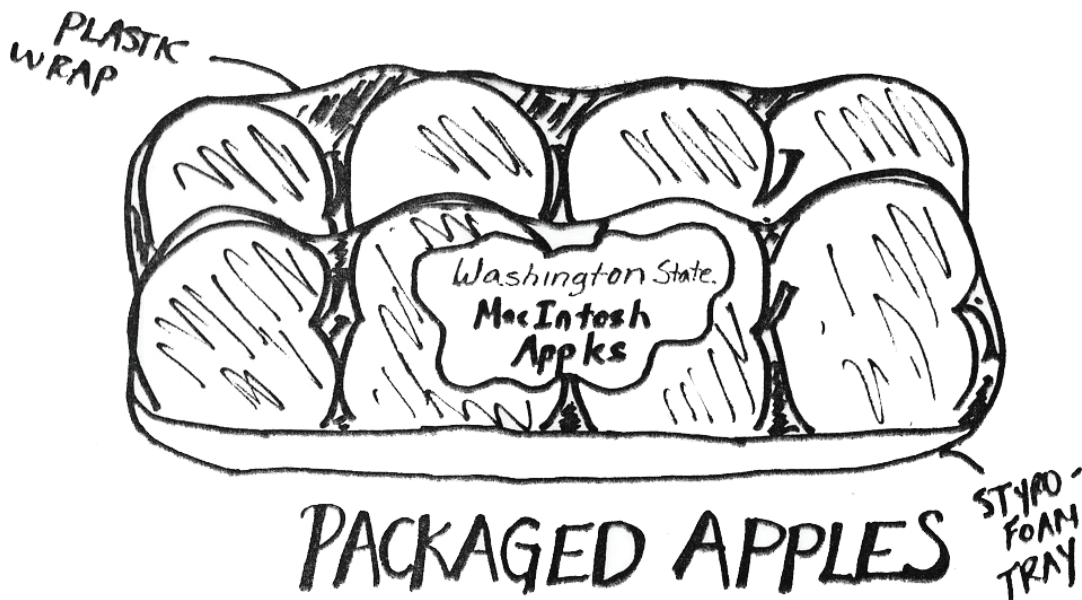
Apple Game Cards (continued)

Make one copy of each card. Cut each card out and mount them on colored paper by state. For example, all New York Apple cards are mounted on green paper. There are seven cards per state. 28 cards total.

Waste Management

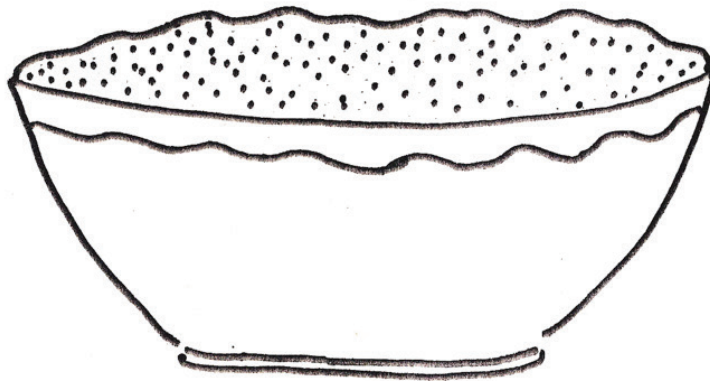
Washington Apple

My core can be put in the compost, but my packaging has to go to the city dump.

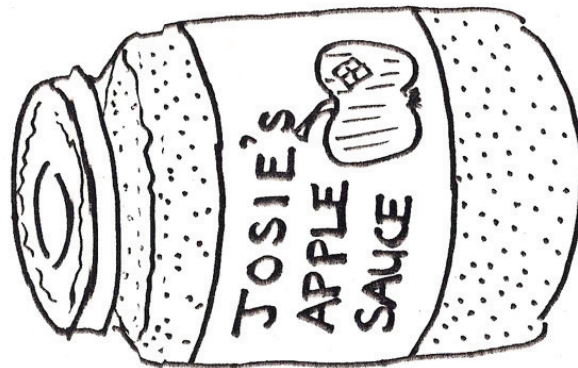


Apple Game Cards (continued)

Make one copy of each card.



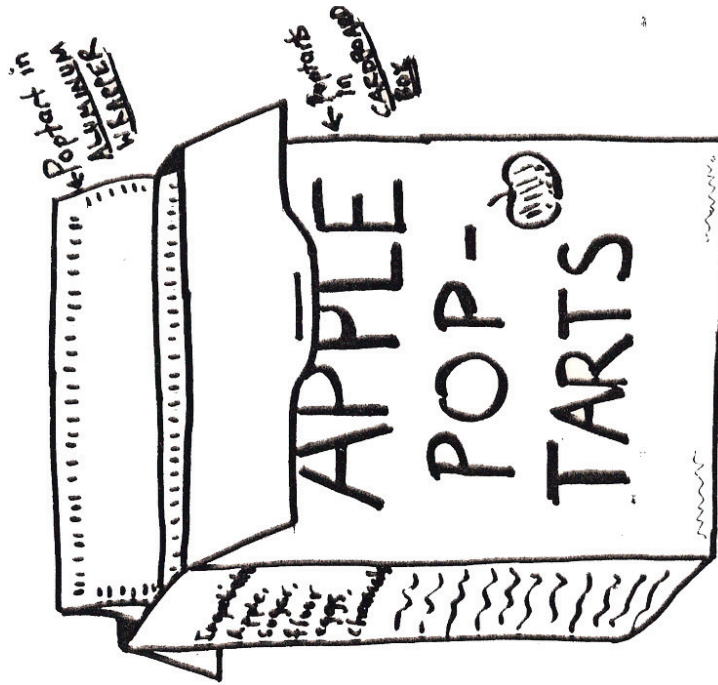
APPLE SAUCE



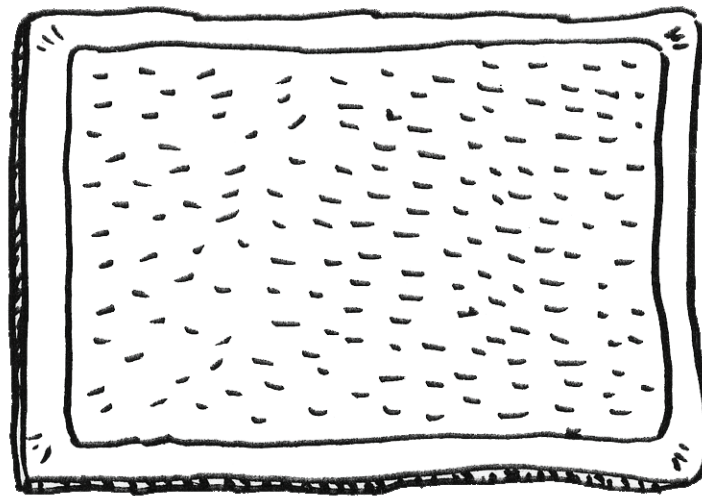
APPLE SAUCE

Apple Game Cards (continued)

Make one copy of each card.



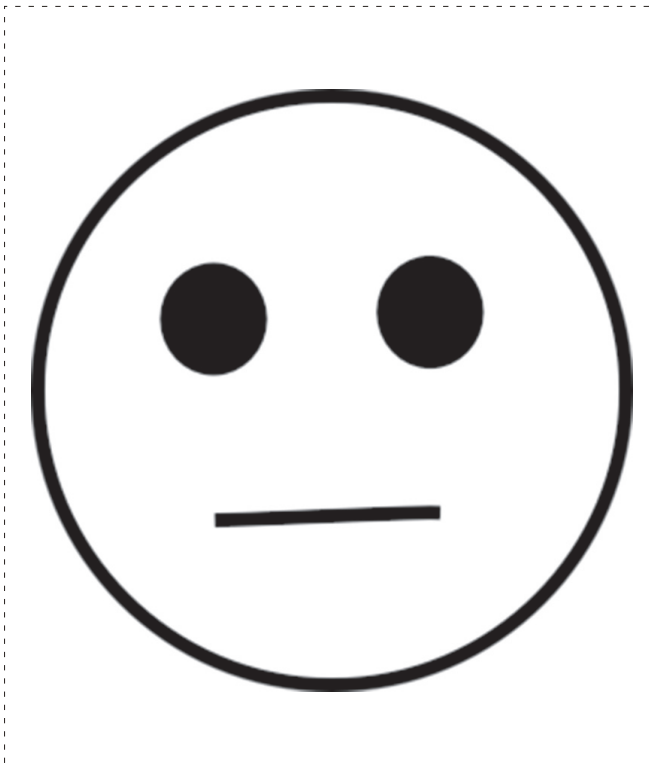
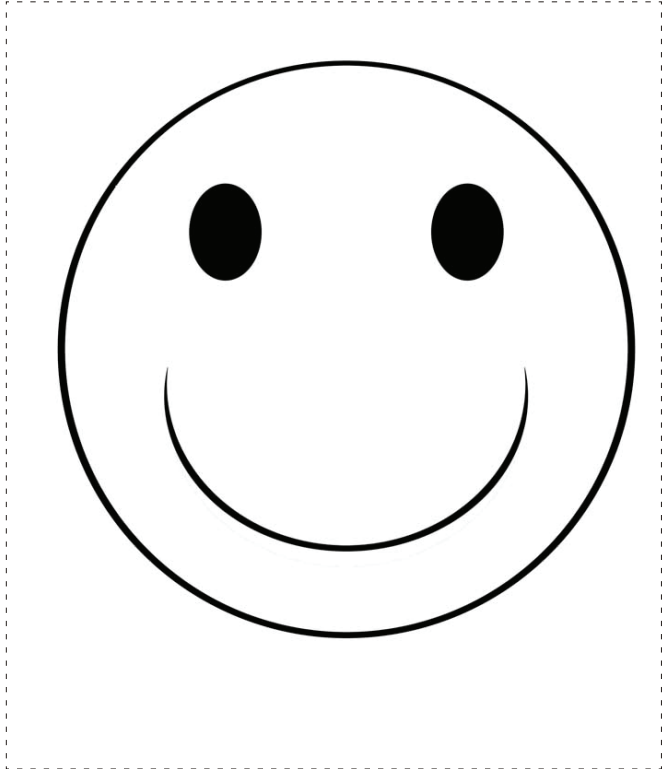
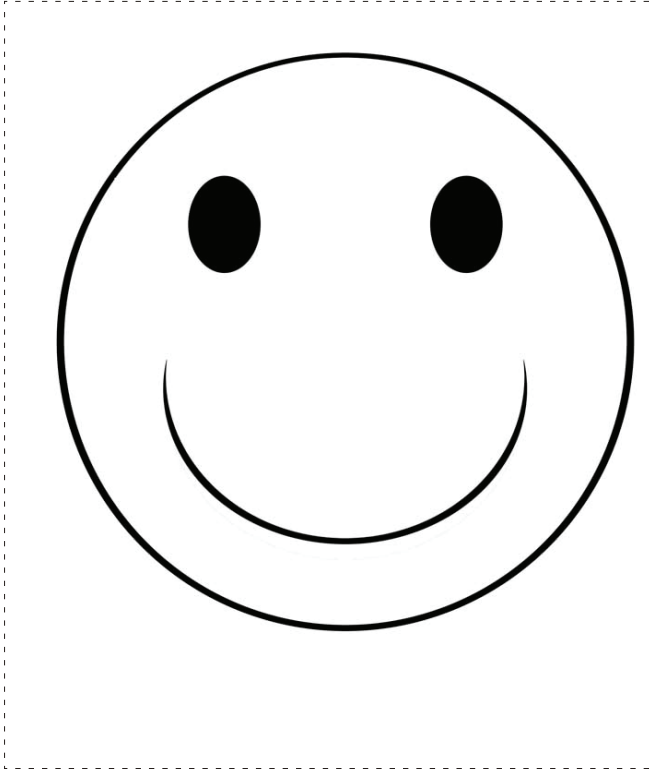
APPLE



POPTART

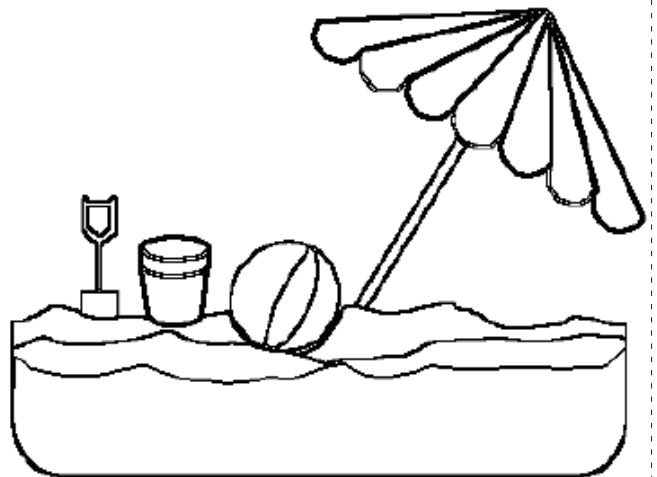
Apple Game Cards (continued)

Make 1 copy of this page and cut cards out. 2 happy face and 2 grin face cards are needed in total.



Apple Game Cards (continued)

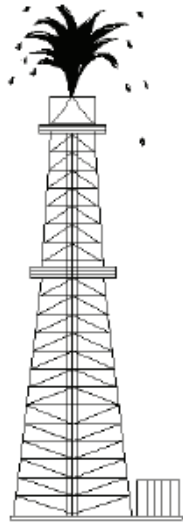
Make 1 copy of this page and cut cards out. 2 sad face, 1 question mark, and 1 sand card are needed in total.



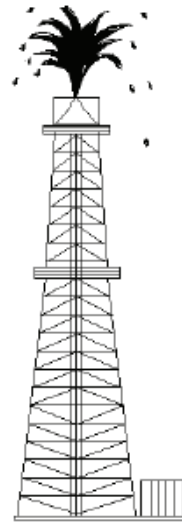
Sand

Apple Game Cards (continued)

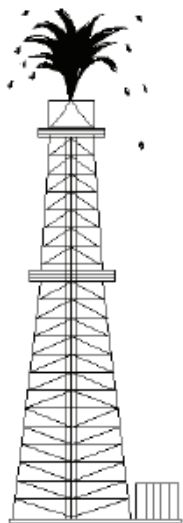
Make 11 copies of this page and cut cards out. 42 petroleum cards are needed in total.



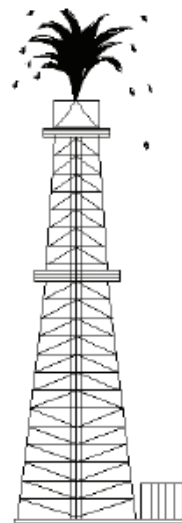
Petroleum



Petroleum



Petroleum



Petroleum

Apple Game Cards (continued)

Make 10 copies of this page and cut cards out. 40 pollution cards are needed in total.



Pollution



Pollution



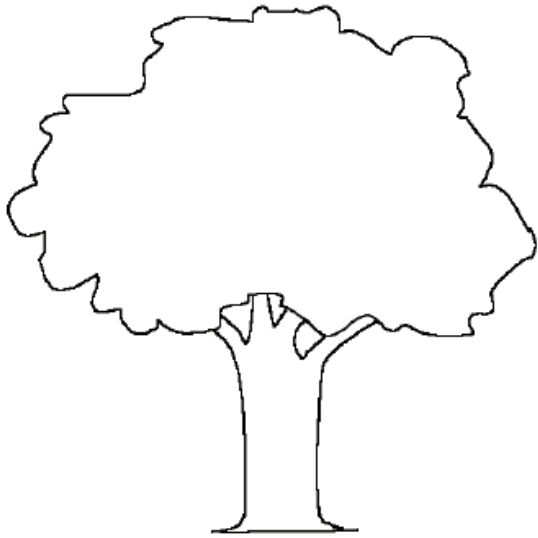
Pollution



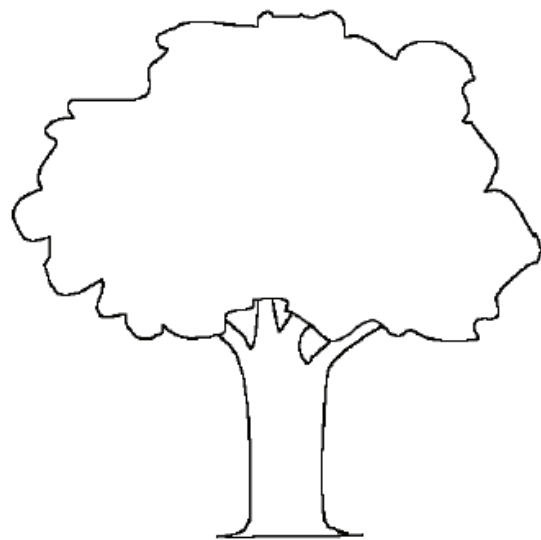
Pollution

Apple Game Cards (continued)

Make 1 copy of this page and cut cards out. 4 tree cards are needed in total.



Tree



Tree



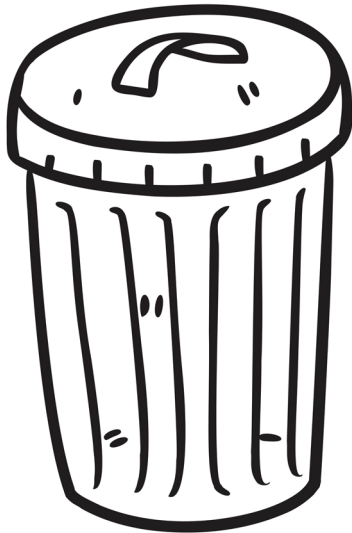
Tree



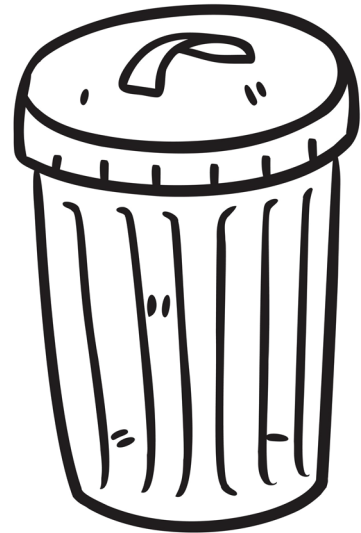
Tree

Apple Game Cards (continued)

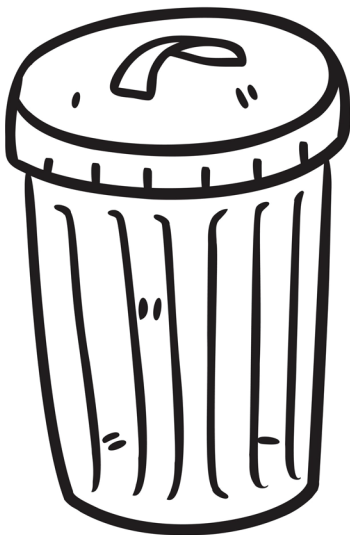
Make 1 copy of this page and cut cards out. 3 city dump cards and 3 minerals cards are needed in total.



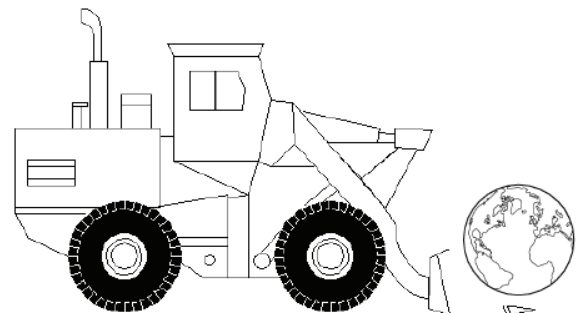
City Dump



City Dump



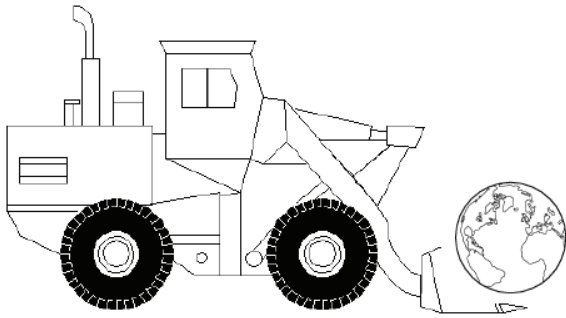
City Dump



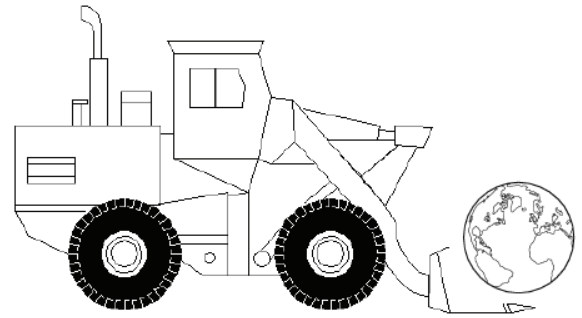
Minerals

Apple Game Cards (continued)

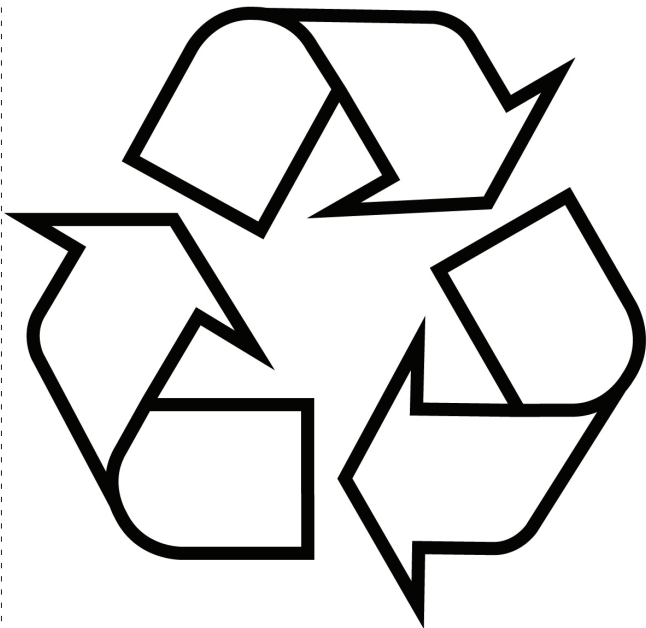
Make 1 copy of this page and cut cards out. 3 mineral cards and 6 recycle cards are needed in total.



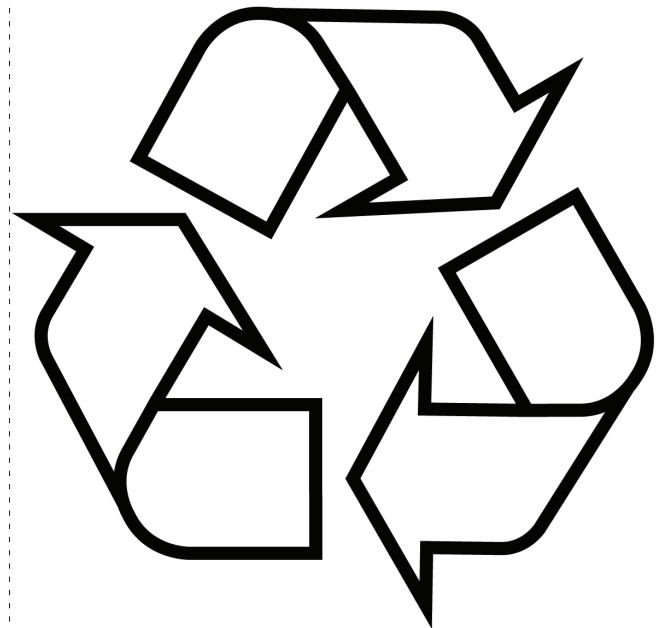
Minerals



Minerals



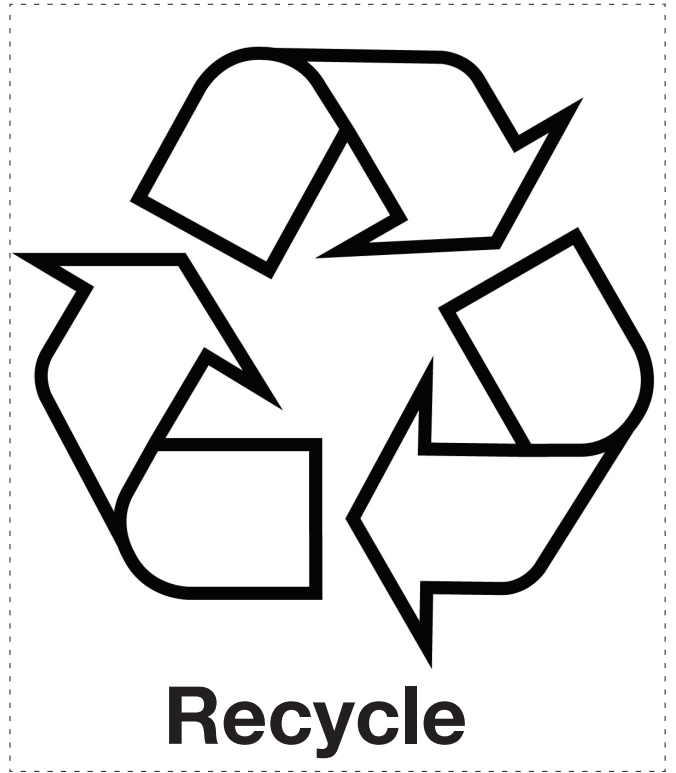
Recycle



Recycle

Apple Game Cards (continued)

Make 1 copy of this page and cut cards out. 6 recycle cards are needed in total.



Food System Facilitator Questions

Facilitator's questions: Go-Gurt

How many cows do you think are needed to produce enough milk for Go-Gurt nation wide? Internationally? Do you think there is any way we could find this out? (Explain that we could call the company and try to find out how much Go-Gurt they sell, how much milk it takes for each Go-Gurt, and then how much milk a typical cow produces in a year.)

Do you think Go-Gurt is produced in one factory or several across the country? (If we wanted to know this we could contact the company.)

How do you think the Go-Gurt gets put into its packaging? (Have campers speculate based on what they know about factory production.)

What natural resources are used to make the package? (Typically Go-Gurt containers are made from plastic that is made from petroleum.)

What do we do with the container when it is empty? Where does it go? Will it end up in a landfill, be re-used, recycled, or burned? (Have campers discuss if it could be recycled where they live. Are there any ways to reuse Go-Gurt containers? Challenge campers to consider the energy cost associated with recycling versus reusing.)

Facilitator's questions: Supermarket tomatoes

What time of the year can we buy tomatoes? (Tomatoes are available in grocery stores all year round because they are imported from warmer climates. When they are available at farmers markets depends on your geographic location and growing season.)

How do you think farms can grow all the tomatoes needed to supply all the American grocery stores with tomatoes? (Have campers discuss where they think all the farms are that grow the tomatoes they have seen in stores.)

Do you think these tomatoes are grown on a farm that grows many different crops or just tomatoes?

How have you seen tomatoes packaged in grocery stores? Why do you think tomatoes are put into packages? (They are often put onto trays and covered with plastic wrap or in plastic containers to keep them from getting bruised or damaged on their journey around the world.)

What is the packaging made from? (Plastic and Styrofoam are made from petroleum.)

What do we do with the container when it is empty? Where does it go? Will it end up in a landfill, be reused, recycled, or burned? (Have campers discuss what can be recycled and what can be reused.)

Make sure you explain that although recycling reduces the use of some raw materials, it still requires the input of energy. The better solution is to reduce purchase of the packaging.

Parts of Food System Cards (large)

Make 2 copies. Cut out the cards and compile into two full sets of 7 cards.

Production

Distribution

Parts of Food System Cards (large) (continued)

Make 2 copies. Cut out the cards and compile into two full sets of 7 cards.

Processing

Packaging

Parts of Food System Cards (large) (continued)

Make 2 copies. Cut out the cards and compile into two full sets of 7 cards.

Purchasing

Consumption

Parts of Food System Cards (large) (continued)

Make 2 copies. Cut out the cards and compile into two full sets of 7 cards.

Waste Management

Farm Images

Make 2 copies for the class. Project images from the digital resources disc.

Industrial Food System



Farm Images (continued)

Make 2 copies for the class. Project images from the digital resources disc.

Industrial Food System



Farm Images (continued)

Make 2 copies for the class. Project images from the digital resources disc.

Community Food System



Farm Images (continued)

Make 2 copies for the class. Project images from the digital resources disc.

Community Food System



Food Systems Glossary

Below are some terms that we hope campers will be able to identify and understand as they relate to the food system:

Local – Describes a method of food production and distribution that is geographically localized. Farmers grow, process, and distribute their goods close to where the foods were produced. The distance that is considered “local” is not set in stone. Often, 100 miles between production and consumption is a general rule of thumb. As another example, farmers that sell at the GreenMarket farmers markets in New York City need to be within 250 miles of New York City.

Regional – Regional food is geographically localized to a specific region like the northeast.

Global – Global food refers to food produced in one country that is transported and consumed in another country.

Organic – Organic foods are those produced without any chemical pesticides or fertilizers.

Sustainable – Sustainable is defined as a method of harvesting or using a resource so that the resource is not depleted or permanently damaged. A sustainable food system is one in which the quality of the soil, water, and crop biodiversity are protected. Farmers and farm workers make livable wages and the food available to consumers is affordable and promotes human health.

Think Globally, Eat Locally

Understanding Food Systems

Have you ever heard the expression “Think Globally and Eat Locally”? What do you think it means? Much of the food Americans eat travels at least 1,500 miles from the farm it was produced on to get to our dinner plates. The American food system has created a shopping and eating experience in which we can go to a grocery store and find food produced from around the world. It also means we can get fresh produce at any time of the year! Tomatoes for example, are not in season in January in the Northeast region of the United States but you can find them in grocery stores because they are imported from regions and countries with warmer climates. This variety makes it easy for consumers to feel like they have a lot of choices whether it is January or July. But things were not always this way. Before we had our current transportation system as well as “cheap oil” people grew their own food. People ate what was in season or what had been preserved from past seasons. This also meant that if a freeze or flood ruined the carrot crop, people would have to figure out something else to eat all winter. Today, however, if the orange crop in Florida is ruined people can get oranges from California or Spain instead. We truly live in a global food system. While many consumers like all the choices the global food system provides, there are others who are worried about the impact of our current food system on the environment, local economies, communities, farmers, and consumers.

So what is the big deal about our current food system and why are people so worried? Well for starters, due to technological advancements food can be kept in storage longer for less money. This means food can travel around the world further and faster than ever before but with enormous costs in energy. Ironically as our food system has grown, it is controlled by a smaller number of global corporations that can manipulate prices, exploit workers, and spend billions of dollars on marketing to make sure you buy their products. We may think we have a lot of choice in our grocery stores but in fact everything in the store has been carefully selected and produced by a few multi-billion dollar companies who profit from every pineapple or Pop-Tart we buy. This leads to a food system where people are more and more disconnected from where their food comes from and the people and energy needed to produce it. Most of us have no idea how, where, or by whom our food was grown, produced, processed, and shipped.

So is there any good news regarding food in America today? Yes!! There is an alternative! A local, sustainable, community food system is good for communities, farmers, the environment, and our taste buds because after all, food just tastes better if it isn't flown halfway around the world! Eating locally means voting with your fork to support a food system that is sustainable and fair. But, eating locally does mean making some adjustments. It means changing our choices, appetites, and eating patterns to better mimic nature and the four seasons. This means indulging in the sweetness of the late summer harvest while experimenting with root vegetables and squashes in the winter. Spring and summer foods can be canned, frozen, or dried so they can be enjoyed all year round. Combine canned tomatoes from the summer with local ground beef in January for a quick and easy meat sauce. Plus, not everything you eat has to be local. This would be close to impossible for many of us - think of the coffee drinkers! Produce and meats are the ideal foods to buy locally because of their weight and perishability which make transporting them over long distances wasteful. And, local produce and meat often taste better. Eating locally connects people to their food, the farmer, and the environment. That is surely something to lift your fork to!

Think Globally and Eat Locally (continued)

Most people, both adults and children, have never been asked to critically think about where their food comes from. Urban children especially are disconnected from our growing spaces and many lack the general knowledge of how plants grow and produce food. The term, 'system' is part of our daily vocabulary and your campers are probably familiar with the word but may not understand its full meaning. A system is a group of interacting elements that function together as a complex, unified whole. Your campers may be familiar with the term 'food system' and may have their own ideas of what it means. A food system involves all the levels of food production, distribution, processing, packaging, purchasing, consumption, and waste management. Understanding how all these parts make up our whole food system can be challenging. We hope campers will understand that a system is made up of its parts, and that if one element in the system is impacted it will directly or indirectly impact the entire system. Our hope is that by the end of the lesson, campers will have a greater appreciation for the steps involved in each of these systems and how our choices at each step impact the greater system. Together you will be exploring two types of food systems: the industrial and the community food systems.

The Industrial Food System

The industrial system is representative of how the majority of food is grown in America. We rely heavily on large farms to produce the vast majority of our food needs. These large farms are often monoculture farms meaning they only grow one, or a few, crop(s). Because these farms are streamlined and specialized to grow only a few crops, they can produce large amounts of food; however it comes at a high cost. Planting the same crop over and over again in the same soil greatly depletes that soil of its nutrients, which leads to erosion and run-off that pollutes our waterways. Industrial farms also rely very heavily on pesticides and fertilizers to keep their crops growing. In a monoculture farm if a crop gets a fungus, it can wipe out the entire farm. The use of pesticides ensures that entire crops are not lost to pests; however, the use of pesticides depletes soil bioactivity, endangers local wildlife, and may impact human health when consumed on our fruits and vegetables. In order to produce these chemical pesticides and fertilizers high amounts of energy in the form of fossil fuels must be used. Because these farms are often hundreds and even thousands of acres large they rely on large farming equipment to maintain and harvest crops. These machines run on fossil fuels, which pollute our airways and waterways.

The industrial food system is also characterized by the long distances food travels to be distributed. Fossil fuels are used to deliver food from farms all over the nation and globe to our supermarkets. Due to the sheer size of the industrial farm system it is very difficult to know which state, let alone which farm a food item came from. Milk for example is combined from several farms before it is distributed to consumers. This practice makes it impossible to know where exactly the milk was produced. This has dangerous ramifications when it comes to food safety and stopping food-borne illnesses. Much of the food in our supermarket and on corner store shelves are highly processed and require a lot of packaging. This processing and packaging takes place in thousands of large factories powered, once again, by huge amounts of fossil fuels. Not only does the processing make it hard to even know which ingredients are in our food, but processing causes a loss of nutrients and usually means the addition of unhealthy additives and preservatives. Finally, there is a great amount of waste in the industrial food system in the form of left-over packaging. One can see that this system greatly disconnects people from their food and the farmers that grow it.

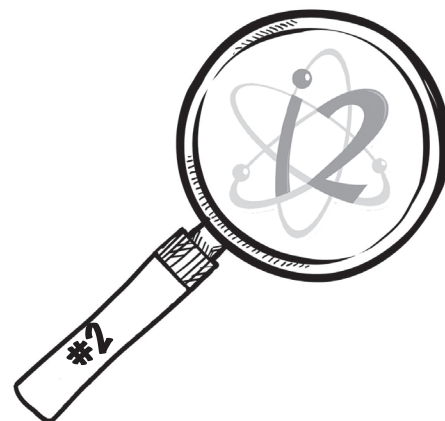
Think Globally and Eat Locally (continued)

The Community Food System

The community food system as we are defining it, is one that embraces locally produced food that uses sustainable practices. The local food movement is gaining popularity throughout the country. People are becoming more interested in where their food was grown, under what conditions it was grown in, and who grew it. While local farms are not always organic, in the interest of your conversations with campers, this week we are advocating both local and organic practices as these practices contribute to a sustainable food system. Organic food production means that no chemicals – pesticides, fungicides, or chemical-based fertilizers have been used on the crops. This allows soil and waterways to remain clean while also producing food that is clean of chemical residues.

At the heart of the community food system is the farmers market. Local and regional farmers come from short distances to bring their products directly to the consumer. Less travel means less fossil fuels are burned resulting in a fresher product that doesn't require a lot of processing or the addition of preservatives to extend the shelf life. At farmers markets across the country people can buy foods grown nearby and meet the men and women who produced them. Very little packaging is needed since much of the food is whole and sold directly to customers by the farm staff. By shopping at these markets you are supporting local jobs and local economies as the money spent in the market goes directly to the farmer and not a corporation. Local organic farms benefit from being diverse and producing a variety of crops that can be sold year round. Amongst many things, this encourages seasonal and healthy eating.

We hope that campers will begin to understand the differences between the two systems and begin to form opinions about which system they want to support.



Hidden Ingredients

.....

Materials

In Guide:

- **Corn Food Images** cards
p. 93
- **Mystery Food Item Images and Labels** cards p. 94
- **Hidden Corn** lesson resource p. 104
- **Uses of Corn** activity sheet p. 105
- **Hidden Corn Derivatives** activity sheet p. 106
- **Whole vs. Processed Foods** teacher note p. 109

Other Materials:

- 10 manila envelopes
- Camera
- 1 fresh ear of corn
- i2 journals and pencils
for each camper

Overview

In this activity, campers identify the differences between whole, semi-processed, and processed foods. Campers recognize that whole foods come from plants and animals – fruits, vegetables, milk, whole grains, legumes, lean meats, poultry, and fish. Campers use ingredient clues to determine mystery food items and learn about the hidden ingredient that is found in much of our processed foods, corn! Campers explore why choosing whole foods over processed foods is healthier. Through this exploration campers discover that the industrial food system is responsible for many of our processed food items while the community food system provides more whole and semi-processed food items.

Objectives

Campers will be able to:

- explain what a whole, semi-processed, and processed food is and be able to identify examples of each;
- analyze the complexity of processing food and the hidden ingredients added to processed foods; and
- identify the pros and cons of food processing.

Before You Begin:

- Review lesson plan and all in guide materials.
- Prepare the **Corn Food Images** cards (can be printed or projected).
- Make copies of **Uses of Corn** and **Hidden Corn Derivatives** activity sheets for each camper.
- Prepare ten mystery item envelopes using the **Mystery Food Item Images and Labels** cards and manila envelopes. Place one **Mystery Food Images** card inside each of the envelopes. Seal the envelope. Adhere the corresponding nutrition label to the outside of the envelope. Make sure the **Mystery Food Image** is not visible through the envelope. If the image is visible you may want to cover the envelope with construction paper.

Clues collected:

- *Uses of Corn* activity sheet
- *Hidden Corn Derivatives* activity sheet
- Photo of nutrition labels and mystery food items

1. Introduce the Case

Introduce campers to their next food detective case, **Hidden Ingredients**. Campers determine what a mystery food item is based solely on the nutrition label. Briefly review what campers have learned about food systems. *Which system produces predominantly “whole” food items? Which system produces predominantly processed food items?*

2. Explore Whole versus Processed

Hold up an ear of corn and the *Corn Food Images* cards. Have campers identify which food item is the whole, semi-processed, and processed food. Ask campers: *What are the differences between each item? What makes something semi-processed versus processed? Is Go-Gurt semi-processed or processed? How about the yogurt from the farmers market?* Ask campers for examples of whole foods. Write them on the board. *Where do these food items come from? Were they originally from a plant or an animal?*

3. Determine the Ingredients

Foods can be changed and processed into many different things. Explain to campers that in groups of two they will be given a mystery food item in a sealed envelope. Each envelope has a nutrition label taped to the front. Campers must guess what food item is in the envelope based on the ingredient label.

Divide the class into groups of two and distribute the mystery food item envelopes. As campers are examining their mystery items and making guesses as to what is inside, ask campers to think about how many ingredients their food item has. Ask campers, *how many of the ingredients do you recognize and how many of the ingredients can you pronounce?* Have campers write down their thoughts in their i2 journals.

Campers open their mystery food item envelopes. Did they guess correctly? Five of the mystery items can be found in the industrial food system and five can be found in the local food system. Have campers identify which foods belong to each system. Take photos of each group's nutrition labels and food items.

4. Connect Processed Food and Health

Explain to campers that sometimes processing food is beneficial; for example grinding corn to become corn meal or cooking tomatoes in order to make tomato sauce. However too many of the foods available today are so highly processed that it's dangerous to our health. Explain that one of the negative outcomes of overly processing foods is that we lose track of

what is actually in our foods.

Ask campers: *Of the ingredients listed in your mystery food, how many do you recognize?* Explain that one way of discovering how much a food is processed is by looking at the ingredient list. If a food is a whole food like an apple, there is no ingredient list. Apples are minimally processed. They get washed and sorted (and perhaps packaged depending on where they are purchased from) but are not changed in any way before they are consumed. If a food is semi-processed, the ingredient list will be very short as seen in the pretzels sold at the farmers market. If a food is highly processed, the ingredient list will be very long as seen in the chicken nuggets from the industrial food system. Explain to campers that a nutrition label is a clue in determining how healthy a food item is. Reading a nutrition label is a tool campers and their families can use when shopping at a grocery store. The more unrecognizable ingredients there are, the less likely it is that the product is a healthy choice.

5. Discover Hidden Ingredients

Campers look at their mystery food and its nutrition label again. Have campers raise their hands if corn is an ingredient in the food item. Distribute and review the *Uses of Corn* activity sheet and *Hidden Corn Derivatives* activity sheet. After a few minutes have campers share their findings. *How many of the ingredients that you could not recognize actually had corn in them? Are you surprised? Discuss with campers: Why do processed foods have so many ingredients? What are some of the reasons why we process foods?* Write responses on the board.

If campers have not already identified these reasons, explain that processing not only extends the shelf life of food but it also allows it to travel far distances from their point of origin to our supermarket shelves.

Discuss with campers:

How many of the food items do you think are produced in the United States?

What are some countries you think we import foods from?

How long do food items typically sit on a shelf at a grocery store? Is it different for produce as compared to Pop-Tarts?

How long does a fresh ear of corn last? How long does cereal?

6. Close the Case

Now that campers have identified the differences between whole, semi-processed, and processed foods and discovered some of the hidden ingredients in the processed food system, discuss the following questions with campers:

What are some of the pros and cons of processing food? (Pros: broadens the amount of foods available for human consumption, prolongs shelf life. Cons: we don't always know what we are eating; too much processing with the addition of fats and sugars can make foods unhealthy.)

Is it possible to only eat unprocessed foods? Is it possible to eat only processed foods?

Do you think people should know about what is in their food? (Campers may reflect on how they felt learning about some of the ingredients they never knew they were eating.)

Campers have now completed the case. Congratulate campers on completing their second food detective case.

Corn Images

Make 2 copies for class. Project images from digital resources disc.



Mystery Food Item Images and Labels

Make one copy of each sheet. Cut images out.



INGREDIENTS: WHOLE GRAIN OATS, MARSHMALLOWS (SUGAR, MODIFIED CORN STARCH, CORN SYRUP, DEXTROSE, GELATIN, CALCIUM CARBONATE, YELLOWS 5&6, BLUE 1, RED 40, ARTIFICIAL FLAVOR), SUGAR, OAT FLOUR, CORN SYRUP, CORN STARCH, SALT, TRISODIUM PHOSPHATE, COLOR ADDED, NATURAL AND ARTIFICIAL FLAVOR, VITAMIN E (MIXED TOCOPHEROLS) ADDED TO PRESERVE FRESHNESS.

VITAMINS AND MINERALS: CALCIUM CARBONATE, ZINC AND IRON (MINERAL NUTRIENTS), VITAMIN C (SODIUM ASCORBATE), A B VITAMIN (NIACINAMIDE), VITAMIN B6 (PYRIDOXINE HYDROCHLORIDE), VITAMIN B2 (RIBOFLAVIN), VITAMIN B1 (THIAMIN MONONITRATE), VITAMIN A (PALMITATE), A B VITAMIN (FOLIC ACID), VITAMIN B12, VITAMIN D3

Mystery Food Item Images and Labels (continued)



INGREDIENTS: CARBONATED WATER, HIGH FRUCTOSE CORN SYRUP, CARMEL COLOR, PHOSPHORIC ACID, NATURAL FLAVORS, CAFFEINE

Mystery Food Item Images and Labels (continued)



INGREDIENTS: WHITE BONELESS CHICKEN, WATER, FOOD STARCH-MODIFIED, SALT, SEASONING (AUTOLYZED YEAST EXTRACT, SALT, WHEAT STARCH, NATURAL FLAVORING [BOTANICAL SOURCE], SAFFLOWER OIL, DEXTROSE, CITRIC ACID), SODIUM PHOSPHATES, NATURAL FLAVOR (BOTANICAL SOURCE). BATTERED AND BREADED WITH: WATER, ENRICHED FLOUR (BLEACHED WHEAT FLOUR, NIACIN, REDUCED IRON, THIAMIN MONONITRATE, RIBOFLAVIN, FOLIC ACID), YELLOW CORN FLOUR, BLEACHED WHEAT FLOUR, FOOD STARCH-MODIFIED, SALT, LEAVENING (BAKING SODA, SODIUM ACID PYROPHOSPHATE, SODIUM ALUMINUM PHOSPHATE, MONOCALCIUM PHOSPHATE, CALCIUM LACTATE), SPICES, WHEAT STARCH, DEXTROSE, CORN STARCH.

Mystery Food Item Images and Labels (continued)



INGREDIENTS: DRIED POTATOES, VEGETABLE OIL (CONTAINS ONE OR MORE OF THE FOLLOWING: CORN OIL, COTTONSEED OIL, SOYBEAN OIL, AND/OR SUNFLOWER OIL), CORN FLOUR, WHEAT STARCH, MALTODEXTRIN, SALT, RICE FLOUR AND DEXTROSE.

Mystery Food Item Images and Labels (continued)



INGREDIENTS: SUGAR, UNBLEACHED ENRICHED FLOUR (WHEAT FLOUR, NIACIN, REDUCED IRON, THIAMINE MONONITRATE {VITAMIN B1}, RIBOFLAVIN {VITAMIN B2}, FOLIC ACID), HIGH OLEIC CANOLA AND/OR PALM AND/OR CANOLA OIL, COCOA (PROCESSED WITH ALKALI), HIGH FRUCTOSE CORN SYRUP, LEAVENING (BAKING SODA AND/OR CALCIUM PHOSPHATE), CORNSTARCH, SALT, SOY LECITHIN, VANILLIN--AN ARTIFICIAL FLAVOR, CHOCOLATE.

Mystery Food Item Images and Labels (continued)



INGREDIENTS: OATS, HONEY, RAISINS, APRICOTS, CINNAMON, GINGER, SALT

Mystery Food Item Images and Labels (continued)



INGREDIENTS: APPLES

Mystery Food Item Images and Labels (continued)



INGREDIENTS: FLOUR, WATER, YEAST, SALT, BAKING SODA

Mystery Food Item Images and Labels (continued)



INGREDIENTS: UNBLEACHED WHITE FLOUR, MOLASSES, BUTTER, SUGAR, EGGS, GINGER, BAKING SODA, SALT.

Mystery Food Item Images and Labels (continued)



INGREDIENTS: CHICKEN

Hidden Corn

When most people think of corn they usually think of the glistening yellow kernels of fresh corn-on-the-cob. Would you be surprised to find out that the average American eats over a ton of corn each year?! You can guarantee it's not a ton of corn-on-the-cob. Most of the corn that we consume in America is refined and processed into its smaller components and used in order to make highly processed food products that we buy and eat everyday. Corn is so embedded in our food system that on virtually any processed food item you can find at least one, but often many more, ingredients that are derived from corn. Some say it is "hidden" in our food, as most people don't even realize they are eating products with corn in it. Often corn derivatives take the form of ingredients we can't pronounce let alone identify.

Over the last few decades high fructose corn syrup has infiltrated our food system. In 1966 the average American consumed roughly 14 pounds of corn sweetener a year. That number has increased more than five-fold. High fructose corn syrup, HFCS, is in products from salad dressing to chewing gum. The average American consumes 80 pounds of HFCS a year!

So how did corn become so central in the American diet? Two words, farm subsidies. The topic of farm subsidies is very complex. Without getting too detailed, we hope that campers will understand a few basic contributing factors for why corn is in so much of our food.

The price of corn is kept very low by government policies known as farm subsidies. Between 1995 and 2006, \$177.6 billion were paid in farm subsidies. Of that, \$56 billion went to corn alone. The low price of corn means farmers don't make very much money growing it. In order to make enough money to survive, they must grow a lot of corn; millions of acres of corn. If the price of corn drops, many farmers are left with the choice of growing even more corn, or going out of business. The low price of corn and the enormous quantities of it mean that there is a lot of cheap corn that the industrial food chain can use. This cheap corn is added to products throughout the system including the food we feed to animals. Thus, when you eat animals from the industrial food system you are also eating corn. The low cost of corn helps explain why processed foods like soda (made of 100% corn) and chicken nuggets (56% corn) are so cheap. However, the price consumers see and ultimately pay does not include the environmental costs of excess fertilizers and pesticides used to grow so much corn. The grocery store price does not account for the cost of fossil fuels needed to produce, harvest, process, package, and distribute all that corn.



Camper:

Hidden Corn Derivatives

Acetic acid	Cetearyl glucoside	Dextrose anything (such as monohydrate or anhydrous)
Alcohol	Choline chloride	d-Gluconic acid
Alpha tocopherol	Citric acid	Distilled white vinegar
Artificial flavorings	Citrus cloud emulsion (CCS)	Drying agent
Artificial sweeteners	Coco glycerides (cocoglycerides)	Erythorbic acid
Ascorbates	Confectioners sugar	Erythritol
Ascorbic acid	Corn alcohol, corn gluten	Ethanol
Aspartame (Artificial sweetener)	Corn extract	Ethocel 20
Astaxanthin	Corn flour	Ethylcellulose
Baking powder	Corn oil, corn oil margarine	Ethylene
Bleached flour	Corn starch	Ethyl acetate
Blended sugar (sugaridextrose)	Corn sweetener, corn sugar	Ethyl alcohol
Calcium citrate	Corn syrup, corn syrup solids	Ethyl lactate
Calcium fumarate	Corn, popcorn, cornmeal	Ethyl maltol
Calcium gluconate	Cornstarch, cornflour	Fibersol-2
Calcium lactate	Crosscarmellose sodium	Flavorings*
Calcium magnesium acetate (CMA)	Crystalline dextrose	Food starch
Calcium stearate	Crystalline fructose	Fructose
Calcium stearoyl lactylate	Cyclodextrin	Fruit juice concentrate*
Caramel and caramel color	DATUM (a dough conditioner)	Fumaric acid
Carbonmethylcellulose sodium	Decyl glucoside	Germ/germ meal
Cellulose microcrystalline	Decyl polyglucose	Gluconate
Cellulose, methyl	Dextrin	Gluconic acid
Cellulose, powdered	Dextrose	Glucono delta-lactone
		Gluconolactone



Hidden Corn Derivatives (continued)

Glucosamine	Lecithin	Mono- and di- glycerides
Glucose	Linoleic acid	Monosodium glutamate
Glucose syrup	Lysine	MSG
Glutamate	Magnesium citrate	Natural flavorings
Gluten	Magnesium fumarate	Olestra/Olean
Gluten feed/meal	Magnesium stearate	Polenta
Glycerides	Maize	Polydextrose
Glycerin	Malic acid	Polylactic acid (PLA)
Glycerol	Malonic acid	Polysorbates (e.g. Polysorbate 80)
Golden syrup	Malt syrup from corn	Polyvinyl acetate
Grits	Malt, malt extract	Potassium citrate
High fructose corn syrup	Maltitol	Potassium fumarate
Hominy	Maltodextrin	Potassium gluconate
Honey	Maltol	Powdered sugar
Hydrolyzed corn	Maltose	Pregelatinized starch
Hydrolyzed corn protein	Mannitol	Propionic acid
Hydrolyzed vegetable protein	Methyl gluceth	Propylene glycol
Hydroxypropyl methylcellulose	Methyl glucose	Propylene glycol monostearate
Hydroxypropyl methylcellulose phthalate (HPMCP)	Methyl glucoside	Saccharin
Inositol	Methylcellulose	Salt (iodized salt)
Invert syrup or sugar	Microcrystalline cellulose	Semolina (unless from wheat)
Iodized salt	Modified cellulose gum	Simethicone
Lactate	Modified corn starch	Sodium carboxymethylcellulose
Lactic acid	Modified food starch	Sodium citrate
Lauryl glucoside	Molasses (corn syrup may be present)	



Hidden Corn Derivatives (continued)

Sodium erythorbate	Vanilla, pure or extract
Sodium fumarate	Vanillin
Sodium lactate	Vegetable anything that's not specific
Sodium starch glycolate	Vinegar, distilled white
Sodium stearoyl fumarate	Vinyl acetate
Sorbate	Vitamin C* and Vitamin E
Sorbic acid	Vitamins
Sorbitan (anything)	Xanthan gum
Sorbitol	Xylitol
Sorghum* (not all is bad; the syrup and/or grain CAN be mixed with corn)	Yeast
Splenda (Artificial sweetener)	Zea mays
Starch (any kind that's not specified)	Zein
Stearic acid	
Stearoyls	
Sucralose (Artificial sweetener)	
Sucrose	
Sugar (not identified as cane or beet)	
Threonine	
Tocopherol (vitamin E)	
Treacle (aka golden syrup)	
Triethyl citrate	
Unmodified starch	
Vanilla, natural flavoring	

Whole versus Processed Foods

One of the goals of *Food Chemistry* is to inspire campers to eat more whole foods and less processed foods. We define whole foods as unprocessed foods that come from plants and animals: fruits, vegetables, whole grains, milk, legumes, lean meats, poultry, and fish. Processed foods are those that have added sugar, fat, salt, preservatives, colorings, and additives. Obesity rates are increasing throughout the nation due in part to increased consumption of processed foods. Diets high in processed foods put consumers at an increased risk for developing high blood pressure, high cholesterol, diabetes, heart disease, and even some forms of cancer.

“Eating real” means eating whole foods that haven’t been highly processed thus eliminating the strain processing puts on the environment and our bodies. Sometimes some processing is beneficial such as grinding corn to make corn meal or dehydrating grapes to make raisins. We also process foods when we cook them and season them. Processing food allows us to diversify our food choices and enjoy a wide range of foods prepared in a variety of ways.

However, too many of the foods available in our grocery stores and corner markets are overly processed in dangerous ways. These foods have been so processed that they are sometimes unrecognizable from their original plant and/or animal form. Other processed foods have ingredient lists a paragraph long including all sorts of unpronounceable preservatives, fillers, and additives. In fact, processed foods are specifically engineered to be irresistible and contain excessive amounts of sugar, fat, and salt. We encourage you to speak with campers throughout the week about the foods they choose to eat at home, at school, and while snacking. Many of us eat overly processed foods without a second thought. Our hope is that by introducing campers to the idea of “eating real” they will start to think more about what they choose to eat and adapt healthier eating habits.



All About Worms

.....

Materials

In Guide:

- **How to Build a Worm Bin** lesson resource p. 115
- **Decomposition 101** lesson resource p. 117
- **Red Wiggler Anatomy** lesson resource p. 118
- **Setting Up the Worm Bin** lesson resource p. 119
- **Care and Feeding of a Worm Bin** lesson resource p. 120
- **What Can We Compost?** lesson resource p. 120
- **Compost Bin Data Log** activity sheet p. 122
- **Red Wiggler Relay Race** lesson resource p. 123
- **Build your own Worm Bin** activity sheet p. 124
- **How to Harvest a Worm Bin** lesson resource p. 125

Other Materials:

- 1 pre-made worm bin
- 1 lb. Red Wiggler worms
- 2-3 newspapers
- Water source
- 3 spray bottles
- Food scraps (1/2 lb.)
- 5 gallon bucket
- Magnifying glass 1 per camper
- Petri dish 1 per camper
- Paper towels
- i2 journals and pencils 1 per camper

Overview

In this activity campers learn about and experience vermicomposting, the practice of using worms to convert dead organic matter into nutrient-rich humus. Campers learn about the detritus food chain and learn that in nature there is no waste. Campers think about how things in nature interact with each other and how in nature everything is connected. Next, campers learn that by composting food scraps we not only limit the amount of waste produced but also improve the quality of soil. They discover the anatomy of the worm and identify its different parts. Campers build a worm bin and learn how to successfully compost.

Objectives

Campers will be able to:

- explain the process of vermicomposting;
- identify the materials needed for and the process of constructing a worm bin;
- describe how to successfully care for a worm bin;
- identify the basic anatomy of a worm; and
- discuss the role worms play in the detritus food.

Before You Begin:

- Review lesson plan and all in guide materials.
- Prepare worm bin using the **How to Build a Worm Bin** lesson resource.
- Prepare copies of **Build your own Worm Bin** and **Compost Bin Data Log** activity sheets for each camper.
- Prepare the **Red Wiggler Anatomy** lesson resource for projection.
- Print **What Can We Compost?** lesson resource to hang by finished bin.

Clues collected:

- *How to Build a Worm Bin* activity sheet
- *Compost Bin Data Log* activity sheet
- Drawing of worm anatomy

1. Introduce the Case

Introduce campers to their next food detective case, **All About Worms**. Have campers share what they had for lunch. *Did you eat all of it? What did you do with the food scraps? Have you ever cooked? Do you have food scraps when cooking? What do you do with them?*

2. Identify Waste in Nature

Ask campers where they think waste goes in nature. Some questions to guide this conversation are: *What happens to leaves when they fall off the trees? What happens when an animal or plant dies in the woods?*

Ask campers if they have ever heard of decomposition. Decomposition is a part of detritus food chain. Ask campers if they have ever heard of the food chain. Review decomposition with campers using the **Decomposition 101** lesson resource as needed.

Be sure to review that in the detritus food chain there are scavengers, detritivores, and decomposers. Ask campers: *What do you think the scavengers do? How about the decomposers?*

Explain that worms, as well as all decomposers, play an important role in the human food system.

3. Discover Red Wiggler Worm Anatomy

Explain to campers that to better understand the role worms play in the detritus food chain they are going to build their own worm compost bin. Before building the bin, campers first examine the worms using magnifying glasses. Using the **Red Wiggler Anatomy** lesson resource projected on the board, review the anatomy of a worm. Tell campers that everyone who wants to will get to hold a red wiggler worm.

Before passing out worms to each camper, remind them that worms are living creatures and to handle them with care. Distribute a magnifying glass and a petri dish with a wet paper towel and a worm in it to each camper. *Why do we need the wet paper towel?*

4. Examine the Worms:

Have campers identify the parts of the worm's anatomy. Have campers draw and label the parts of the worm in their i2 journals. As campers examine the worms, have them reflect on the following questions:

How does the worm feel to the touch?

What does the worm do when you touch it gently?

Which end is the head and which end is the tail? How can you tell?

Can you see the worm's mouth and eyes?

How does the worm move?

Does the worm have an odor?

What color is the worm and does it have any markings?

Can you see through the worm? If so, what do you see.

After discussing the questions with campers, collect the worms.

5. Create the Proper Environment for the Worms

Have campers share what living creatures need to live (air, water, food, shelter). Explain to campers that the worm bin will provide a home for the worms and a place where campers can compost food scraps. Have campers think about where they might find worms in nature. *What kind of habitat would a worm like? A place with lots of sunlight or a dark place, a place that is moist or a place that is dry?* In their natural habitat, Red Wigglers live under lots of moist bedding, like leaves. Ask campers, *what can be used in an indoor compost bin to simulate the worms natural habitat?* Like all living things, worms grow and live best when the conditions are just right. Worms like the dark. Sunshine dries worms out and can kill them.

6. Set Up a Worm Bin:

It is time to set up the worm bin. Show campers the worm bin that has been prepared ahead of time. Ask campers, *why do you think we drilled large holes along the sides of the bin?*

Review all the materials needed to make the worm bin with campers and assign campers tasks using the *Setting up the Compost Bin* lesson resource. Complete the worm bin set up. Review the *Care and Feeding of a Compost Bin* and *What Can we Compost?* lesson resources with campers and explain how as a group, you will take care of the worms. Hang the *What Can We Compost?* lesson resource by the finished worm bin.

7. Compost Bin Data Log

Now that the worm bin is complete introduce campers to the *Compost Bin Data Log* activity sheet. This will allow campers to stay organized as they care for the worms all week. Have campers fill in information pertaining to what they completed today.

Get Up & Move!

If there's time and space, set up and play the Red Wigglers Relay Race using *Red Wigglers Relay Race* lesson resource.

8. Close the Case

Remind campers that we will be feeding the worms for the remainder of camp. This worm bin will stay at i2 for the duration of camp. Ask campers to think of other places and other people who may be able to utilize a worm bin (schools, families, cafeterias, office buildings, farms) and the pros and cons of having a compost bin in these different settings.

How to Build a Worm Bin

Making a Worm Bin

When building an indoor compost bin there are several questions to ask: Do you want to have a plastic or wooden bin? What size bin do you want? Where is the bin going to go? The advantage to using wooden bins is that they “breathe,” which makes maintenance easier. However, wood is expensive and it is harder to make a wooden bin than to modify a plastic one. Unless you are a woodworker or know someone who is, try the plastic bin. The dimensions are the same, as is the placement of the holes on the sides and in the bottom.

Note: If you prefer to purchase a compost bin, visit the National Gardening Association’s Gardening with Kids online store (www.kidsgardening.org).

Find a spot for your compost bin where the temperature range is 40° to 85°F. Red Wiggler worms thrive in temperatures that range from 55° to 77°F. Be sure to keep the compost bin away from any heating unit. The worms will die if the compost gets too hot. If possible, keep a thermometer in the bin to monitor the temperature. The process of decomposition generates heat, so the compost will be warmer than the classroom.

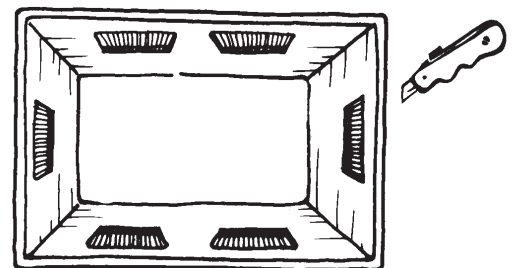
Materials

- Durable, polyethylene storage bin, 18 gallon with tightly fitting lid
- Fiberglass screening (about 2 square feet)
- White glue or glue gun with glue sticks
- Candle or gas burner
- Heat resistant work gloves
- Power drill with a door knob drill bit (optional)
- Heavy duty utility knife
- Permanent marker
- 30”x 30” square piece of 1/2” metal screening with edges taped to prevent injury (used as castings filter screen when ready to harvest)

To Prepare the Bin

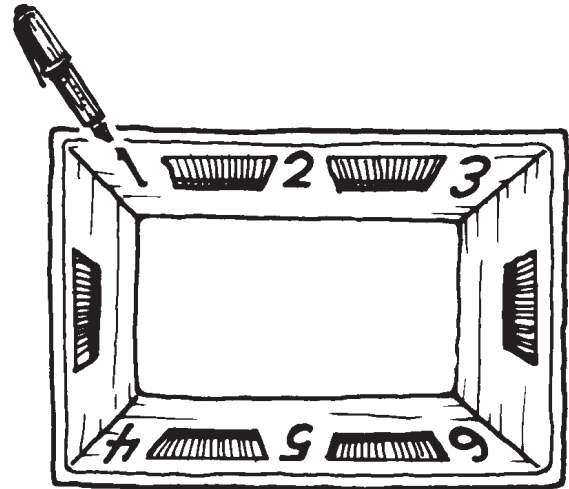
These steps should be done ahead of time without the campers.

1. Wearing heat resistant work gloves, heat the heavy duty utility knife over a candle or gas burner.
2. Using the heated knife cut 6 holes, about 2 in x 3 in, on the sides near the top of the bin. Make 2 squares on the long sides, and one on each short side. These holes in the side let air get into the bin (see image on right). If using a power drill with a door knob bit, make 6 round holes around the top.



How to Build a Worm Bin (continued)

3. Cut fiberglass screening into 6 different squares large enough to cover the holes on the sides of the bin. Using glue, cover the holes on the side of the bin with the fiberglass screening. Use ample glue to really make a seal at the edge of the screening.
5. (Optional) Use the permanent marker to number the inside walls of your compost bin (see image on right). This will help you keep track of where you put food in the bin each week. You can add food to one numbered section each week.
6. Your bin is now complete and ready for worms! To purchase Red Wiggler worms check at local gardening or compost facilities. You also can purchase them from the National Gardening Association's Gardening with Kids online store at www.kidsgardening.org. You will need one pound of red wiggler worms for your box.



Decomposition 101

Detritus Food Chain

When people think of the food chain they often think of plants and animals, producers and consumers. Plants are producers. They make their own food through photosynthesis. Animals are consumers. Consumers forage or hunt to find their food eating producers along the way. But plants and animals are not the only members of the food chain because within this system, waste is produced. The detritus food chain is what takes care of all the organic waste: dead animals, dead plants, and animal waste. All this organic waste is a vital source of nutrients that needs to be returned to the life cycle. The detritus food chain is comprised of many creatures divided into scavengers, detritivores, and decomposers.

Scavengers eat dead plants and animals and help break them down into smaller pieces. Animals like crows, vultures, and cockroaches are scavengers.

Detritivores are multicellular organisms like worms and insects that eat decomposed plants and animals. Through a variety of anatomical and physiological processes they break up and shred organic matter, which they consume as food.

Decomposers are organisms like fungi and bacteria. They don't have mouths to digest their food; instead they get energy from chemicals they absorb from decaying organic matter.

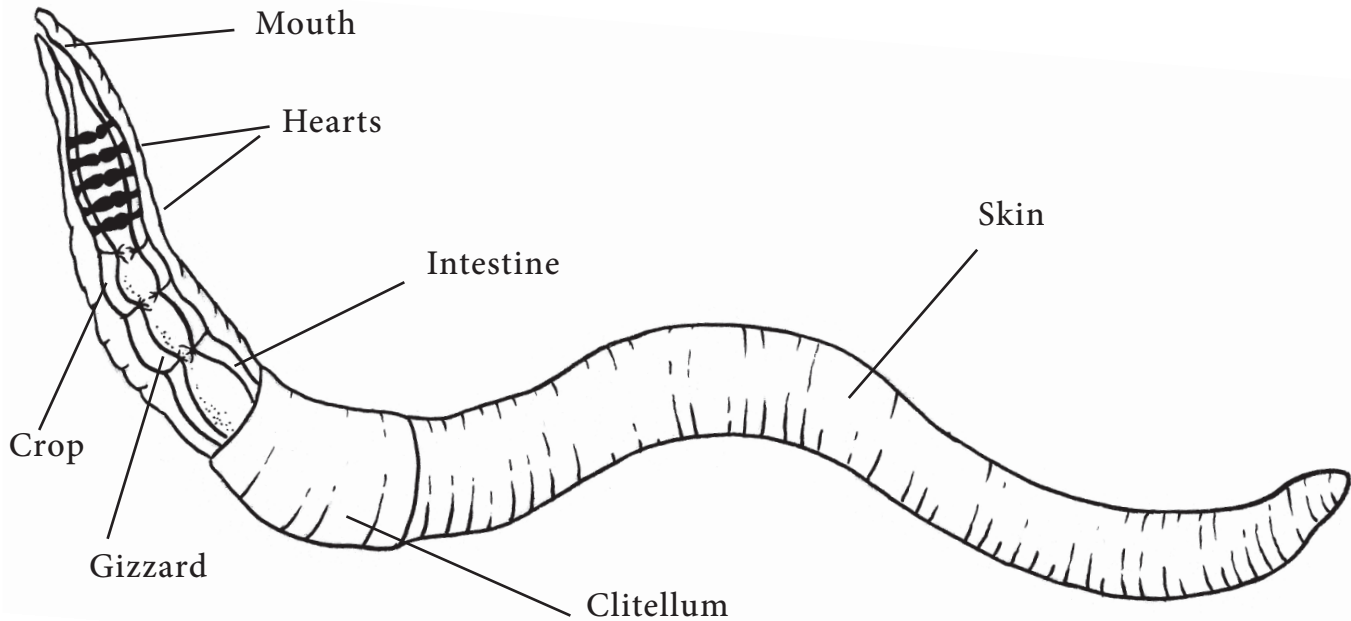
This breakdown or decay of organic materials by scavengers, detritivores, and decomposers is called decomposition. The detritus food chain ensures that there is no waste in nature.

Vermicomposting

All organic material begins to decompose when it dies. Using worms in a process called vermicomposting can use decomposing or decaying matter (like rotting food) to enrich and add nutrients to soil. Vermicomposting is a hands-on, engaging way to teach campers about decomposition. Worms and microorganisms convert organic matter into nutrient-rich humus, a term used to describe organic matter that cannot break down any further. Worms consume decaying matter, which provides energy to the worm. What they do not digest is excreted into castings, or worm excrement. Castings are nutrient rich and help air and water permeate the soil while boosting the nutrient content of the soil.

Did you know there are at least 4,000 species of worms worldwide? Red Wiggler worms are specifically used for vermicomposting. Red Wigglers are epigeic meaning they like to live at the surface of freshly decaying plant and animal residues. Even though these worms can eat animal products, you will not be using any animal products in your worm bin. Animal products in a worm bin can cause odors and attract undesirable pests. Red wigglers can live in a wide range of temperatures. They eat, grow, reproduce, and survive best in temperatures between 55° to 77°F. A worm can live for a few weeks to one year.

Red Wiggler Anatomy (*Eisenia fetida* is the scientific name)



Mouth: Red Wiggler worms eat food scraps and other plant materials. Worms do not have teeth. Microorganisms and moisture break down organic matter in the worm bin, and worms suck in microorganisms and bits of organic matter.

Hearts: Red wiggler's have five "hearts." These hearts are actually five pairs of large blood vessels. Blood travels through the body and brings oxygen to all the parts of the worm.

Crop: Food travels from the mouth to the crop where it is broken down into smaller pieces. Sometimes food is stored in the crop.

Gizzard: Food passes into the gizzard from the crop, where it is broken down into even smaller pieces. The gizzard is made of strong muscles that act like teeth. Sand in the gizzard helps grind the food.

Intestine: Food passes into the intestine from the gizzard, where digestion is completed. The worm gets nutrients and energy from the digested food. The worm excretes the undigested food as waste. This waste, also called castings, is what makes up compost.

Clitellum: Red Wigglers reproduce quickly, so there are always plenty of worms. The clitellum plays an important function in reproduction. This band hardens and forms a cocoon that the worm slides over its head. Each cocoon can hold up to 20 fertilized eggs. After about three weeks, the eggs hatch.

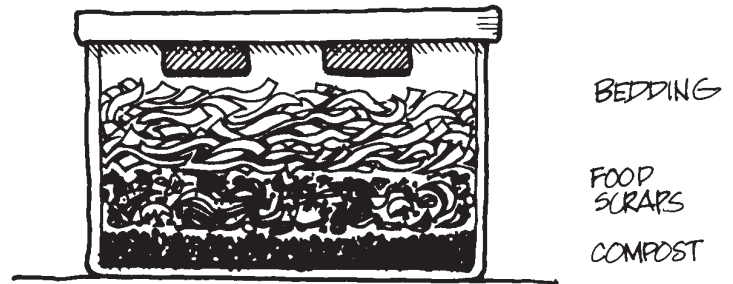
Skin: worms breathe through their skin, instead of through lungs or gills. They require a moist environment for the exchange of air to take place. Have you ever seen worms on top of the ground during a rainstorm? They are trying to get to a dryer place. It can't be too dry, though. If it is, the worms will dry out and die.

Images used with permission from Teachers College Columbia University *Growing Food* book of the *Linking Food and the Environment* LIFE curriculum series

Setting up a Worm Bin

Materials needed:

- Previously prepared worm bin
- Newspaper
- Scissors
- Water source
- 1 quart measuring cup
- Food scraps, 1 -2 handfuls
- Fallen leaves
- Scale for weighing food scraps



Creating a Compost Bin “Habitat”

1. Shred enough newspaper to fill the bin. To shred the paper, fold two large sheets in quarters and tear lengthwise (with the grain of the paper) into 1/2” strips.
2. Place shredded newspaper in the bin. The bin needs to be almost completely full. Shred more newspaper if need be.
3. Add some dried, fallen leaves that has been in contact with soil underneath the newspaper.
4. Pour two to three quarts of water over the top of the paper. Mix and fluff the paper so it is evenly wet and air can circulate around it. Remind campers that worms need moisture to help them breathe so it is important that the newspaper always remains moist. In the future they will use a spray bottle to moisten the bedding if it becomes dry.
5. Scoop the bedding to one side, gently place half of the worms on one side of the bin, cover them with bedding. Gently place the other half of worms on the other side of the bin, cover them with bedding.
6. Lastly, weigh and add 1 handful of food scraps to each side of the bin underneath the bedding. It is important to keep all food scraps buried deep within the bedding so the worms can access it and also to keep pests and fruit flies away.

A Note about Moisture

Shredded newspaper mimics a Red Wiggler’s natural habitat. It holds water well and is easy to keep fluffy so air can circulate, decreasing the chance of bad odors. Water provides the moisture that worms need to survive. Monitor the moisture in the bin carefully. If the compost bin gets too wet, the worms will crawl up the side to escape from the water. If it’s too dry, the worms will clump together in a ball to share moisture. They will eventually dry out and die.

Care and Feeding of a Compost Bin

Food Scraps

On average, Red Wiggler worms can eat half their body weight in one day. If you have 1 pound of Red Wigglers you can feed them about 1/2 pound of food a day. When starting a new bin it is best to not over feed the worms until they are adjusted to their new home. After 2-3 days the worms should be adjusted and evenly distributed throughout the bin. Once this happens, the worms can be fed every few days. Cut food scraps as small as possible before feeding them to the worms. This will allow the food scrapes to rot faster which will encourage the worms to eat more and compost faster. Always remember to bury your food scraps under the bedding so the worms can find it and to prevent pests.

Water

Monitor the moisture of the bedding on the top of the bin. If it seems dry, use a spray bottle to spray water on the top layer of newspaper bedding. Carefully fluff the newspaper to distribute the moisture and allow air to circulate. Do not directly pour water into you bin. If you pour water onto the paper, most of it sinks to the bottom of the box. This makes the compost very thick and hard to harvest and may drown the worms.

Bedding

To maintain a 4”–6” layer of bedding, add shredded newspaper once every week or two. Moisten the newspaper in a large bucket or sink before you put it in the bin. This helps prevent water from accumulating at the bottom of the bin.

Harvesting your Compost

Worm castings need to be harvested every 3–4 months to keep the worm population healthy. Use the castings as a top dressing on potted plants, flower beds, street-tree pits, in gardens, or mix them with potting soil and use the mix as a seed-starting medium. It's important to harvest the castings, as they can become toxic to the worms over time. There are many methods to harvesting a worm bin and with time you will identify the method that works best for you. We have outlined two harvesting methods in the *How to Harvest Your Worm Bin* lesson resource.

Worm Handling Tips

To hold a worm, gently pick it up with one hand. Be careful not to squeeze too hard! Place the worm in the palm of the hand. Worms will vary in activity level; some will wiggle and move while others will remain still. Remember, worms don't like light so if campers are looking at them for a long period of time, the worm will begin to feel stressed. Lastly, worms are not solitary creatures. Removing a worm from its habitat would be stressful to the worm.

What can we compost?

Yes

- Raw vegetable trimmings
- Coffee grounds and filters
- Tea bags
- Finely crushed eggshells
- Used paper towels and napkins
- Trimmings from healthy house plants and flowers
- Dried leaves or mulch that have some soil on them

If you are new to composting and want to make sure your compost bin does not develop odors or attract bugs, only add items from this list.



Maybe

- Raw fruit scraps
- Cooked vegetables and fruit

These foods can cause odors, create conditions where mold will grow, or attract bugs. If you microwave these foods for one minute on high, or freeze them, it will reduce the possibility of attracting bugs. Thaw before using.



No

- Animal products
- Anything greasy
- Grains, beans, or breads
- Feces from dogs, cats, or birds
- Wood chips

These items can cause odors and attract bugs and rodents.





Camper:

Compost Bin Data Log

In order to keep your compost bin organized you will keep a Compost Bin Data Log. Be sure to add information daily as you learn to care for your worms.

Date bin was set up: _____

Weight of worms added to bin: _____

Number of campers adding food scraps on a regular basis: _____

Date	<i>Weight of food added</i>	<i>Type of food added</i>	<i>Notes</i>

Red Wigglers Relay Race

Set Up:

1. Designate a large space to set up the relay race. On one end of the space identify a “start line.” On the other end of the space identify a “finish line.”
2. Place the two buckets on the finish line.
3. Divide the class into two teams. Position the teams in two single-file line at start line.
4. Place several pom-pom balls on the start line. They should be placed in the middle so each team can easily access them.
5. Give the person at the head of each line a pillow case.
6. Two teaching assistants stand next to each bucket on the finish line.

Materials:

- A large space
- Two buckets (represent flower pots)
- Pom-pom balls (represent nutrients)
- Two pillow cases (optional)

Note: You can use any found materials in your classroom to play this game

How to play:

The first campers in line stand inside their pillowcases, they are now “red wiggler worms”. When the facilitator calls “go”, the campers grab a nutrient (pom-pom ball) and race towards their plant (bucket). When the camper reaches his or her plant they are asked a question. If they get the question correct they deposit their nutrient in their plant and race back to their team in order to hand the laundry sack off to the next camper. If the camper get the question wrong they do not deposit a nutrient and returns to their team so that the next camper may go. Play continues until all campers have had the chance to answer at least one question. The team with the most nutrients in their plant wins!

Examples of questions:

How do worms breathe? (through their skin)

What type of worms are we using for our worm bin? (red wigglers)

Name two items that worms like to eat? (any fruit or veggie)

Name two items we CANNOT put in the worm bin? (meat, dairy, fats)

What part of the food chain are worms a part of? (detritus food chain)

People often say that “worm poop” is the final product in vermicomposting but we know that “worm poop” is really called? (castings)

When organic matter dies it begins to _____? (decompose)

Name two parts of the worms anatomy we discussed (anus, segments, setae, clitellum, and mouth).

Do worms have teeth? (no)

Describe the type of environment worms like to live in. (dark and moist)



Camper:

Build Your Own Worm Bin

Materials

- Plastic bin (about 18 gallons 24" x 16.5" x 15.9") with tightly fitting lid
- Fiberglass screening (about 2 square ft.)
- White glue or glue gun
- Candle or gas burner
- Utility knife
- Permanent marker
- Newspaper
- Food scraps
- Red Wiggler worms

What do worms like to eat?

Add up to ½ pound of food per day.

Yes

- Raw vegetable trimmings
- Coffee grounds and filters
- Tea bags
- Finely crushed eggshells
- Used paper towels and napkins

Maybe

- Raw fruit scraps
- Cooked vegetables and fruit

No

- Animal products
- Anything greasy
- Grains, breads, beans

Make sure you have an adult present

1. Heat a utility knife. Cut 6 squares, about 2" x 3", on the sides near the top of the bin. Make 2 squares on the long sides, and one on each short side. These holes in the side let air get into the bin.
2. Cover the holes on the side of the bin with the metal screening. Glue the screen with white glue or a glue gun. Use ample glue to really make a seal at the edge of the screening.
3. Purchase Red Wiggler Worms. You will need one pound of red wiggler worms for your box. Check for red wigglers at local gardening or compost facilities. You also can purchase them from the National Gardening Association's Gardening with Kids online store (www.kidsgardening.org).
4. Fill the bin with shredded newspaper so that the bin is almost completely full. Pour two to three quarts of water over the top of the paper. Mix and fluff the paper so it is evenly wet (like a wrung out sponge) and air can circulate around it. Make sure there is no water left in the bottom of the bin
5. Scoop some of the bedding to one side of the bin and add a handful of soil. The soil will introduce other microorganisms into the habitat that will be beneficial.
6. Gently place half the worms on one side of the bin, cover them with bedding. Gently place the other half of worms on the other side of the bin, cover them with bedding.
7. Lastly, add the food scraps underneath the bedding. It is important to keep all food scraps buried deep within the bedding so the worms can access it and also to keep pests and fruit flies away.

Note: Keep newspaper bedding moist by spraying it with a water bottle. Do not pour water directly on the newspaper because it will sink to the bottom of the bin making the finished worm castings and the bin environment too wet. Add more shredded newspaper as needed, the bin should always be almost full of paper. Remember to moisten newspaper every time you add more.



How to Harvest your Worm Bin

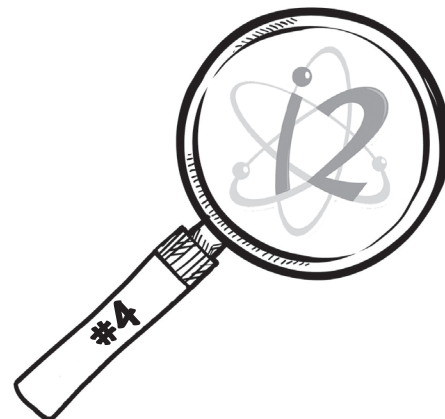
Harvesting means removing the finished compost from the bin. Worms need to be separated from their castings which, at high concentrations, create an unhealthy environment for them. As you feed and care for your worm bin you will notice with time a change in bedding to compost ratio. When it is time to harvest there will be more compost than bedding in the bin. A healthy, active bin will be ready to harvest in 3-5 months. There are two harvesting methods to utilize depending on how much time you have, how many people you have to help, and how hands-on and messy you want to get! Method 2 is preferred when working with kids.

Method 1: Less mess, more time!

1. Do not add new food to the bin for two weeks. After two weeks push all of the worm bin contents to one half of the bin, removing any large pieces of undecomposed food or newspaper.
2. Put fresh food scraps in empty side of bin and cover with fresh bedding.
3. Feed the bin on the freshly bedded half for 2-3 weeks. The worms will move over to the new side (where the food is), conveniently leaving their compost behind in the old section. To encourage your worms to move to the freshly bedded side cover only the new side of the bin with bedding. This will cause the old side to dry out, thus encouraging the worms to move to the new side.
4. When the majority of your worms have migrated to the new side of the bin remove the compost from the old side of the bin. Check for any worms that may not have migrated and return them to the bin. The compost is now ready to use. You may choose to use a filter screen to help sort finished compost. Place compost on a screen. Gently shake the screen from side to side. Run your hand gently through the compost encouraging it to fall through the screen. Anything that doesn't go through the screen gets put back in the bin. Don't forget to add more food scraps and bedding to the freshly harvested bin so the worms will spread out and use both sides of the bin again.

Method 2: More mess, less time!

1. Do not add new food to the bin for two weeks. Spread a tarp out on a flat surface. Dump the entire contents of the worm bin onto the tarp.
2. Separate the bin contents into piles of compost, worms, undecomposed food scraps, and bedding. If working with children you might divide up the bin contents so each child has a small pile to harvest. Each pile will contain worms, compost and undecomposed food and bedding. If you are harvesting in a well lit space only make two piles: one with finished compost and one with worms, undecomposed food and bedding. Remember worms are light sensitive. They will move to the bottom of the pile where it is dark and moist.
3. Continue sorting the finished compost until nothing remains of your pile but a collection of worms. Collect the worms and put them back in their bin. Add fresh, moistened bedding and food scraps.



Cooking 101

.....

Materials

In Guide:

- *i2 Cooking Safety and Sanitation* poster p. 130
- *Hand Washing* poster p. 131
- *i2 Cooking Safety and Sanitation Norms* cooking resource p. 132
- *How to Properly Wash Produce* cooking resource p. 134

Other Materials:

- Dry measuring spoons
- Dry measuring cups
- Liquid measuring cups
- Camper knife 1 per camper
- Cutting board 1 per camper
- Fresh produce

Overview

In this lesson campers review the i2 cooking safety and sanitation norms. Campers are introduced to the i2 kitchen classroom which consists of cooking stations, the “hot-zone”, and the shared ingredient station. Also campers review common household measuring cups and spoons and learn techniques for how to properly measure wet and dry ingredients.

Objectives

Campers will be able to:

- list the i2 cooking safety and sanitation norms;
- demonstrate proper measuring techniques; and
- demonstrate safe produce washing practices.

Before You Begin:

- Review lesson plan and all in guide materials.
- Using a copy machine, enlarge and print the *i2 Cooking and Sanitation* and *Hand Washing* poster to 11” x 17” and hang in your cooking area. Ideally, if your classroom has a sink in it, hang the *Hand Washing* poster over the sink.
- Identify areas in the classroom for at least two cooking stations, a “hot zone,” and the shared ingredient station.

Clues collected:

- *i2 Cooking and Safety Sanitation* poster for class
- *Hand Washing* poster for class

1. Introduce the Case

Introduce campers to the cooking component of *Food Chemistry*. Each day campers will learn food chemistry principles and prepare recipes featuring whole, minimally processed foods. Explain to campers that they will be introduced to a variety of foods and recipes that are healthy for them and the environment.

2. Explain Cooking Safety and Sanitation

Draw campers' attention to the *i2 Cooking Safety and Sanitation* and *Hand Washing* poster. Explain that cooking safety and sanitation are very important as we do not want anyone to get cut, burned, hurt in any way, or sick. Review each point on the poster by using the *i2 Cooking Safety and Sanitation Norms* lesson resource.

3. Discuss Respect in the Kitchen

Campers are very aware of their social environment and are impressionable to the opinions of others in the social group. The kitchen, like the classroom, should be a place of respect and trust.

Discuss that some campers may have more cooking experience than others. This is a time for everyone to learn and to help support each other. Explain that in the kitchen they are chefs and food chemists! Encourage campers to use descriptive language to describe foods they try. Simply calling a food "good" or "gross" does not say anything. When something tastes good, campers need to think about why it tastes good in order to describe it. Explain that it takes real thinking to put the taste of something into descriptive language. When something does not taste good, also think about why. How can the recipe be adjusted to make it taste better?

Food is intrinsically tied to culture. Sharing foods together is sharing in each others diversity. Take the time to discuss cultural food differences. Remind campers that taste is developed over time and through multiple taste exposures.

4. Review Kitchen Equipment

Introduce campers to incremental measuring cups and spoons. Demonstrate how to measure both wet and dry ingredients. Show campers how to properly use a knife and how to "cut with a claw."

5. Demonstrate Proper Washing

Stress the importance of proper hand washing to campers. Demonstrate how to wash your hands using warm water and soap. Using the *How to Properly Wash Produce* cooking resource discuss the importance of food

safety with campers. Show campers how to properly wash produce. Explain to campers that all hands and produce must be washed before use.

6. Introduce Stations

Explain to campers that for each cooking case, they will be divided into two cooking groups and each group makes the recipe(s). Within their groups, campers can select their own roles for executing the recipes. Explain that each day cooking stations will be set up with some of the ingredients needed. Other ingredients will be found at a “shared ingredient station” as these ingredients will be shared by everyone. Show campers the “shared ingredient station.” The “Hot Zone” is the area in the classroom where teachers will be cooking foods using induction burners and toaster ovens. This area is off limits to campers unless instructed by a teacher to enter the “Hot Zone.” Show campers where the location of the “Hot Zone” is.

i2 Cooking and Sanitation Poster

1. Be aware of people and equipment around you
2. Cut with a claw
3. Saw to slice
4. Turn down the heat
5. Don't yuck someone else's yum
6. Talk the talk
7. Try anything twice
8. Keep the bugs at bay

Hand Washing Poster

Proper hand washing involves the following steps:

1. Wet your hands with clean running water (warm or cold) and apply soap. Don't leave water running, remember we want to teach the campers about good health for them and the planet.
2. Rub your hands together to get a good lather for at least 20 seconds. If you need a timer, hum the "Happy Birthday" song from beginning to end twice.
3. Rinse your hands thoroughly under running water.
4. Dry your hands with a clean towel.

i2 Cooking Safety and Sanitation Norms

1. Be Aware of People and Equipment Around You.

Safety is the number one priority when cooking with campers in the classroom. There are lots of people, equipment, and activities going on in a kitchen. Assign designated areas in the classroom that will serve as cooking stations, shared ingredient stations, “Hot Zone,” a dirty dish area, and washing and drying areas. Make sure campers know where these designated areas are in the classroom. Campers must walk, not run, in the kitchen. Campers must be mindful of their bodies, their classmates bodies, and the cooking spaces.

2. Cut with a Claw.

Using proper cutting techniques are essential to kitchen safety. Campers have different experiences and comfort when working with knives. The knives used at i2 are plastic knives appropriate for use by children. The knives are serrated and work best when used in a saw-like fashion. Even though the knives are plastic, they are still capable of causing injury. It is important to teach campers proper cutting technique to make sure everyone remains safe.

Using the dominant hand, hold the knife firmly with fingers wrapped around the handle. The thumb and index knuckle should rest firmly on either side of the top of the blade. The non-knife hand is called the guiding hand and its job is to hold the food in place and keep it from moving. When cutting, ensure that the fingers of the guiding hand are curled inwards so that the fingertips are tucked away, while still being able to hold the food firmly. This is known as a “claw” grip and should be used by campers at all time.

3. Saw to Slice.

With the guiding hand firmly in the “claw” grip, use a sawing motion to cut foods. Campers should not use the knives to “chop” foods. Campers have less control with the knife when used as a chopping tool. Chopping not only sends pieces of food flying, but it creates a safety concern for the camper using the knife as well as those nearby.

4. Turn down the Heat.

In the kitchen there are many hot surfaces including hot plates, pots, and toaster ovens. The “Hot Zone” in the i2 classroom is the designated area where teachers will be cooking. Campers should not be in the “hot zone” unless instructed. When working around hot elements it is important to take special care. All pot handles should always be turned inwards on the stove. Foods taken out of and put into the toaster oven should always be done with oven mitts. Notify campers and other staff members when a hot pan is cooling on a flat surface. Wet hands should never be used to unplug appliances.

Along with hot surfaces, tempers can also get “heated” in the kitchen. Cooking is not just about eating but about teamwork and community building as well. Campers will have to work together in order to get a shared meal on the table. It is important that everyone stays cool, calm, and respectful in the kitchen. Remind campers that they all have different cooking backgrounds and experiences that need to be respected. Remember, there is no one right way to cook. If campers are getting heated (stressed), encourage them to take a deep breath and maybe even take a break to cool down.

i2 Cooking Safety and Sanitation Norms (continued)

5. Don't Yuck Someone Else's Yum:

If campers are expressing dislike for foods, it may discourage others from enjoying those foods as well. We want campers to feel comfortable trying new foods, as well as to be sensitive to foods that are enjoyed by others. Words like “nasty” or “yucky” are not helpful when describing a food and should be discouraged from use in the classroom. Campers should learn to express their opinions constructively. For example, if a camper does not like something have him or her think about how they would change the recipe to be more pleasing to his/her taste preferences. Similarly, a camper who makes a disgusted face after trying a new food does not build respect in the kitchen and may influence other people's opinions about the food.

6. Talk the Talk:

Campers should be able to describe what they made and why they liked it to someone else. Words like “yummy” or “nice” do not tell much about the food and why it tastes good. Words like “salty,” “crunchy,” and “mushy” better describe the food. Encourage campers to use the *Descriptive Words* activity sheet in **Case 5 Cooking to Eat Real** to help describe the foods they are tasting.

7. Try Anything Twice:

Not all campers will like everything that is made at camp. However, campers should at least try everything that is made at least once, ideally twice. Explain that the first time you take a bite of something it's all about the anticipation, “will I like it?” With the second bite campers can better appreciate the flavor and experience. Encourage campers to try everything even if they already express preconceived ideas about whether they will like it. Campers may try a food prepared one way and not like it but then try it again prepared another way and love it. Encourage campers to be open minded and adventurous, trying new foods is fun and enlightening. Remember, it's impossible to know if they like something if they don't try it.

8. Keep the Bugs at Bay:

Cleanness in the kitchen keeps everyone safe. Make sure all campers and teachers carefully wash hands with soap and warm water before they start handling food and after they touch anything on their body (hair, nose, ears) or in the classroom. Review proper hand washing techniques with all staff and campers. If you have to sneeze or cough do so into the inside of your elbow to keep hands clean. When in doubt, it never hurts to rewash hands. In order to prevent bugs and rodents in the classroom it is important to make sure the classroom is cleaned thoroughly after cooking.

How to Properly Wash Produce

Nationwide, outbreaks of E-coli in spinach packages and listeria on cantaloupes has made people more aware of the importance of washing their fruits and vegetables before cooking and consuming them. The FDA says that all fruits and vegetables, including those organically grown, should be washed to remove dirt, surface microbes, and pesticides. The chances of getting sick from the types of germs that grow naturally on fruits and vegetables are low and is of primary concern with dairy, meat, and fish. However, many of our supermarket fruits and vegetables travel great distances and are being processed in large-scale farming and food production facilities where cross contamination and growth of germs is more likely; contributing yet another reason to choose local foods as much as possible.

Share the following tips with campers:

- 1. Rinse, Not Sink:** Rinse your produce under running water rather than filling the sink with water. This is more effective for removing dirt. For foods with a lot of surface area, like grapes, broccoli florets, and berries, wash them in a colander under running water.
- 2. Rub a Spud:** Potatoes, melons, citrus and cucumbers either have many grooves or sticky waxes making it easy for germs to hide and stick to them. All visible dirt should be removed; rub these produce vigorously with your hands or with a brush to get them clean.
- 3. Leaf through the Leaves:** For leafy vegetables like lettuce, kale, and cabbage, which grow close to the ground, it is most effective to peel and compost outer layers and or separate the leaves so that they can be washed individually. If the leaves will be used later, it is recommended to pat them dry before storing them to prevent the growth of bacteria.
- 4. Detect for Damage:** Fruits and vegetables with broken skin should be saved for your compost box. Germs don't generally grow inside the flesh of foods until they have an entry way in and that's what broken skins and peels provide.
- 5. Other tips:** remove the produce sticker before washing; use warm water when you are to cook the produce; and make sure to wash produce even if you are going to peel it, so that dirt and germs don't get transferred from the knife to the food item.



Cooking to Eat Real

.....

Materials

In Guide:

- **Eat Real: Getting Ready** cooking resource p. 139
- **Eat Real: Set Up** cooking resource p. 140
- **Eat Real: Feature Foods** cooking resource p. 143
- **Descriptive Words** activity sheet p. 145
- **Burger** camper's recipe sheets p. 146
- **Burger Binders** food science resource p. 150
- **Eat Real: Cooking Skills** cooking resource p. 153
- **Guacamole** camper's recipe sheet p. 155
- **Find What Binds** activity sheet p. 156
- **Pinto Bean and Quinoa Burgers** take home recipe p. 157
- **Spiced Guacamole** take home recipe p. 158

Other Materials:

- All ingredients and equipment listed on **Eat Real: Getting Ready** cooking resource
- i2 journals and pencils
1 per camper

Overview

In this lesson campers learn how to use whole, plant based foods to make a “real” version of a commonly processed fast food, burgers. They taste and describe the feature foods, quinoa and watercress, and use them to prepare bean burgers with spiced guacamole learning new cooking skills in the process. Campers use scientific inquiry to analyze the different sensory qualities of various binding agents and select a bean burger-binding agent option that best suits their taste. Lastly, campers eat communally and share their opinions about the recipe.

Objectives

Campers will be able to:

- demonstrate how to juice a lime and cut an avocado;
- use descriptive words to describe texture differences in foods;
- recognize aspects of good scientific experimental design;
- identify a few common binding agents and their properties in food; and
- demonstrate increased confidence in their ability to prepare a simple recipe using real foods.

Before You Begin:

- Review lesson plan and all in guide materials.
- Gather ingredients and equipment and complete food preparation and cooking station set up using **Eat Real: Getting Ready** and **Eat Real: Set Up** cooking resources.
- Review the **Eat Real: Feature Foods** and **Eat Real: Cooking Skills** cooking resources and the **Burger Binders** food science resource
- Make copies of **Burger** and **Guacamole** camper's recipe sheets, **Bean and Quinoa Burger** and **Spiced Guacamole** take home recipes, and **Descriptive Words** activity sheet for each camper.

Clues collected:

- *Bean and Quinoa Mini-Burger* take home recipe
- *Spiced Guacamole* take home recipe
- *Descriptive Words* activity sheet
- *Find What Binds* activity sheet

1. Introduce the Case

Introduce campers to their first cooking case, **Cooking to Eat Real**.

Explain to campers that each day they will cook new foods that relate to the days overall theme. Explain that each cooking case highlights specific feature foods, cooking skills, and a food science principle. The recipe of the day is bean and quinoa mini-burgers with spiced guacamole. Campers will make several versions of the burgers in order to experiment with different binding ingredients.

2. Highlight Feature Food

Ask campers, *how can cooking help us eat real?* Explain that when we cook, we take control of the quantity and quality of the ingredients used. Explain that each recipe will highlight a whole, plant based feature food. For some campers, this food may be entirely new while for others, it may already be part of their regular diet. Using the *Eat Real: Feature Foods* cooking resource introduce the two feature foods: quinoa and watercress. Allow campers to see, smell, and touch the raw form of each feature food. Next, campers taste the watercress raw and the prepared quinoa. Distribute the *Descriptive Words* activity sheet so campers can look over the descriptive words and choose a few that describe the watercress and quinoa. Have them write a few descriptive words for each in their i2 journals. Ask a few campers to share the words they chose for each food. Tell campers they will use the *Descriptive Words* activity sheet every day during cooking.

3. Explore Binding Agents

Distribute copies of *Burger: Bean & Quinoa* and *Guacamole* camper's recipe sheet (campers can share) and introduce each ingredient. Ask campers to identify which ingredients are whole foods and which are semi-processed. Review the recipe directions. Indicate that on the recipe sheet there are boxes for them to check off each step in the recipe once it has been completed.

Explain that the *Burger: Bean & Quinoa* is the original recipe. Camper's will make an additional three recipes that are slightly different. Distribute copies of *Burger: Bean & Applesauce*, *Burger: Bean & Egg*, and *Burger: Bean Only* camper's recipe sheets (campers can share).

Allow campers to identify the difference between the original, *Burger: Bean & Quinoa* camper's recipe sheet and the other recipes. Using the *Burger Binders* food science resource, explain what the role of a binding agent is and how it applies to the burgers the campers are making today. Explain that after the burgers are made, campers will explore sensory differences (sight, smell, texture, taste, sound) that the different binding agents impart on the burgers.

4. Make Burgers

Divide campers into two cooking groups. Each group will work under adult supervision. Explain that each group will make two of the four burger recipes. Provide each group with several copies of two different **Burger** camper's recipe sheets. Have campers identify which ingredients are at their cooking stations and which ingredients are at the shared station. Help campers identify who is responsible for which step in the recipe.

Have all campers wash their hands, reminding them to follow the handwashing procedures that were reviewed earlier. Once all hands are washed, begin cooking. Have teaching assistants lead the two cooking groups while the lead instructor floats between groups to ensure that everything is running smoothly. Once each small group has made their burgers have one instructor be in charge of cooking the burgers. To accommodate the quantity of burgers getting cooked, they will have to be cooked in several batches. Burgers can be cooked very close to each other in the pan, just leave enough room for flipping them. Make sure to keep burgers from each specific binder recipe separate from each other. Separate enough burgers from each recipe for the burger binder experiment ($\frac{1}{2}$ burger of each type per camper). The remaining burgers can be placed in a preheated toaster oven on low to warm. Ensure that the different binder batches are not mixed together; they will look very similar.

5. Conduct Burger Binder Experiment

Tell campers that they will now conduct a scientific experiment to compare the different binding agents. Ask campers, *why did we make a burger without a binding agent? How might this make our experiment better?* Explain that a control helps us see the effect of what we are testing, binding agents, by giving us something to compare each burger to. *What else might help us determine the differences provided by each binding agent?* Explain to campers that to be good detectives, they need to make sure that all other aspects of the samples are the same, only the binding agent should be different. *Why is this important?* Explain to campers that they will each try the different burgers in a blind test taste. *What does this mean? Why might it be important to conduct a blind test taste of the four burgers?* Use the **Burger Binders** food science resource to lead a scientific analysis of the four burger samples.

6. Make Guacamole

Using the **Eat Real: Cooking Skills** cooking resource introduce the cooking skills. Demonstrate how to juice a lime, how to cut an avocado, and how to caramelize onions. Ask campers, *why do we add lime to guacamole besides for the taste?* Explain that lime juice can be used for various reasons,

Turn up the Heat!

One of the featured cooking skills is caramelizing onions. If working with older campers, caramelizing is a fun and engaging skill for campers to learn. Older campers may caramelize onions on their own providing they are under adult supervision.

If campers are caramelizing onions, this step should be completed before campers prepare the burgers.

including the slowing of enzymatic browning. Ask the group to think of other fruits that may brown and whether or not they can use lime/lemon juice on them as a natural preservative of color (e.g. apples, potatoes, bananas, pears). Show campers the caramelized onions that have been prepared beforehand and explain the process of caramelizing. Campers now complete the guacamole recipe in their small groups using these new skills. Once made, cover the guacamole to minimize contact with air until ready to eat.

7. Eat!

Campers can decide which of the burger-binder samples they liked the best and select one for their final snack. Have campers sit and eat as a group. Throughout camp, it is important that meals are always eaten together, including instructors, while everyone is seated at a table. Eating together helps to encourage communication, allows instructors to model food tasting behavior, and helps build connections with the food. Have the campers use descriptive words to talk about the foods they are eating. Describe that this is the whole, real version of a commonly processed food that they may eat. *How does it compare?*

8. Clean Up

Once everyone is finished, it is time to clean up. Everyone should be involved in the cleaning process. Make sure that all cooking and eating surfaces are wiped down and floors are swept. If possible, have campers wash their own dishes. Cleaning will go faster if some washing has already been done throughout the activity.

9. Close the Case

Ask the campers the following questions:

What did you think of the burgers?

What is your favorite ingredient that we used today?

Will you make this at home?

Will you share the recipe with anyone else?

What other food does it remind you of?

Have campers record their impressions in their i2 journals. Distribute **Pinto Bean and Quinoa Mini-Burger** and **Spiced Guacamole** recipes to each camper to take home. The take home recipe features quinoa as the binder. Have campers make a note on the recipe if they preferred a different binder. Congratulate campers for taking their first steps to becoming “real eaters.”

Eat Real: Getting Ready

These are all the ingredients and supplies you need to make all the recipes and complete all cooking demonstrations and activities for 20 campers.

Shopping list

- 3/4 cup dry quinoa
- 8 Tbsp. extra-virgin olive oil
- 4 cloves garlic
- 2 15-oz. cans pinto beans
- 2 tsp. smoked paprika
- 3 tsp. ground cumin
- 2 bunches fresh cilantro
- 1 ½ cup cornmeal
- 2 tsp. salt
- Freshly ground pepper to taste
- 24 100% whole-wheat English Muffins
- 2 bunches fresh watercress
- 2 tomatoes
- 4 ripe avocados
- 2 limes
- 3 medium cooking onions
- ¼ tsp. cayenne pepper
- ¼ cup applesauce
- 1 egg
- 1 bag of ground flaxseeds

Cooking Equipment

- 6 dish towels
- 1 medium-sized saucepan
- 2 can openers
- 2 large skillets
- 2 baking sheets
- 1 baking sheet
- Aluminum foil or parchment paper
- Cutting boards, 1 per camper
- Knives, 1 per camper
- 6 sets of measuring cups
- 6 sets of measuring spoons
- 2 potato mashers
- 1 flipping spatula
- 4 large mixing spoons
- 2 large bowls
- 4 medium sized bowls
- 2 lemon juicers
- 2 large plates
- Tasting spoons
- Pot holders
- Fine mesh strainer
- Colander
- 7 small bowls
- Tongs
- Cups, utensils, napkins, small plates per camper
- Sticky tabs

Advanced Prep

- Cook quinoa for **Burger: Bean and Quinoa** recipe according to package directions. Reserve cooked quinoa for both the tasting and cooking component of the lesson. Set some raw quinoa aside for the campers to see and touch.
- Cut and saute together, 1 onion and 4 cloves of garlic.
- Prepare watercress and quinoa tasting samples according to the **Eat Real: Feature Foods** cooking resource.
- Wash watercress and pat dry (use 1/2 bunch for the tasting and divide the rest between the two groups to garnish their mini-burgers).
- Prepare the caramelized onions using the **Eat Real: Cooking Skills** cooking resource
- Line two large baking sheets with foil or parchment paper
- Set up stations using the **Eat Real: Set Up** cooking resource.

Eat Real: Set up

Use this sheet to prepare the classroom for cooking. Campers prepare each recipe in small cooking groups. Set up a cooking station for each small group with all food and equipment listed, separated by recipe. Prepare the shared ingredient station with the food and equipment that are shared by all groups in a communal location. Prepare the Hot Zone with the listed food and equipment.

Station: Cooking Group 1

A. Burgers: Bean & Quinoa and Bean & Applesauce

Foods:

- ½ sautéed onion garlic mixture
- 1 15 oz. can pinto beans, drained and washed
- ½ bunch cilantro, washed
- 12 100% whole wheat English Muffins
- ½ bunch watercress
- 1/4 cup cooked quinoa
- 1/4 cup unsweetened applesauce

Equipment:

- 10 knives*
- 10 cutting boards*
- 1 large baking sheet
- 1 potato masher*
- 2 sets of measuring spoons*
- 2 sets of measuring cups*
- 1 large plate
- 1 large bowl
- 1 medium bowls
- 1 large mixing spoon
- 2 small bowls
- 1 dish towel

Preparation:

1. Open, drain, and wash can of pinto beans and place in a small bowl.
2. Cut the English Muffins in half.
3. Wash the cilantro and watercress and pat dry with a clean dish towel.

B. Guacamole

Foods:

- 2 ripe avocados
- ½ bunch cilantro, washed
- 1 lime
- 1 batch caramelized onions
- 1 large tomato

Equipment:

- 10 knives*
- 10 cutting boards*
- 1 potato masher*
- 2 sets of measuring spoons*
- 2 sets of measuring cups*
- 1 large bowl
- 2 medium bowls
- 1 large mixing spoon
- 1 dish towel

Preparation:

1. Caramelize the onions, using the *Eat Real: Cooking Skills* cooking resource.
2. Wash the cilantro and pat dry with a dish towel.

* Knives, cutting boards, measuring cups, dish towels, and measuring spoon sets could be shared between the recipes.

Eat Real: Set up (continued)

Station: Cooking Group 2

A. Burgers: Bean & Egg and Bean Only

Foods:

- ½ sauted onion garlic mixture
- ½ bunch cilantro, washed
- 1 15-oz. can pinto beans, drained and washed
- 12 100% whole wheat English Muffins
- ½ bunch watercress
- 1 egg

Equipment:

- 10 knives*
- 10 cutting boards*
- 1 silicon baking mat
- 1 large baking sheet
- 1 potato masher
- 2 sets of measuring spoons*
- 2 sets of measuring cups*
- 1 large plate
- 1 large bowl
- 1 medium bowl
- 2 small bowls
- 1 large mixing spoon
- 1 dish towel

Preparation:

1. Open, drain, and wash can of pinto beans and place in a small bowl.
2. Cut the English Muffins in half.
3. Wash the cilantro and watercress and pat dry with a clean dish towel.

B. Guacamole

Foods:

- 2 ripe avocados
- ½ bunch cilantro, washed
- 1 lime
- 1 batch caramelized onions
- 1 large tomato

Equipment:

- 10 knives*
- 10 cutting boards*
- 1 potato masher
- 2 sets of measuring spoons*
- 2 sets of measuring cups*
- 1 large bowl
- 2 medium bowls
- 1 large mixing spoon
- 1 dish towel

Preparation:

1. Caramelize the onions, using the *Eat Real: Cooking Skills* cooking resource.
2. Wash the cilantro and pat dry with a dish towel.

* Knives, cutting boards, measuring cups, dish towels, and measuring spoon sets could be shared between the recipes.

Eat Real: Set up (continued)

Station: Shared Ingredients

Foods:

- Cayenne pepper
- Salt
- Pepper
- Ground cumin
- Paprika
- Cornmeal
- Olive oil

Station: Hot Zone

Foods and Equipment:

- 2 large skillets
- 1 flipping spatula
- 1 set of measuring spoons
- Olive oil
- Oven mitts/pot holders
- Burners
- Toaster oven
- 1 baking sheet for toaster oven

Eat Real: Feature Foods

Quinoa and Watercress

The purpose of the feature foods is to introduce potentially new foods to the campers. Feature Foods highlight an ingredient in its raw or simply prepared form in order to expose campers to foods in their whole form.

Materials:

- 6-quart pot of water
- Quinoa
- Fine mesh strainer
- Small bowl
- Salt
- Tasting spoons for each camper
- 1 bunch of watercress
- Colander
- Dish towel
- Tongs

Quinoa

What is quinoa? Quinoa (pronounced Keen-wah) is a healthy, nutrient-rich food. It is a good source of protein and therefore is a great meat alternative for vegans and vegetarians. Quinoa looks like a grain because of its neutral color and hard exterior but it is actually a seed. When cooked, the seeds expand and become tender, light, fluffy and chewy with little spirals that emerge like tails out of the seed.

How to Prepare Quinoa for Tasting:

When cooking quinoa, it is important to wash the seeds thoroughly before you boil them as they can often have a natural bitter coating that is easily removed with washing. Cook $\frac{3}{4}$ cup dry quinoa following package instructions. Once cooked, reserve $\frac{1}{2}$ cup of cooked quinoa for the pinto bean and quinoa mini-burgers. Lightly salt the remaining quinoa for the tasting component of the activity.

Tasting: Give each camper a spoonful of the cooked quinoa to taste.

Eat Real: Feature Foods (continued)**Watercress**

What is watercress? Watercress is a mustardy, peppery-flavored green that is often compared to arugula because of its similar flavor. It grows in cool running water and has small, crisp vibrant leaves. It is normally sold in small bunches. When selecting watercress, ensure that there is no sign of wilting or yellowing. Watercress can be added to spice up sandwiches, added to salads and soups and can even be added to smoothies.

How to Prepare Watercress for Tasting:

Wash the watercress and pat dry. Tear or cut up the leaves into smaller pieces.

Tasting: Using tongs, give each camper a small amount of the raw leaves to taste.



Camper:

Descriptive Words

acidic	dry	liquid	rough	squishy
aromatic	dull	little	round	starchy
beautiful	earthy	long	runny	stringy
black	fair	luscious	salty	striped
bland	fat	melted	satisfying	strong
blue	fibrous	moist	savory	sugary
brittle	fine	mushy	scented	sweet
brown	firm	nice	scrumptious	syrupy
bumpy	flavorful	nutritious	sharp	tan
bushy	flavorless	oblong	shiny	tart
chewy	fluffy	oily	short	tasty
chunky	fragrant	orange	silky	tender
clean	fresh	oval	simple	thick
cold	golden	pale	skinny	thin
colorful	good	peeled	slimy	tiny
cool	grand	peppery	small	tough
creamy	green	pink	smooth	unripe
crispy	hard	pleasing	soft	watery
crumbly	healthy	plump	sour	wet
crusty	heavy	purple	speckled	white
curly	hot	red	spicy	wilted
delicious	interesting	rich	spongy	yellow
doughy	juicy	ripe	spotty	zesty

Add your own descriptive words here!

Burger

Makes 12 small patties (for taste test and eating)

Bean & Quinoa

Ingredients at station:

Sautéed garlic and onions

Cilantro

Pinto beans

12 100% whole-wheat English muffins

Watercress

Cooked quinoa

Ingredients at shared station:

Smoked paprika

Ground cumin

Salt

Pepper

Cornmeal

Directions:

1. Tear **cilantro** leaves into small pieces and measure a heaping **1/4 cup**.
2. Take small bowl to shared ingredient station. Measure out **1/2 teaspoon smoked paprika, 1/2 teaspoon ground cumin, 1 teaspoon salt, 1/4 teaspoon pepper, and 1 1/2 tablespoons cornmeal**.
3. In a large bowl, add beans and **1/2 of the garlic and onions mixture**. Use a potato masher to mash until smooth.
4. To the mashed beans, add cooked quinoa, torn cilantro, and spice and cornmeal mixture. Mix all the ingredients together until combined evenly.
5. Take large plate to shared ingredient station. Measure **1/2 cup of cornmeal** and spread it out evenly on plate.
6. Rewash hands.
7. Take some of the bean mixture and roll into a ball, about the size of a golf ball. Then gently flatten it to form a burger.
8. Coat burgers with cornmeal and place on baking sheet.
9. Bring baking sheet to teacher in "hot zone."
10. Prepare for tasting and eating.

Burger (continued)

Makes 12 small patties (for taste test and eating)

Bean & Applesauce

Ingredients at station:

Sauted garlic and onions

Cilantro

Pinto beans

12 100% whole-wheat English muffins

Watercress

Applesauce

Ingredients at shared station:

Smoked paprika

Ground cumin

Salt

Pepper

Cornmeal

Directions:

- 1. Tear **cilantro** leaves into small pieces and measure a heaping **1/4 cup**.
- 2. Take small bowl to shared ingredient station. Measure out **1/2 teaspoon smoked paprika, 1/2 teaspoon ground cumin, 1/2 teaspoon salt, 1/4 teaspoon pepper, and 1 1/2 tablespoons cornmeal**.
- 3. In a large bowl, add beans and **1/2 of the garlic and onions mixture**. Use a potato masher to mash until smooth.
- 4. To the mashed beans, add **1/4 cup applesauce**, torn cilantro, and spice and cornmeal mixture. Mix all the ingredients together until combined evenly.
- 5. Take large plate to shared ingredient station. Measure **1/2 cup of cornmeal** and spread it out evenly on plate.
- 6. Rewash hands.
- 7. Take some of the bean mixture and roll into a ball, about the size of a golf ball. Then gently flatten it to form a burger.
- 8. Coat burgers with cornmeal and place on baking sheet.
- 9. Bring baking sheet to teacher in Hot Zone.
- 10. Prepare for tasting and eating.

Burger (continued)*Makes 12 small patties (for taste test and eating)***Bean & Egg****Ingredients at station:**

Sautéed garlic and onions

Cilantro

Pinto beans

12 100% whole-wheat English muffins

Watercress

Egg

Ingredients at shared station:

Smoked paprika

Ground cumin

Salt

Pepper

Cornmeal

Directions:

1. Tear **cilantro** leaves into small pieces and measure a heaping **1/4 cup**.
2. Take small bowl to shared ingredient station. Measure out **1/2 teaspoon smoked paprika, 1/2 teaspoon ground cumin, 1 teaspoon salt, 1/4 teaspoon pepper, and 1.5 tablespoons cornmeal**.
3. In a large bowl, add beans and **1/2 of the garlic and onions mixture**. Use a potato masher to mash until smooth.
4. To the mashed beans, add **1 egg**, torn cilantro, and spice and cornmeal mixture. Mix all the ingredients together until combined evenly.
5. Take large plate to “shared ingredient station.” Measure **1/2 cup of cornmeal** and spread it out evenly on plate.
6. Rewash hands.
7. Take some of the bean mixture and roll into a ball, about the size of a golf ball. Then gently flatten it to form a burger.
8. Coat burgers with cornmeal and place on baking sheet.
9. Bring baking sheet to teacher in Hot Zone.
10. Prepare for tasting and eating.

Burger (continued)

Makes 12 small patties (for taste test and eating)

Bean only

Ingredients at station:

Sauted garlic and onions

Cilantro

Pinto beans

12 100% whole-wheat English muffins

Watercress

Ingredients at shared station:

Smoked paprika

Ground cumin

Salt

Pepper

Cornmeal

Directions:

1. Tear **cilantro** leaves into small pieces and measure a heaping **1/4 cup**.
2. Take small bowl to shared ingredient station. Measure out **1/2 teaspoon smoked paprika, 1/2 teaspoon ground cumin, 1/2 teaspoon salt, 1/4 teaspoon pepper, and 1.5 tablespoons cornmeal**.
3. In a large bowl, add beans and **1/2 of the garlic and onions mixture**. Use a potato masher to mash until smooth.
4. To the mashed beans torn cilantro and spice and cornmeal mixture. Mix all the ingredients together until combined evenly.
5. Take large plate to “shared ingredient station.” Measure **1 cup of cornmeal** and spread it out evenly on plate.
6. Rewash hands.
7. Take some of the bean mixture and roll into a ball, about the size of a golf ball. Then gently flatten it to form a burger.
8. Coat burgers with cornmeal and place on baking sheet.
9. Bring baking sheet to teacher in “hot zone.”
10. Prepare for tasting and eating.

Burger Binders

Exploring Binders using an Experimental Design

Binding agents (aka binders) hold ingredients in mixtures together. They also give foods their texture, firmness, and shape. Starches, gums, and proteins are frequently used as binders. A binder's main function is to make things stick together. They do this in one of two ways. The molecular structure of the binder may change shape allowing it to attach and stick to another food molecule or, the molecules in the binder absorb water and become thicker. The most common binders tend to have a gooey consistency. Mixing 2 tablespoons of ground flaxseed with 6 tablespoons of warm water can demonstrate the gooey consistency that binding agents take to help food stick together.

In the Burger Binder experiment, we are comparing the impact of a few different binding agents in a scientific process. A scientific experiment is an information-gathering exercise to compare different conditions. In order to conduct a scientific experiment that is comparing what you want it to compare correctly, a few important features are necessary.

1. You will need to keep a component of the experiment constant, as a standard of comparison. This is called the 'experiment control.' In our Burger Binder experiment, this would be the burger recipe without the binding ingredient.
2. The condition of the experiment that you are trying to test (here, the different binders) should be the only component that is different across the samples that you are testing. In our Burger Binder experiment, all the recipes are identical other than the binder that we are testing.
3. Blinding is a component of experimental design that conceals the tester from the manipulated condition until after the test. By concealing the type of binder used in our experiment until after the campers have tried the burgers is known as blinding. This can allow campers to more correctly assess the qualities that we want to measure without subconsciously introducing preconceived prejudices, for or against each condition. Scientists call this bias, and blinding can help to minimize bias to create a more accurate scientific experiment.

Burger Binders (continued)

Burger Binders Experiment

In this experiment, campers use a scientific experiment process to analyze the sensory properties of three different binding agents: egg, applesauce, and quinoa, against a control (no binding agent). In order to compare the differences between the four samples, campers are given a half patty of each sample. They have the opportunity to taste each sample (twice) to make observations about how it looks, smells, tastes, and feels, and to compare across samples. They record their findings onto their *Find What Binds* activity sheet.

Materials:

- 2 Tbsp. ground flaxseed
- Small bowl of warm water
- 1 spoon
- Large plates for each camper
- Cups of water for each camper
- Sticky tabs and marker

Set-up

1. Gather ground flaxseed, spoon, and a bowl of warm water.
2. Draw a plate on the whiteboard and divide it into 4 equal parts. Label each quadrant A, B, C, D, starting in the upper left-hand quadrant moving clockwise.
3. Gather large dinner plates for each camper. Mark 4 quadrants A, B, C, D on each plate using sticky tabs corresponding to the diagram on the board.
4. Gather all the burger patties. Assign each burger a letter: the control burgers are letter A, the egg-binder burgers are letter B, the quinoa-binder burgers are letter C, and the apple sauce-binder burgers are letter D. But, do not reveal to campers which burger is which.
5. Cut the burgers into quarters. Place two quarters of each burger type in their assigned quadrant.

Procedure

1. Briefly review the function of a binding agent. Pass around some ground flaxseed for campers to feel. Demonstrate the properties of a binding agent by mixing two tablespoons of ground flaxseed with 6 Tbsp. of warm water. Allow campers to observe the properties of the ground flaxseed when mixed with water.
2. Review aspects of a good scientific experiment and how they have been applied in this case. (E.g. Use of control, blind taste testing, etc.)
3. Point out the plate drawn on the whiteboard. Explain to campers that they will try ONLY one of the

Burger Binders (continued)

two samples in each quadrant, then make their observations onto their *Find What Binds* activity sheet. Quadrant A is the control. They should start with quadrant A and then move clockwise to quadrant B, C, and then D. When they have analyzed each sample, they can select whichever second samples they want to try again. Ask campers to drink a sip of water before trying each sample in order to cleanse their palate. Explain that this will help ensure that residual flavors and foods from a sample does not impact their analysis of the following samples.

4. Have campers guess which binder was used in sample B, C, and D. Allow them to share their observations for each of the samples. Discuss similarities and differences that they observed in appearance, taste, texture, smell, and sound.

Questions

1. *What was different about the control? What does this tell you about how binding agents work?*
2. *What differences could you detect between the different binding samples? Are there instances where you think one binder, over another, would be more appropriate? Why?*
3. *Based on your observations and analysis, which binding agent do you think makes the tastiest burger? Has the best texture? Has the best smell? Has the best sound?*
4. *Which sample do you like the best? Why? Which sample do you like the least? Why? What are some ways you could make the sample that you least liked better?*

Eat Real: Cooking Skills

Citrus, Avocados, and Onions

How to Juice Citrus

Citrus juice can be used for many things. It can be part of a salad dressing or incorporated into side dishes and entrees. It enhances the flavor of foods like greens, fish, and chicken, and can be added to drinks like water and seltzer to give more flavor.

If a recipe only needs a little splash, slicing off a wedge of lemon or lime and gently squeezing it is adequate. The rest of the fruit can be stored in an airtight reusable container in the fridge. It should last for 4 to 5 days.

If the recipe calls for the juice of a whole fruit, there are a few tricks that can make juicing easier while capturing the majority of the fruit's juice:

1. Rolling the fruit on the counter top (before you slice it) helps break down the fibers in the fruit and allows the juice to be extracted more freely when you squeeze it.
2. Heating the fruit in the microwave for 10 seconds softens the fruit. This also helps to break down the fibers allowing the juice to be extracted more easily.

To extract the juice, cut the fruit in half. Taking one half at a time, either squeeze the fruit by hand or use a citrus juicer. Make sure to get rid of the seeds. Citrus seeds are not edible and are often very bitter.

How to Cut an Avocado

Avocados are soft fruits with a thin rind and a large pit in the center. To cut an avocado, place it on a flat surface on top of a dish towel which will help keep the avocado from rolling. Holding the fruit with one hand in the “claw” position, use a knife to cut the avocado lengthwise around the seed. Open the two halves to expose the pit. Using a spoon, scoop out the pit. Once the pit is removed, use a spoon to scoop out the flesh.

A note about the discoloration of fruits

Some non-citrus fruits and vegetables brown when they are cut open and exposed to air (e.g. apples, pears, potatoes, bananas, avocados). This happens when the proteins, known as enzymes, in the fruit or vegetable react with oxygen in the air. Because this reaction results in the browning of the fruit or vegetable it is known as *enzymatic browning*. However, enzymatic browning can be slowed by adding lime juice or another acid, like vinegar to the flesh of the fruit or vegetable. The acid from the lemon juice helps break down the enzymes in the food thus preventing them from browning.

Eat Real: Cooking Skills (continued)

How to Caramelize Onions

Caramelizing is used extensively in cooking to bring out nutty, caramel flavors and to provide color to foods. Caramelizing occurs when sugars present in the food are exposed to heat.

Caramelizing onions is done by slowly cooking them in a little olive oil until they are a rich brown color. Onions are naturally sweet and cooking them slowly allows the natural sugars in the onion to caramelize providing them with intensified sweetness.

Ingredients

- 2 onions, finely chopped
- 3 tablespoons olive oil
- 1 teaspoon salt

Directions

1. Using a sauté pan, coat the bottom of the pan with the olive oil.
2. Heat the pan on medium high heat until the oil has been warmed, about 1 minute.
3. Add the chopped onions and stir, coating the onions in the oil. Make sure that the onions are spread out evenly over the pan.
4. Turn the heat down to medium-low and let the onions cook slowly for 10 minutes.
5. Sprinkle salt over the onions and stir to incorporate.
6. Let them cook for another 20 minutes allowing them to soften and brown. The onions are ready when they are dark, sweet, and thickened to a jam-like consistency.

Guacamole

Serves 10 campers

Ingredients at station:

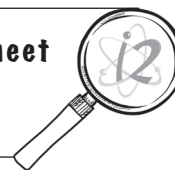
- Avocados
- Cilantro
- Lime
- Caramelized onions
- Tomatoes

Ingredients at shared station:

- Salt
- Cayenne pepper
- Ground cumin

Directions:

1. Cut the lime in half and juice it in a medium-sized bowl.
2. Cut avocados in half. Using a spoon, scoop out the pit.
3. Using a spoon, scoop out the avocado into the bowl with the lime juice. Using a potato masher, mash the avocado until the avocado is mostly smooth with only small chunks of avocado remaining.
4. Tear **cilantro** leaves into small pieces and measure a heaping **1/2 cup**. Add cilantro to bowl with avocado.
5. Add caramelized onions to the bowl.
6. Take a small bowl to “shared ingredient station.” Measure out **1/8 teaspoon cayenne pepper, 1/2 teaspoon ground cumin** and **1/4 teaspoon salt**. Add these spices to the avocado mix. Blend until everything is combined.
7. Cut **1 tomato** into small pieces. Add the tomato to the bowl and gently mix just until the tomatoes are combined.



Camper:

Find What Binds

Taste the 4 varieties of burgers. Use all 5 senses to analyze them using descriptive adjectives. Use words from the Descriptive Words list to help you. Write your description in the boxes below.

	Burger A	Burger B	Burger C	Burger D
Sight				
Smell				
Touch				
Sound				
Taste				

What's the difference?!

How different were the burgers? Which one was your favorite and why?

Pinto Bean and Quinoa Burgers

The bean and quinoa mini-burgers will even have carnivores asking for seconds. The cornmeal coating gives a nice crunch and the smoked paprika, cumin, and cilantro give them a Tex-Mex kick. We experimented with a variety of different ingredients that served as binding agents. This recipe uses quinoa but we also tried egg and applesauce. Ask your food scientist which recipe he or she preferred.



Makes 12 mini burgers

Ingredients:

- Water
- ¼ cup quinoa, rinsed carefully (follow package directions for cooking)
- 3 Tbsp. extra-virgin olive oil (divided)
- ½ medium onion chopped
- 2 clove garlic, finely chopped
- 1 15 oz. can of pinto beans, well drained and rinsed
- 1 tsp. smoked paprika
- 1 tsp. ground cumin
- ½ cup chopped fresh cilantro
- 3 Tbsp. cornmeal, (plus 1 cup for coating mini-burgers)
- 1 tsp. salt
- Freshly ground pepper to taste
- 12 100% whole-wheat slider buns

Directions:

1. Follow package directions to cook the quinoa. It should take about 10-15 minutes to cook.
2. In a medium skillet, heat 1 tablespoon olive oil over medium heat. Add the chopped onions and garlic and cook, stirring occasionally, until soft and fragrant, about 3 minutes.
3. To a large bowl, add beans, paprika, and ground cumin. Mash the beans into a smooth paste with a potato masher or fork.
4. To the bean mixture, add the cooked quinoa, cilantro, 3 tablespoons cornmeal, salt and pepper; stir to combine.
5. Form the bean mash into 12 mini-burger patties, about the size of a flattened golf ball. Put them into the freezer for 5 minutes.
6. Preheat oven to 200°F.
7. Heat 1 tablespoon oil in a large skillet over medium-high heat. Reduce heat to medium and cook 6 mini-burgers at a time until heated through and brown and crisp on both sides, 2 to 4 minutes per side.
8. Transfer to the baking sheet and oven to keep warm.
9. Cook the remaining 6 mini-burgers with the remaining 1 tablespoon oil, reducing the heat as necessary to prevent over-browning.
10. Serve the burgers on buns with watercress and guacamole.

Spiced Guacamole

Guacamole is a simple, healthy dip that can top burgers, sandwiches, salads, or can be eaten on it's own with carrot sticks or whole wheat pita.



Makes about 2 cups

Ingredients:

- 1 Tbsp. olive oil
- ½ medium onion, chopped
- ¾ tsp. salt (divided)
- 2 ripe avocados
- 1 lime, juiced
- ½ cup chopped fresh cilantro
- 1/8 tsp. cayenne pepper
- ½ tsp. ground cumin
- 1 tomato, chopped

Directions:

1. In large sauté pan, heat oil on medium high heat for about 1 minute. Add chopped onions, stir to coat all onions with oil.
2. Turn heat down to medium low and cook for 10 minutes, until onions are clear.
3. Sprinkle 1/2 teaspoon of salt over the onions and stir to incorporate. Cook for another 20 minutes, until onions are dark brown, sweet smelling, and sticky. Turn off heat, and put the caramelized onions aside for later.
4. Cut avocados in half. Using a spoon, scoop out the pit.
5. Using a spoon, scoop out the avocado flesh into a bowl. Using a potato masher, mash the avocado until the avocado is mostly smooth with only small chunks of avocado remaining.
6. Pour the lime juice over the avocado and stir well.
7. Add the caramelized onions, chopped cilantro, cayenne pepper, cumin, and 1/4 teaspoon salt to the mashed avocado and mix well.
8. Add the chopped tomato and gently mix, just until tomato pieces are mixed through.

.....

Food Chemistry

Day 2



Mostly Plants



Learning in the Garden

.....

Materials

In Guide:

- **Background on Plant Needs** lesson resource p. 164
- **Background on Plant Parts and their Functions** lesson resource p. 165
- **Plant Needs Image** cards p. 166
- **Plant Parts Diagram** lesson resource p. 172
- **Garden Case Book** activity sheet p. 173
- **Nutrient Cycling Background & Skit** lesson resource p. 178
- **Community Garden Debrief** lesson resource p. 179

Other Materials:

- Bug boxes
- Digital cameras
- Nutrient Cycling Skit props
- Clipboards 1 per camper
- Magnifying glasses 1 per camper
- i2 journals and pencils 1 per camper

Overview

Throughout this case, campers explore various aspects of plant science through a field trip to a local community garden. Campers put their detective skills to work in order to find different plant parts that we eat. Campers discover different members of the garden ecosystem at various trophic levels, as well as investigate how the garden is set up to meet all the needs of the growing crops. The visit builds upon campers' understanding of industrial versus community food systems and worm composting from Day 1 by providing first-hand experience with a community food production operation.

Objectives

Campers will be able to:

- identify and describe what whole, unprocessed fruits and vegetables look like in their living, whole-plant form;
- describe the following plant science concepts: plant parts and function, plant lifecycle, cycle of nutrients, plant needs;
- demonstrate increased appreciation and value for food and food production; and
- describe how and why different agricultural practices are employed in food production to meet the challenges of growing food in an urban environment.

Before You Begin:

- Review lesson plan and all instructor materials.
- Prepare **Plant Needs Image** cards and **Plant Parts Diagram** lesson resource.
- Review **Nutrient Cycling Background & Skit** lesson resource and practice Nutrient Cycling Skit.
- Prepare copies of **Garden Case Book** activity sheet for each camper.

Clues collected:

- *Garden Case Book* activity sheet
- Photos from the garden

1. Introduce Day 2

Welcome everyone back to camp! Introduce them to the theme of the day Eat Mostly Plants. Review the cases you will be covering today: **Learning in the Garden**, **Gardening in the Classroom**, and **Cooking to Eat More Plants**.

2. Introduce the Case

Introduce campers to their next food detective case, **Learning in the Garden**. Tell campers that today they will explore various aspects of plant science. Campers discover how plants grow and why eating plants is important. In the garden they will be solving three different cases: Plant Parts Hunt, Nutrient Cycle Suspects, and Meeting Plant Needs.

3. Review Plant Needs, Parts, and their Functions

Before leaving for the garden review plant needs as well as plant parts and their functions using the *Background on Plant Needs* and *Background on Plant Parts and their Functions* lesson resources as needed. Campers most likely have already been exposed to these concepts at some point in the past so this is a time to assess what they know and fill in any knowledge gaps. Start by asking campers, *what do plants need to survive?* As campers share their responses, hold up the *Plant Needs Image* card that corresponds with the answers the campers give. For example, when a camper says “sunlight” hold up the “sunlight” *Plant Needs Image* card. Explain that we will see these needs being met today in the garden. Using the *Plant Parts Diagram* lesson resource ask campers to help you name all the plant parts and together discuss the role that each plant part plays in helping the plant survive and/or reproduce.

4. Nutrient Cycling Skit

Using the *Nutrient Cycling Background & Skit* lesson resource perform a skit reviewing producers, consumers, decomposers, and the cycling of nutrients in an ecosystem.

5. Prepare for and Travel to Garden

Distribute and review the *Garden Case Book* activity sheet. Review field trip rules and safety precautions. Gather materials and have campers get ready to leave (bathroom, water bottles, sunblock, etc). Depart for the garden.

Get Up & Move!

Finding a community garden or farm within walking distance is a great way to get the campers involved in some physical activity. If you haven't already, you might want to introduce the pedometers (see **Case 11 Finding Balance**) so campers can start to count their steps!

6. Explore the Garden

Meet with a community gardener at the garden. The community gardener will introduce the garden, go over any rules, and give a tour of the space. Give campers 30-45 minutes to complete the *Garden Case Book* activity sheet. Each camper should complete their own *Garden Case Book* activity sheet but they can work together in small groups. Instructors should walk around the garden helping groups as needed. When everyone is finished/ time is up, meet as a large group and share some of the findings. With the permission of the community gardeners, harvest a few things that could be used to prepare our Plant Parts Salad in today's cooking lesson.

7. Close the Case

Use the *Community Garden Debrief* lesson resource to encourage your campers to think beyond the community garden space they visited today. Challenge campers to think about how the science of plants and growing food relates to food systems and how the consequences of different farming techniques impact those food systems. This conversation will lay a foundation for future conversations on food access.

Background on Plant Needs

Plant Needs Background:

Plants, like humans, need certain resources to survive, grow, and reproduce. Plants are autotrophic which means they make their own food. Conversely, humans and other animals are heterotrophic, which means they must consume food to get the proper energy required for growth and reproduction. Most plants make their own food in the form of plant sugars and starches through a process called photosynthesis. Photosynthesis requires water, carbon dioxide, and sunlight.

Therefore three of the basic plant needs are: water (which they absorb from the soil), carbon dioxide (taken in from the surrounding air through the leaves), and sunlight (which is also absorbed through the leaves). Plants also need minerals like phosphorus, nitrogen, potassium, calcium, and zinc. Usually plants use their roots to absorb these nutrients from the soil they grow in. Sometimes plants are grown directly in water that contains nutrients like the edible plant watercress that grows on the surface of streams or rivers. Plants grown directly in nutrient-rich water are said to be grown hydroponically. Plants also need space to grow. When crops are planted too close together, there is not enough access to water, nutrients, and sunlight. Unfortunately, in the case of over-planting, not all the plants survive. Finally, plants need protection from predators. Some plants have adapted thorns and spikes to scare off animals that might eat them, others are poisonous.

On farms and in gardens, humans help protect their plants from pests like deer, groundhogs, and insects using various methods of pest control like putting up fences, spraying pesticides, and encouraging beneficial animals and insects that are natural predators of pests. For example, tomato hornworm caterpillars are a nasty pest that eat tomato plants, so gardeners don't want them in their garden. There is a certain parasitic wasp called a Braconid wasp that attacks the hornworm caterpillars. Some gardeners will grow plants that attract Braconid wasps to their garden, so they will kill the hornworm caterpillars.

Background on Plant Parts and their Functions

Plant Parts & their Functions:

Most plants have the same basic parts: roots, stems, and leaves. When they are reproducing, most plants have flowers that turn into fruits with seeds inside. These plant parts (roots, stems, leaves, flowers, fruits, and seeds) can look very different depending on the plant. Plants that are related may have similar looking plant parts. Each plant part serves important and unique functions for the plant.

ROOTS: The roots of the plant anchor it into the substrate in which it is growing (usually soil). Without roots the stem of the plant would simply fall over. The roots also absorb water and nutrients from the soil or growing environment.

STEM: The stem is a means for transportation. Water, minerals, and sugar (plant food) travel up and down the stem. It also provides support for the leaves, flowers, and fruit of the plant.

LEAVES: Leaves absorb sunlight and carbon dioxide and are the site of photosynthesis. They make food for the plant.

FLOWERS: Flowers are the plants' means for reproduction. Once the flower is pollinated it will develop into a fruit which will house, nourish, and protect the seeds.

FRUIT: The fruit also helps spread the seeds.

SEED: The purpose of the seed is to grow into a new plant.

Plant Needs Image

Make one copy of each sheet and cut it out: SUNLIGHT



Plant Needs Image (continued)

Make one copy of each sheet and cut it out: WATER



Plant Needs Image (continued)

Make one copy of each sheet and cut it out: CARBON DIOXIDE



Plant Needs Image (continued)

Make one copy of each sheet and cut it out: NUTRIENTS



Plant Needs Image (continued)

Make one copy of each sheet and cut it out: SPACE

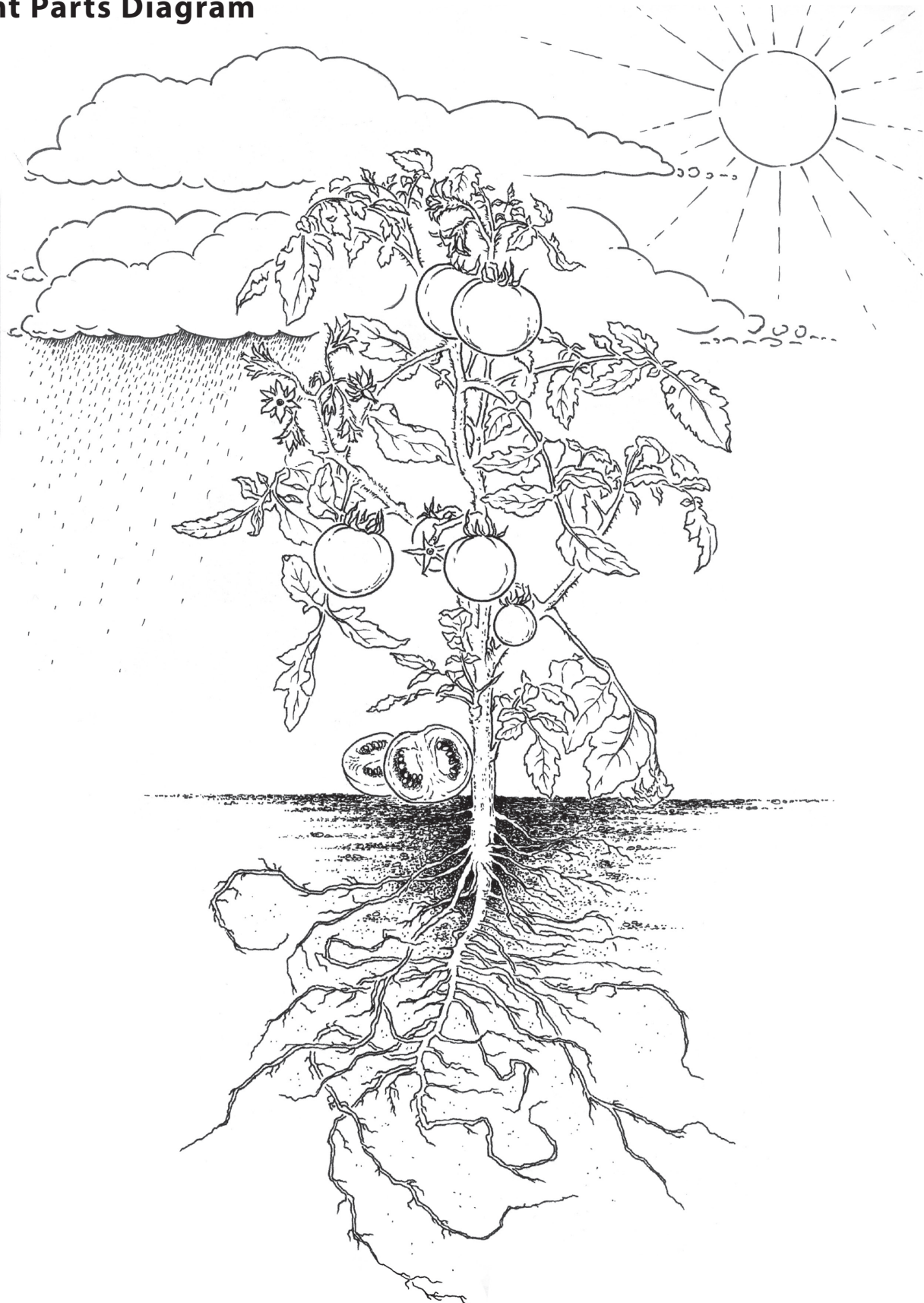


Plant Needs Image (continued)

Make one copy of each sheet and cut it out: PROTECTION



Plant Parts Diagram





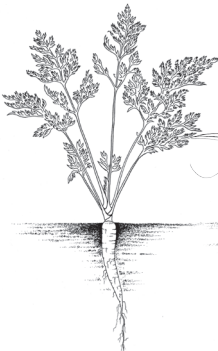

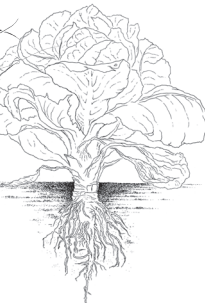
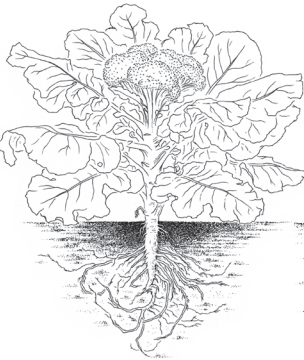

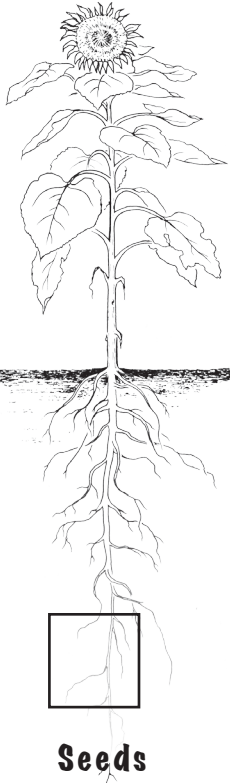
Camper:

Garden Case Book

Welcome to an urban community garden right in your city! As food detectives you will be investigating three different cases in the garden. Read each case carefully before proceeding. Use field and plant guides to help identify unknown organisms. Make sure to document your findings with drawings, photographs, notes, and samples when appropriate. Start with whichever case you'd like and try to solve as many as you can with the time provided. *Be careful not to disturb anyone's gardens or crops*

Subcase #1: Plant Parts Hunt

The chef in charge of the food menu at i2 camp doesn't believe there are local vegetable menu options that represent each part of the plant. Your assignment is to show her that it is possible to grow an edible stem, root, fruit, leaf, flower, and seed right here in your city or town to serve in your cafeteria. Try to find the crops below. Check off the box when you have found it.

					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Roots Carrots	Stems Chives	Leaves Lettuce	Flowers Broccoli	Fruit Peppers	Seeds Sunflowers



Garden Case Book (continued)

We eat roots, stems, leaves, flowers, fruits, and seeds. Look around the garden and for each box below sketch or write the name of a food that is that plant part (for example spinach - leaves). Then write something interesting about that plant to help the i2 chef better understand her healthy, local options. The edible part of the plant may not be visible yet (it may be underground, it may not be in bloom yet, etc). Just document the plant as you see it.

Roots

Stems

Leaves

Flowers

Fruits

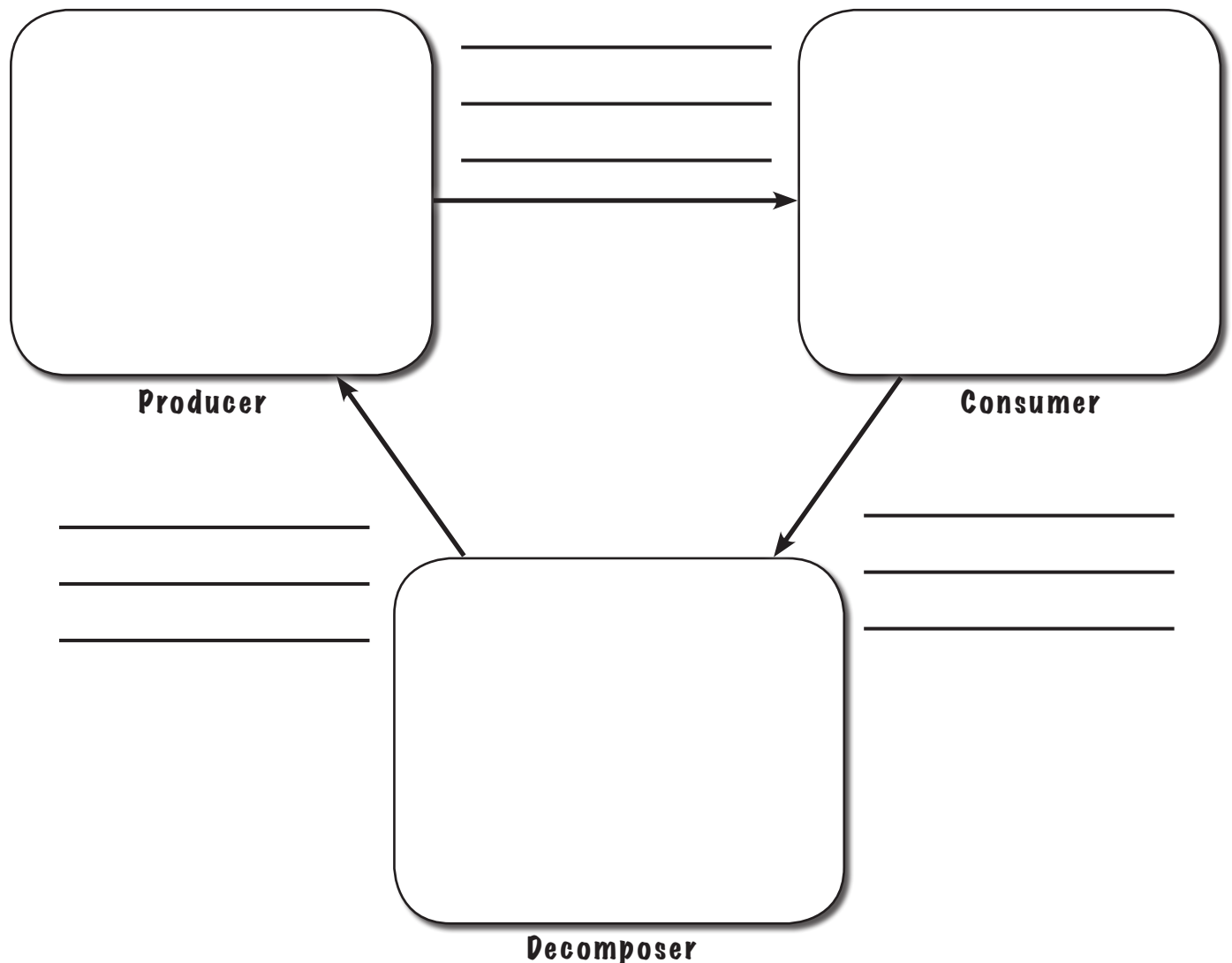
Seeds



Garden Case Book (continued)

Subcase #2: Nutrient Cycling Suspects

Experts know that nutrients cycle through a food chain. Anthony V. Gardener has enlisted your help to identify the key players in the nutrient cycle happening in his garden bed. Find and identify a producer, a consumer, and a decomposer in the garden. Document each in the nutrient web below to show Mr. Gardener how nutrients are cycled in his garden plot, and briefly describe how the nutrients cycle through each interaction.





Garden Case Book (continued)

Subcase #3: Meeting Plant Needs

Biggs E. Businessman has identified a plot in your city where he wishes to build his Big Old Company. It happens to be the community garden you are in right now. The community and members of the garden are fighting back because they think the garden is a community asset that is important to keep. Mr. Businessman argues that plants shouldn't be grown in the city, and that this area is unfit for growing plants and would be better suited for manufacturing Big Olds. You have been hired to investigate if plants are getting what they need. Look around the garden and talk to the gardeners. Describe if the plants are getting ample sun, water, fresh air, clean nutrient rich soil, space, and protection. Use drawings or take photos to accompany your notes.

Sunlight: _____

Water: _____

Clean, Fresh Air (Carbon Dioxide): _____

Soil: _____



Garden Case Book (continued)

Space: _____

Protection: _____

Nutrient Cycling Background & Skit

Nutrient Cycling Background:

Picture a simple food chain: grass grows, rabbit eats grass, coyote eats rabbit, coyote dies and its body is broken down by decomposers like fungi, worms, and bacteria, returning nutrients to the ground to fertilize future grass plants. Nutrients cycle from the soil, to the grass plant, to the rabbit, to the coyote, and back to the soil via decomposers. Trophic level is the position within the food chain or web that an organism occupies. Producers are autotrophs, or things that make their own food, like photosynthetic plants. Primary consumers are organisms that eat or consume producers. They can be herbivores or omnivores. Secondary consumers are organisms that eat primary consumers. They are carnivores or omnivores. Tertiary consumers are organisms that eat secondary consumers. Decomposers are organisms that feed on and break down dead organisms.

Nutrient Cycling Skit Instructions:

Using the lines below as a guide, create a short skit, about 3 minutes, to share with campers that reviews nutrient cycling and trophic levels so they know what to look for in the garden. Get creative with props, costumes, and getting into character.

GRASS (*grows as it speaks*): I am a blade of grass. I use water that I soak up from the soil, carbon dioxide that I bring through my leaves, and the power of sunlight to make my own food so I can survive and grow. Because I can make my own food in order to grow, I am a primary consumer.

RABBIT (*hops around and starts eating the grass*): Yum! I am a rabbit. I love to munch on grass because it's full of tasty nutrients. It gives me energy and building blocks to survive and grow. Because I eat grass, a primary consumer, I am a secondary consumer.

COYOTE (*speaks as it stalks its prey*): Look at that delicious rabbit, perfect for coyote stew! It eats fresh grass all day so it is a nutritious meal for me. All the nutrients from the grass go into the rabbit and then into me. This makes me a tertiary consumer. (*Attacks and eats rabbit, leaves and comes back with a cane*). I've had a nice, long life. Time to say goodbye (*dies*).

WORMS (*use fake worms or have a live player*): I am a worm. I like to feed on dead organisms and help return their nutrients to the soil so plants can use them to grow and make their own food. This makes me a decomposer. Along with my friends, fungi and bacteria, we speed up the decomposition of dead things so the cycle can continue again.

Plant grows again. The End.

Community Garden Debrief

Your campers spent the morning thinking, exploring, and learning about different crops and the edible plant parts they produce. Campers discovered how growing spaces meet the needs of the plants in order to produce food and how nutrients cycle through the garden and all its inhabitants. Now it's time to go beyond the science of plants and growing food in order to understand the community garden or urban farm in the bigger context of food systems.

During this debrief, ask questions that encourage campers to compare and contrast the local urban growing space with a farm that is involved in the industrial food system. *“Think back to what we learned yesterday about industrial vs. community food systems: How would plants’ needs be met on an industrial farm? What are the consequences of these different farming techniques?”* Help campers to understand that industrial farms utilize large open spaces in order to give hundreds of acres of monocrops (corn, wheat or soy, for example) sufficient access to space and sunlight. Industrial farms also use tons of inputs like water to irrigate their crops, chemical fertilizers to give plants nutrients, pesticides to kill unwanted pests, and fuel-guzzling machines to do all the work which relies on the planet’s limited resources. This results in high yields of identical crops. Run-off produced from the fertilizers and pesticides used pollute our water ways. While this system produces a lot of food, it also takes up a lot of land, water, and other resources, like fuel, to maintain and creates a lot of non-reusable waste. However, this system may have hit its peak as now with more and more pesticide-resistant pests, yields are starting to decline.

Contrast this system with the garden: *“Think of the growing space we saw today, what are the big differences? What are the trade-offs?”* Have campers reflect on the third subcase in their **Garden Casebook** activity sheet. Have campers explain how gardeners water their plants, how they make sure the soil is nutrient-rich, and how they protect their crops from pests. Guide them to explain that most growing is done by hand or with hand tools. If there is compost in the garden have campers connect what they have learned about recycling nutrients and how compost is a natural, organic fertilizer. Remind campers about the worm bin they created on Day 1 and its role in organic fertilizing. Ask campers, *“How many people are fed off of what’s produced in this garden? Is this a viable way to feed city dwellers?”* Help them to realize that while urban gardens minimize waste and pollution, they only feed a small fraction of the city. Ask campers for ideas on what a system somewhere in between an urban garden and an industrial farm could look like.

Finally, ask campers, *“Were you surprised by anything in the garden? What would they grow if they had a garden plot? Could they see themselves or their families growing their own food? What about a garden at school?”*



Gardening in the Classroom

.....

Materials

In Guide:

- **Gardening in the Classroom: Materials** lesson resource p. 184
- **Gardening in the Classroom: Set Up** lesson resource p. 185
- **Soil Test Demonstrations** experiment sheet p. 189
- **Mixing Soil** experiment sheet p. 191
- **Fava Bean Exploration** experiment sheet p. 192
- **Sprouting** experiment sheet p. 193
- **Planting Microgreens** experiment sheet p. 195
- **Growing Log** activity sheet p. 197
- **Harvesting Sprouts** experiment sheet p. 199
- **Harvesting Microgreens** experiment sheet p. 200
- **Soil Background** teacher note p. 201
- **Seed Anatomy and Germination** teacher note p. 202

Other Materials:

- All materials on the **Gardening in the Classroom: Materials** lesson resource
- Digital camera(s)
- Water source
- i2 journals and pencils ?
1 per camper

Overview

In this activity, campers go “undercover” as gardeners to further investigate how to grow and harvest their own food. They mix potting soil, explore soil science, investigate the anatomy of seeds and sprouts, and then plant and harvest their own sprouts and microgreens!

Objectives

Campers will be able to:

- explain the difference between dirt and soil;
- plant, grow, and harvest their own sprouts and microgreens; and
- appreciate what it takes to grow food.

Before You Begin:

- Review lesson plan and all instructor materials.
- Gather and prepare materials for the stations using the **Gardening in the Classroom: Materials** and **Gardening in the Classroom: Set Up** lesson resources.
- Prepare copies of **Growing Log** activity sheets for each camper.

Clues collected:

- Video of soil test demo
- Herb garden
- Microgreen trays
- Sprouts
- Photos
- **Growing Log** activity sheet

1. Introduce the Case

Introduce campers to their next food detective case, **Gardening in the Classroom**. Explain that in this case the group is going “undercover” as gardeners in order to get hands-on information on what it takes to grow their own food. Their tasks will be to investigate the differences between soil and dirt, to mix soil, plant and sprout their own seeds, take care of the microgreens and sprouts throughout the rest of the camp session, and harvest microgreens and sprouts for today’s cooking activities. Review plant needs and how we will meet them here in the classroom. Ask the campers what will happen if plant needs are not met (ex. *What will happen if we forget to water our herbs/microgreen trays? What if they don’t get enough light?*)

2. Explore Soil

Divide campers into 2 groups. They will stay in these groups for the rest of the lesson. One instructor leads a discussion on the difference between soil and dirt and then performs the soil test demonstration with one group. A second instructor mixes soil and fills up trays to prepare for microgreen planting with the second group. Then switch groups.

Group 1 - Soil Test Demonstrations:

Start by asking campers: “*What is the difference between soil and dirt?*” Record their answers on the board. Explain that dirt is simply mineral material with no living organisms while soil is nutrient rich with organic matter, microorganisms, worms, and other decomposers - it is ALIVE! Ask campers if they think crops will grow better in soil or dirt? Incorporate the worm bin from Day 1 and the compost operation campers observed this morning at the garden into the discussion. Make sure you define “organic matter” as the remains of living things. Refer to the **Soil Background** teacher note to enhance the discussion as needed.

To show the difference between dirt and soil perform the soil test demonstrations using the **Soil Test Demonstrations** experiment sheet. Have campers record observations in their i2 journals.

Group 2 - Mixing Soil & Filling Trays:

Using the **Mixing Soil** experiment sheet to instruct campers on how to mix soil into a 5-gallon bucket using the different components: potting soil, compost, and vermiculite. Talk about the importance of each ingredient. Use the **Soil Background** teacher note as needed. Help campers find the desired soil consistency. Then, have campers take turns filling microgreen trays.

Go Deeper

When you are exploring sprouting you can deepen the conversation by including a discussion of the pigment chlorophyll. Chloroplasts are the parts of plant leaves where photosynthesis takes place. Chloroplasts contain the green pigment chlorophyll, which gives plants their color. But chlorophyll doesn't turn green until it is exposed to sunlight. Sprouts that germinate in the dark are white until they are uncovered and "green up."

3. Plant & Sprout Seeds

In their same groups have campers explore planting seeds and preparing sprouts to monitor throughout the week. Have each group start with observing and setting up fava bean sprouts. Then have one group prepare seeds for sprouting and the other plant microgreens trays. Then have the groups switch. Read *Fava Bean Exploration, Sprouting, and Planting Microgreens* experiment sheets for further instructions and set-up. Review *Seed Anatomy and Germination* teacher note background information on these topics. Campers will use *Growing Log* activity sheet to record their observations throughout the week.

4. Harvest Sprouts & Microgreens

Now it's time to harvest! Share the pre-grown sprouts and microgreens with the campers and let them observe them. Have one group harvest microgreens and the other harvest sprouts. Then switch. Feel free to combine the sprouts and microgreens for washing. See *Harvesting Sprouts & Microgreens* experiment sheet for further instructions and set-up.

5. Clean Up

Have campers help clean up from activities.

6. Close the Case

Ask campers to share some of their observations from their gardening-in-the-classroom experience. While one instructor is leading the clean up and debrief, the other instructors can be setting up the cooking area for the next lesson. Ask campers: *Did you learn anything new? Did anything surprise you? Will any of you consider growing sprouts/microgreens at home? Could you market and sell sprouts or microgreens? What would you call your product? Who would you sell it to?*

Gardening in the Classroom: Materials

This is a full list additional materials to complete this case. Refer to *Gardening in the Classroom: Set Up* lesson resource to help you prepare and set up the classroom for the various activities.

- 1 cup of gray, rocky dirt
- 4 glass jars with lids
- 1 tablespoon
- 1 small bottle 3% hydrogen peroxide
- 4 spoons
- 3 8-oz. clear drinking cups
- 4 five-gallon buckets
- 1 3-gallon bag of soil
- 1 2-gallon bag of vermiculite
- 1 3-lb. bag of compost
- 2 sets of Microgreen Tray Sets
- 1 16-oz. bag dried fava beans
- 2 sealable sandwich bags per camper
- Masking tape
- 1 permanent marker
- 1 magnifying glasses per camper
- Paper towels
- 3 spray bottles
- 1 5x6 Tray Sprouter
- ½-lb. bag of radish seed
- ½-lb. bag of broccoli seed
- 2 large bowls
- 2 medium bowls
- Colander
- 4 clean dish towels
- 1 pair kid scissors per camper
- Water source

Gardening in the Classroom: Set Up

Use this lesson resource along with *Gardening in the Classroom: Materials* lesson resource to gather materials and prepare for the activities in this case.

Soil Test Demonstrations

Materials:

- 1 cup of gray, rocky dirt
- 1 cup compost (used for the “soil” sample)
- 4 glass jars with lids
- Masking tape and permanent marker for labeling
- Tablespoon
- 6% or 8% Hydrogen Peroxide
- 4 spoons

Preparation:

1. Collect a sample of gray, rocky dirt. Try to find an area where nothing is growing, ensuring that there is very little life in the dirt.
2. Label two of the jars “Soil” and two of the jars “Dirt.”

Mixing Soil

Materials:

- 3 8 oz. clear drinking cups
- 4 five-gallon buckets
- Masking tape and permanent marker for labeling
- 1 3-gallon bag of soil
- 1 2-gallon bag of vermiculite
- 1 3-lb of compost
- 2 10x10 inch trays for planting microgreens (from a Microgreen Tray Set)

Preparation:

1. Collect bags of potting soil, compost, and vermiculite. These are the ingredients for “Super Soil Mix.” Empty bags into separate 5-gallon buckets and label them. Put a plastic cup inside for scooping.
2. Set out an empty bucket where campers will add the soil mix components. Label it “Super Soil Mix!”
3. Set out two 10x10 inch microgreen trays to fill (1 for each group).

Gardening in the Classroom: Set Up (continued)

Fava Bean Exploration

Materials:

- 5 fava beans to sprout a week in advance
- 2-4 fava beans per camper to soak the day before
- 4-5 dry fava beans for observation
- 1 sealable sandwich bag per camper
- Masking tape and permanent marker for labeling
- Magnifying glasses
- Paper towel
- 1 spray bottle

Preparation:

1. ONE WEEK BEFORE: Soak 5 fava beans overnight and then sprout them in a reusable plastic sandwich bag with a moist paper towel. Make sure to keep the beans moist but check to make sure they don't mold. You are doing this so campers can observe already sprouted fava beans.
2. ONE DAY BEFORE: Pre-soak enough fava beans for each camper to have 2-4 beans for observation
3. JUST BEFORE: Set out materials.

Sprouting

Materials:

- 1 5x6 Tray Sprouter
- 3 tablespoons radish seed to sprout a week before camp
- 3 tablespoons radish seed to presoak and set out for sprouting
- 1 tablespoon unsoaked radish seed for observation

Preparation:

1. ONE WEEK BEFORE: Sprout radish seeds. This is so the campers have a finished product to observe and harvest.
 - Soak 3 tablespoons of radish seed in any container (but not in the sprouter) for 8-12 hours.
 - Following the directions on the *Sprouting* experiment sheet, sprout and maintain the soaked radish seeds in the sprouter, exactly as you will do with the campers. Make sure you rinse and drain them properly over the next week.

Gardening in the Classroom: Set Up (continued)

2. ONE DAY BEFORE: Soak 3 tablespoons of radish seeds, leaving 1 tablespoon unsoaked for observation.
3. JUST BEFORE: Set out the materials.

Planting Microgreens

Materials:

- 1 Microgreen Tray Set to grow 2 microgreen trays in advance
- 1 Microgreen Tray Set to plant with campers: 1 10x20 inch Drip Tray, 2 10x10 inch trays filled with Super Soil Mix (from Mixing Soil activity), 2 10x10 inch trays used as lids
- 3 tablespoons broccoli seeds to grow a week before camp
- 3 tablespoons broccoli seed to presoak and set out for planting
- 1 tablespoon unsoaked broccoli seed for observation
- 2 spray bottles
- Magnifying glasses

Preparation:

1. ONE WEEK BEFORE: Prepare and plant microgreens. This is so the campers have a finished product to observe and harvest.
 - Soak 3 tablespoons of broccoli seeds for 8-12 hours. Rinse and drain well.
 - Following the directions on the *Mixing Soil* experiment sheet, create a soil mix and fill two 10x10 trays.
 - Following the directions on the *Planting Microgreens* experiment sheet, plant the soaked broccoli seeds and maintain the trays, exactly as you will do it with the campers. Make sure you spray with water twice a day
2. ONE DAY BEFORE: Soak 3 tablespoons of broccoli seeds for 8-12 hours. Rinse and drain well.
3. JUST BEFORE: Two of the 10x10 trays are set out and filled during the Mixing Soil activity. The rest of the Tray Set and materials should be set out together for this activity. Each group will plant half of presoaked seeds in one 10x10 filled tray, using a second empty tray as the lid. Both sets of planted trays with lids will go in the 10x20 drip tray.

Gardening in the Classroom: Set Up (continued)

Harvesting Sprouts

Materials:

- Pre-grown radish sprouts
- 2 bowls of cold water
- Colander
- 4 clean dish towels
- Sealable plastic bags for take homes

Preparation :

1. JUST BEFORE: Set up a washing and drying station with all materials.

Harvesting Microgreens

Materials:

- 2 pre-grown broccoli microgreen trays
- Kid scissors for harvesting
- 2 medium bowls to harvest into
- Use washing station from Harvesting Sprouts activity (2 bowls with cold water, colander, clean dish towels, resealable plastic bags for take homes)

Preparation:

1. JUST BEFORE: Set out the materials.

Soil Test Demonstrations

You have just discussed the differences between soil and dirt. The major difference between soil and dirt is the presence of organic material in the soil. Remind campers that living organisms are both composed of and produce a lot of organic matter, which is carbon based. Tell campers that they will be helping you with two different experiments. The first will use hydrogen peroxide (H_2O_2) to indicate how much organic matter is in soil compared to how much is in dirt. Ask campers: *What will happen when you add the hydrogen peroxide to each sample?* The second will be using water to indicate how much organic material are in the two samples by mixing water with soil and water with dirt and letting them sit. Then, campers will observe the differences as the soil and dirt settle. Ask campers: *What differences do you expect to observe?*

Set-up

1. Gather and prepare materials, see *Gardening in the Classroom: Set Up* lesson resource.

Procedure

Demo 1

1. Show campers the dirt and the soil you have gathered. Ask the campers, *which one do you think is dirt and which one is soil, why?*
2. Measure two tablespoons of dirt into one jar labeled “Dirt” and two tablespoons of soil into one jar labeled “Soil.”
3. Add 3-4 tablespoons of hydrogen peroxide to each (at the same time).
4. Campers observe the bubbling that occurs in each jar making note of any similarities or differences.
5. Allow campers to feel the outside of the glass jar as the reaction gives off heat energy.

Questions

Remind campers that we are testing for organic, or carbon-based, material in each sample. Ask campers: *Which sample mixed with hydrogen peroxide had more bubbles?* Write carbon on the board and next to it write its chemical symbol “C.” Then write hydrogen peroxide on the board with its chemical symbol “ H_2O_2 .” Have campers describe what they think was happening when the hydrogen peroxide was added to each sample. Explain, that the carbon from the organic material bonded with the oxygen (O_2) from hydrogen peroxide to form carbon dioxide (CO_2) and water (H_2O). The CO_2 escapes in the form of gas caused the bubbles. Ask campers: *Based on your observations which has more organic material, soil or dirt? Why does the presence of organic material in soil produce a better growing medium for plants?*

Soil Test Demonstrations (continued)**Demo 2**

1. Add ½ cup of soil into the empty “Soil” jar and ½ cup of dirt into the empty “Dirt” jar.
2. Fill the jars the rest of the way with water and stir.
3. Let the jars sit for 1 hour.
- 4.. Return to the jars and make observations on the differences between the dirt and soil now that they have settled.

Questions

When the samples have settled there should be a much thicker layer of material floating on the surface of the water in the soil samples versus the dirt sample. This is because organic material is less dense than the other components of soil and dirt like sand, clay, or pebbles, and because the living organisms in soil create holes as they move, aerating it. Ask campers: *What differences do you observe between the 2 jars? Which has more material floating? Based on what we learned about the difference between soil and dirt, what do you think the floating material is? Review: Based on your observations which has more organic material, soil or dirt? Why does the presence of organic material in soil produce a better growing medium for plants?*

Mixing Soil

This activity will allow campers to get their hands in the soil and learn the different components of soil mixes that farmers and gardeners use to start seeds. Campers will learn why one should add compost and vermiculite to a regular potting soil mix, reinforcing the importance of aeration, nutrient content, and good consistency in healthy soil. The soil they mix will be used to plant microgreens in the next activity.

Note: If you have access to vermicompost you might want to add it to your soil mix, or even use it instead of regular compost. It's a great natural fertilizer!

Set-up

1. Gather and prepare materials, see *Gardening in the Classroom: Set Up* lesson resource.

Procedure

1. Write the following ratio on the board: 10% vermiculite, 20% compost, 70% potting soil.
2. Ask campers, *How will you measure these percentages?* The easiest way to measure out these ratios is to think of the whole amount as 10 scoops using a consistent tool to scoop, the plastic cup. 10% of 10 scoops is 1 scoop, so you will add 1 scoop of vermiculite to your soil mix. 20% of 10 scoops is 2 scoops, so you will add 2 scoops of compost to your soil mix.
3. Campers take turns scooping the correct ratios of soil mix components until they have half of the bucket full and then mixing the soil mix with their hands.
4. Teach campers the “Squeeze Test” to find the desired consistency. When they take a handful of their Super Soil Mix and squeeze it, the soil should remain compacted but easily crumble when manipulated. If the soil fails to compact it is too light and may require more dense compost. If the soil is so compact that it won't crumble after being compressed, it is too dense and needs to be lightened with more potting soil and vermiculite.
5. Campers fill two 10x10 trays from Microgreen Tray Set with Super Soil Mix, leaving a cm

Questions

1. *What are the components of our Super Soil Mix?*
2. *Why did we add vermiculite? What about compost? How do these components make our soil mix a better growing medium?*
3. *How can you tell if your soil mix is the right consistency?*

Fava Bean Exploration

Campers not only observe seed anatomy but also set up a germination demonstration in order to observe incremental growth of a sprout.

Set-up

1. Gather and prepare materials, see *Gardening in the Classroom: Set Up* lesson resource.

Procedure

Each camper should:

1. Observe soaked and unsoaked fava beans with magnifying glasses.
2. Draw a picture of a soaked fava bean that has split open in i2 journal. Note any interesting comparisons between the soaked and unsoaked fava bean.
3. Wrap the beans in wet paper towel and put them in a resealable plastic bag labeled with camper's names for later observation.
4. Find a place out of direct sunlight to store the bags for the rest of the camp week. You could tape each one to the wall for easy observation. The campers will observe their sprouting fava beans once a day. They will also check the moisture levels and spray their beans/paper towels as needed.
4. Have campers complete Day 1 observations for Fava Bean Growth in *Growing Log* activity sheet.

Questions

1. *How were the soaked and unsoaked fava beans different? How were they the same?*
2. *What do you predict they will look like tomorrow? In two days? At the end of the week?*

Sprouting

Tell campers they will be sprouting radish seeds in order to observe their growth over the next few days. Explain the difference between sprouts (germinated without using soil) and microgreens (planted in soil). Have campers observe the dry and pre-soaked seed. Ask campers, *why do you think some seeds are good for sprouting and others are not?* Explain that some plants have edible sprouts while others do not. While we eat the fruit of tomato plants, for example, they have mildly poisonous leaves and stems so we don't want to sprout those for eating. The directions below are specific for the "SproutMaster - 5x6 Tray Sprouter," however you can use any commercial sprouter or even a glass jar with a mesh lid. For more information on how to use this sprouter, along with nutrition info, recipes, and extensive directions for sprouting using various types of sprouters, including instructional videos, photos, and time-lapse videos, visit <http://www.sproutpeople.org>. These directions are specific to sprouting radish seeds but you should feel free to experiment. The SproutMaster - 5x6 Tray Sprouter comes with 3 trays, each with a divider, so if you would like to you could experiment with sprouting various different types of seeds. Sprouting will not allow all campers to have a hands-on roll all the time. Take turns with the procedure steps.

Set-up

1. Gather and prepare materials, see *Gardening in the Classroom: Set Up* lesson resource.

Procedure

1. Let campers observe the soaked and unsoaked radish seeds with magnifying glasses.
2. Let campers empty the seeds into the sprouter's tray to drain off the excess water.
3. Run cool water over the seeds in the tray for 15-20 seconds or until the water running through the tray is clear.
4. Shake the tray from side to side to drain thoroughly.
5. Explain how they will repeat this process every 8-12 hours for the next couple of days.
6. Stack the sprouter trays by placing the base (identical to the lid), text side up, followed by a tray, followed by a lid, text side up. This will ensure a seal on top and a gap on the bottom for air circulation. You can add multiple trays, just make sure to put a lid in between each one.
6. Because the sprouter is not transparent, you can place it in direct sunlight if you wish. However, you may have to rinse more often with cool water to compensate.
7. Have campers complete Day 1 observations for the radish sprout growth in their *Growing Log* activity sheet.

Sprouting (continued)

Procedure - Moving Forward

1. Rinse the radish seeds every 8-12 hours for 5-6 days. This may mean rinsing and draining before you leave for the day and first thing in the morning. Use a lot of water pressure to ensure that the sprouts don't clump up.
2. Have the campers write their daily observations in their *Growing Log* activity sheets.
3. Once the leaves begin to open, unstack and uncover the trays, and leave in the sun to "green up."
4. To harvest, follow directions on *Harvesting Sprouts* experiment sheet.

****Note:** Radish sprouts will begin to show microscopic root hairs on day 3. These root hairs tend to stick to the roots when wet and will therefore disappear after rinsing. Don't mistake these for mold.

Questions

1. *Why is it important to rinse the seeds?* (In order to germinate, or sprout, the seeds must be kept moist. Also, we want to make sure our seeds are clean.)
2. *Why do we want air circulation in our sprouter?* (Explain that the seeds need proper airflow to germinate and grow and to ensure that no fungus or bacteria grow on the wet seeds.)

Planting Microgreens

Using the trays of soil filled with Super Soil Mix, campers plant seeds to grow microgreens. Explain the difference between sprouts and microgreens. Show campers the broccoli seeds they'll be planting. Ask campers, *why do you think some seeds are good for growing microgreens and others are not?* Explain that some plants have edible leaves while others do not. While we eat the fruit of tomato plants, for example, they have mildly poisonous leaves and stems so we don't want to sprout those for eating. If campers have already completed the sprouting station, they should be able to explain this concept to you. The directions below are specific to growing 2 trays of broccoli microgreens in 10x10 inch trays, using the Microgreen Tray Set. Each Microgreen Tray Set includes a 10x20 inch drip tray and four 10x10 inch trays (2 for planting and 2 used as lids). Visit <http://www.sproutpeople.org> for detailed information about microgreens including photos, instructional and time-lapse videos, nutrition info, and recipes for broccoli and other seed types.

Set-up

1. Gather and prepare materials, see *Gardening in the Classroom: Set Up* lesson resource.

Procedure - Today

1. Let campers observe the soaked and unsoaked broccoli seeds with magnifying glasses.
2. Have campers spray the soil before they plant.
3. With your help, have each group of campers spread half of presoaked broccoli seeds evenly onto the top of one of the soil-filled trays.
4. Spray the trays with the spray bottles.
5. Cover each tray by placing an upside down tray on top as a lid.
6. Once both groups are done, put both planted trays in the 10x20 drip tray.
7. Place the trays on a windowsill or table.
8. Explain that campers will make observations and water the trays daily.
9. Have campers complete Day 1 observations for the Microgreen Growth on the *Growing Log* activity sheet.

Procedure - Moving Forward

1. Water each day by spraying on top as well as adding water to the drip tray underneath to ensure that the seeds get sufficient water to germinate and grow. Make sure that there isn't excessive water in the drip tray. A little is okay. If the soil begins to mold, remove the moldy section, let the tray dry out and put a fan by the trays.

Planting Microgreens (continued)

2. Have the campers write their daily observations on their *Growing Log* activity sheets.
3. When the leaves begin to open or the microgreens push up on the lid, remove the lids.
4. When the first set of leaves is fully open on the broccoli sprouts harvest them. Use the instructions on the *Harvesting Microgreens* experiment sheet.

Questions

1. *What do you predict they will look like tomorrow? In two days? At the end of the week?*
2. *Why do we cover the seeds? (Many seeds germinate better in the dark. Usually we plant seeds under the ground).*



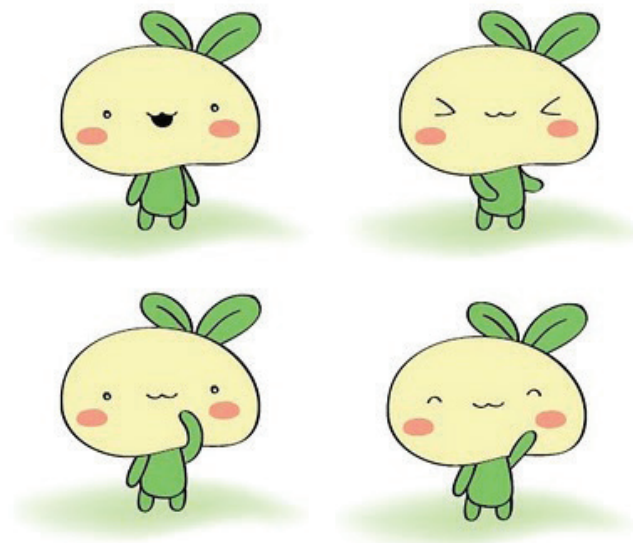
Camper:

Growing Log

Use this growing log to write down your daily observations of your fava beans, sprouts, and micro-greens, including the dry seeds. You can also use the space to draw a picture.

Fava Bean Growth:

Day	Observations
Dry Fava Bean	
Day 1	
Day 2	
Day 3	
Day 4	





Growing Log (continued)

Radish Sprout Growth

Day	Observations
Dry Radish Seed	
Day 1	
Day 2	
Day 3	
Day 4	

Broccoli Microgreen Growth:

Day	Observations
Dry Broccoli Seed	
Day 1	
Day 2	
Day 3	
Day 4	

Harvesting Sprouts

Campers harvest and wash sprouts. Some of the harvest is set aside to add to the salad campers will prepare in **Case 8 Eat More Plants**. You will need to grow sprouts prior to the start of camp to ensure that they are ready for harvesting.

Set-up

1. Gather and prepare materials, see *Gardening in the Classroom: Set Up* lesson resource.

Procedure

1. Have campers verbally describe the radish sprouts they see, noting size, color, shape, etc.
2. Campers wash their hands.
3. Dump the sprouts into the bowl of cold water. Move the sprouts around. Any hulls present will float to the top and can be skimmed off. [NOTE: Sprouts and microgreens can be combined and washed together using the same washing station.]
4. Transfer sprouts to the second bowl by taking handfuls, shaking off the water, and dropping them into the second bowl of cold water.
5. Repeat steps 3 and 4 as many times as necessary until sprouts are clean. Use fresh water for each wash.
6. Drain sprouts using the colander.
7. Transfer sprouts to a clean dish towel and gently pat dry.
8. Set half of the harvest aside in a covered bowl in the fridge for use in **Case 8 Eat More Plants**.
9. Let campers taste sprouts.
10. Let campers fill resealable bags with the remaining sprouts to take home. Store in fridge until the end of the day.

Questions

1. *How would you describe the taste of the sprout? Did you like it?*

Harvesting Microgreens

Campers harvest and wash microgreens. Some of the harvest is set aside to add to the salad campers will prepare in **Case 8 Eat More Plants**. You will need to grow two broccoli microgreen trays prior to the start of camp to ensure that they are ready for harvesting.

Set-up

1. Gather and prepare materials, see *Gardening in the Classroom: Set Up* lesson resource.

Procedure

1. Have campers verbally describe the broccoli microgreens they see, noting size, color, shape, etc.
2. Campers wash their hands.
3. Using scissors, have campers snip the sprouts just above the soil line and place them into the harvest bowls.
4. Dump the microgreens into the bowl of cold water. Move the sprouts around. Any hulls present will float to the top and can be skimmed off. [NOTE: Sprouts and microgreens can be combined and washed together using the same washing station.]
5. Transfer the microgreens to the second bowl by taking handfuls, shaking off the water, and dropping them into the second bowl of cold water. Use fresh water for each wash.
6. Repeat steps 4 and 5 as many times as necessary until microgreens are clean. Use fresh water for each wash.
6. Drain microgreens using the colander.
7. Transfer microgreens to a clean dish towel and gently pat dry.
8. Set half of the harvest aside in a covered bowl or in the fridge for use in **Case 8 Eat More Plants** lesson.
9. Let campers taste sprouts.
10. Let campers fill small plastic bags with the remaining microgreens to take home. Store in fridge until the end of the day.

Questions

1. *How would you describe the taste of the broccoli microgreen? Did you like it?*

Soil Background

Soil is the layer of organic and mineral matter that covers the surface of our earth. Depending on where you are, the contents of the soil will vary, but general soil contents include plant roots, plant and animal remains, minerals, rocks, air, and water. Soil is made in part by the physical and chemical breakdown of rocks and dead plants and animals, through a slow and ongoing process, and is therefore ever changing. Many factors effect the condition and content of different soils. Climate plays a role as wind, water, and ice move and erode soil. Also, living creatures play a role in defining soil. Burrowing animals like worms and moles mix and aerate soil. Plant roots also open channels in the soil allowing water and air in. Decomposers in the soil help return the nutrients from once living plants and animals to the soil.

Today, you will be helping campers to answer the question, “What is the difference between dirt and soil?” Soil is full of living organisms, like plants, worms, fungus, bacteria, and insects. Because there are so many creatures living in soil, including decomposers which break down dead organic matter, soil is full of organic matter and nutrients that plants need to grow and survive. Dirt, on the other hand, is simply broken down rocks and minerals with no living organisms in it. Because it lacks organic material, it is an unsuitable environment to grow plants.

Organic matter is the remains of living things found in soil. Organic matter is made up of mostly carbon. It improves the quality and productivity of soil, better allowing plants to grow in it. This is because the decomposition of organic materials adds vital nutrients to the soil, like nitrogen, phosphorus, potassium, and many other micro-nutrients. Organic material also improves the structure of the soil and keeps nutrients from being washed away by rain. Finally, it helps retain moisture in the soil.”

Seed Anatomy and Germination

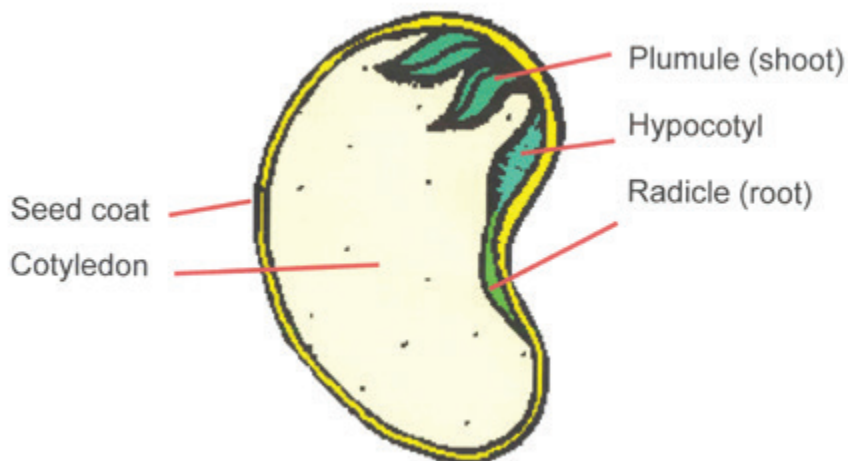
Seed Anatomy:

When the flower of a plant is pollinated, or fertilized, the ovaries grow and ripen into a fruit with seeds inside. The seed is an important part of the reproduction of the plant as each seed has the potential to grow into a new plant. There are three parts to a seed: the embryo, the endosperm, and the seed coat. The embryo is the miniature, immature plant that will grow under the right circumstances. It is made up of the:

- radicle - embryonic root
- epicotyl - will become the embryonic stem and leaves (plume and hypocotyl in image below)
- cotyledon(s) - seed leaves

The endosperm is the nutrition or food source for the seed. It is usually made up of starch and sometimes has some oil and protein as well. In some seeds the cotyledons are the source of nutrition storage for the growing embryo. This food source allows the seed to sprout and grow in the absence of soil for a certain period of time. This is what will allow seeds to sprout in the container without using any soil. The seed coat surrounds the embryo and endosperm and protects it from damage, disease, and predators.

Not all plants have edible shoots and leaves. Tomatoes for example have poisonous leaves and therefore would not be good to grow as sprouts. Only the fruit of the tomato plant is edible. Plants that are good for sprouting and/or growing microgreens are those with tasty, edible sprouts like mustard, radish, sunflowers, beans, peas, and basil.



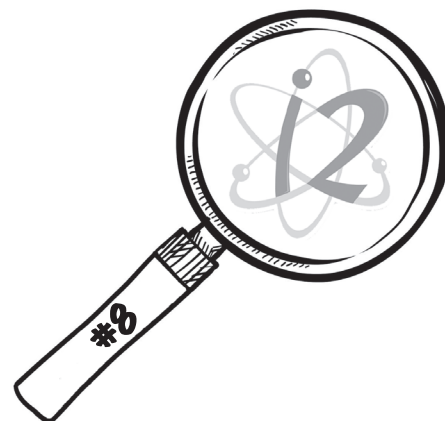
Seed Germination

Germination occurs when the seed goes from a dormant stage to an active growing stage that eventually develops into a seedling. The seed must have proper water, oxygen, light, and temperature in order to germinate. The seeds of different plants have different germination needs and conditions. For example, most seeds need to germinate in the dark, but others, like lettuce require light to germinate.

Seed Anatomy and Germination (continued)

As the embryo grows the radicle, or embryonic root, pushes through the seed wall and grows down into the soil. The shoot grows upward and toward the light. Gravitropism is the growth and movement of a plant in response to gravity. Regardless of the placement of a seed in the soil the root will always grow down and the shoot will always grow upwards. Similarly, phototropism, refers to a plant's ability to always grow towards light. As campers observe the pre-grown sprouts and microgreens, have them look for seeds experiencing these two phenomena. The leaves that developed inside the seed, the cotyledons, will push out of the ground, sometimes with the seed coat or covering still attached. These will open and new growth will continue. The first set of true leaves may look very different from the cotyledons, which tend to take on the shape of the seed itself.

Sprouts and microgreens are full of vitamins, minerals, and nutrients needed to nurture the growing seedling so they are also very healthy to eat. Make sure that you always wash sprouts well before eating.



Cooking to Eat More Plants

.....

Materials

In Guide:

- ***Eat More Plants: Getting Ready*** cooking resource p. 210
- ***Eat More Plants: Set Up*** cooking resource p. 211
- ***Eat More Plants: Feature Foods*** cooking resource p. 214
- ***Eat More Plants: Cooking Skills*** cooking resource p. 216
- ***Plant Part Salad*** camper's recipe sheet p. 217
- ***Exploring Our 5 Senses*** food science resource p. 218
- ***Emulsions*** food science resource p. 221
- ***Make it, Shake It!*** activity sheet p. 225
- ***Wheat Berry Salad*** take home recipe p. 226
- ***Honey, Cider, Cinnamon Vinaigrette*** take home recipe p. 227

Other Materials:

- All ingredients and equipment listed on the ***Eat More Plants: Getting Ready*** cooking resource
- i2 journal and pencils
1 per camper

Overview

In this lesson, campers are reintroduced to the theme of the day, “mostly plants,” and discuss why a mostly plant-based diet is good for them and the environment. Using their plant-part knowledge, campers identify the plant parts of each whole food ingredient. Campers learn how to safely blanch vegetables and discover two Feature Foods: wheat berries and sprouts. Next, campers explore the role our senses can play in their taste perceptions. Campers learn about the properties of emulsions and use what they learn to make salad dressings for their plant-part salad. Lastly, they sit down as real eaters to enjoy their salads together.

Objectives

Campers will be able to:

- identify the food forms of plant parts;
- demonstrate ability to prepare an all-plant based dish;
- recognize the sensory contributions to taste;
- identify the properties of emulsions and common food emulsifiers; and
- use culinary skills to create their own salad dressings.

Before You Begin:

- Review lesson plan and all in guide materials.
- Gather ingredients and equipment, and complete food preparation and cooking station set up using ***Eat More Plants: Getting Ready*** and ***Eat More Plants: Set Up*** cooking resources.
- Review ***Eat Local: Feature Food*** and ***Eat Local: Cooking Skills*** cooking resources and ***Exploring Our 5 Senses*** and ***Emulsions*** food science resources.
- Make copies of ***Plant Part Salad*** camper's recipe sheet, ***Wheat Berry Salad*** and ***Honey, Cider, Cinnamon Vinaigrette*** take home recipes, and ***Make It, Shake It!*** activity sheet for each camper.

Clues collected:

- *Wheat Berry Salad* take home recipe
- *Honey, Cider, Cinnamon Vinaigrette* take home recipe
- *Make It, Shake It!* activity sheet

Go Deeper

If campers are very interested in the meat industry, you might want to watch one or both of the following movie clips available online:

True Cost of Food
found at <http://www.sierraclub.org/truecostoffood/movie.asp>

McDonald's, the meat industry, and chickens (from *Food, Inc.*)
found at <http://www.youtube.com/watch?v=a3P5tmkjHa8>

1. Introduce the Case

Introduce campers to their next food detective case, **Cooking to Eat More Plants**. Remind campers that the theme of the day is to eat more plants. Ask campers to name some plants that they eat and write their responses on the board. Make sure they mention grains, beans, legumes, and nuts, not just fruits and vegetables. Ask campers, *why might it be important to eat more plants?* Record the answers on the board. Some campers may come from homes where meat is commonly consumed and others may follow vegetarian or vegan diets. Focus the conversation on the importance of eating plants for individual health and the health of the environment. Focus more on why to eat plants and less on why not to eat meat. Also, use this time to synthesize materials learned throughout the day. Include the following points in the discussion:

Healthier for You: Ask campers, *have you heard of the term “eat the rainbow?” What does it mean?* Fruits and vegetables come in a variety of colors. The more variety that you choose, the more nutrients you will get to keep you healthy. Plants contain nutrients like vitamins, minerals, natural sugars and starches, fiber and phytochemicals. All these components help your body make connections and function properly to help you from getting sick. They keep your body strong and healthy.

Minimal Effect on the Environment: Growing plants has less of a detrimental effect on the environment than producing meat. Remind campers that plants are producers. They make up the first trophic level that uses the energy of the sun to make food. The meat that we eat comes from animals that are primary consumers. They feed on plants to survive, and then we eat them, making us secondary consumers. Help campers understand that because most of the food available in the U.S. is part of the industrial food system, a lot of resources and energy go into first growing the plants used for animal feed, and then into raising the animals we eat as meat. To grow both the plants and the animals the industrial food system uses enormous amount of resources and space and produces more pollution and waste than we can safely handle. Therefore eating more plants is healthier for the environment.

2. Highlight Feature Foods

Using the *Eat More Plants: Feature Foods* cooking resource, introduce the two Feature Foods: wheat berries and sprouts. Allow campers to see, smell, and touch the raw form of each feature foods. Offer campers a tasting of the previously prepared samples. Wheat berry is not edible raw and should be pre-cooked for the tasting. Allow campers to describe how the wheat berries and sprouts/microgreens taste, smell, and feel as a group.

3. Practice Cooking Skills

Demonstrate how to wash broccoli in a colander. Broccoli is best washed after it is broken into smaller florets in order to remove any dirt that might be hiding. Allow this demonstration to lead into the following skill building discussion on blanching.

Remind campers that in the hot zone, they must keep their distance from the heating elements and keep a cool head. Using the information on the *Eat More Plants: Cooking Skills* cooking resource, explain to campers that blanching is a process commonly used in food preparation in which the chef cooks the fruit or vegetable in boiling water for a very short time period, 1-3 min in order to cook the produce while maintaining certain quality characteristics like texture and color. Blanching is also a technique that is used to slow down the natural decomposition process so that foods can be preserved and still maintain flavor and texture. Put the washed broccoli into a boiling pot of water for 1 min, just until the broccoli turns bright green. Remove broccoli from heat, drain it, and set it aside into a bowl of cold tap water or ice water.

4. Make the Salad

Have campers re-wash their hands. Divide the campers into their respective cooking groups. Provide each group with several copies of *Plant Part Salad* camper's recipe sheets to share. Before starting the recipe have campers take turns telling you what plant part each ingredient is. Then, review the recipe together. Allow campers to self-assign different tasks such as washing, chopping, preparing, and assembling the vegetable portions of their salad.

5. Explore Our 5 Senses

Discuss the ways that we come in contact with food (through our eyes, when something looks good; through our nose, when we smell foods; with our hands, when we touch it, etc.). Allow campers to consider all the ways in which we may sense a food. *Now what happens when food comes into the mouth?* Ask campers to close their eyes and picture eating a carrot. *What is the first thing that you see? How might it feel on your tongue. How about when you bite into it? What do you feel? Hear? Taste?* Explain that our tongue is the taste organ, but we also feel with our mouths, and foods provide sound when we chew on them.

Use the *Explore Our 5 Senses* food science resource to explain to campers what will happen at each tasting station of the Case for Tastes experiment. Divide the group into two small groups and further into pairs. Direct one small group to one tasting area and the other to another. Help campers

Go Deeper

There are other variables that affect taste perception. Campers can look into the effect of different amounts of salt dissolved in water. Another possibility would be to have campers dry their tongues with a quarter of a paper towel or a paper napkin and look into the role of saliva in taste. Finally, sucking on an ice cube could allow campers to explore how temperature affects taste perception.

select the role of “taster” or “tester” and assist them with their blindfolds. Explain that after the “taster” has tried all four samples, they will switch roles. When all pairs have completed the taste test, bring the group back together to discuss what they discovered from the experiment.

6. Discover Emulsions

Ask campers to tell you what would happen if you poured oil into a glass of water. Prompt them to reveal that the two liquids would remain separate with the layer of oil on top of the water. *Why do you think this might happen? Can you imagine what would happen if we stirred them up?* Explain that emulsions are mixtures of two or more liquids that don't ordinarily mix well. Use the *Emulsions* food science resource to conduct a scientific exploration of emulsions.

7. Dress it Up

Now that campers have an understanding about taste perceptions, and the food science behind emulsions, they are ready to make their own dressings. Divide campers into four small cooking groups. Give each group an 8-ounce mason jar and allow them to use their *Make It, Shake It!* activity sheet to select their ingredients, make their salad dressing, and record their recipes. Use the *Emulsions* food science resource to suggest certain flavor combinations.

8. Eat!

The four dressings that are made can be used to dress each portion of divided plant-part salad. Allow campers to try all four varieties so they can taste the creative concoctions of their fellow campers. While sitting down to eat together give campers an opportunity to explain what they selected for their dressing and why.

9. Clean Up

Once everyone is finished it is time to clean up. Everyone should be involved in the cleaning process. Make sure that all cooking and eating surfaces are wiped down and floors are swept. If possible, have campers wash their own dishes. Cleaning will go faster if some washing has already been done throughout the activity.

7. Close the Case

Ask the campers the following questions:

What did you like about the salad?

What is your favorite plant part?

Which dressing did you like? Why?

If campers indicate that they don't like something, ask them to suggest what they would do differently?

Have campers record their impressions in their i2 journals. Distribute **Wheat Berry Salad** and **Honey, Cider, Cinnamon Vinaigrette** take home recipes to each camper. Indicate that now that they know how to make their own dressings, they can either follow the recipe provided, make substitutions to the recipe, or make their own dressing from scratch when enjoying their plant-part salad at home. Congratulate campers for their investigative skills, culinary creativity, and completing today's cooking case.

Eat More Plants: Getting Ready

These are all the ingredients and supplies you need to make all the recipes and complete all cooking demonstrations and activities for 20 campers.

Shopping list

- 4 cups dry organic red winter wheat berries (~ 8 cups cooked)
- 1 bunch of celery
- 2 cups tart dried cherries
- 1 bunch of scallions
- 1 crown of broccoli
- 1 large bunch fresh parsley
- Radish sprouts and broccoli microgreens (from Case 7)
- 2 tsp. granulated sugar
- ½ tsp. table salt
- 2 tsp. white vinegar
- ½ tsp. instant coffee
- ½ cup vegetable oil
- 3 heads of garlic (12 cloves)
- 2 shallots
- 1 jar of Dijon mustard
- 12 Tbsp. balsamic vinegar
- 12 Tbsp. cider vinegar
- 4 large oranges
- 4 lemons
- 1 4-oz. can tomato paste
- 1 ½ cup olive oil
- 4 Tbsp. honey
- Ground cumin
- Paprika
- Cinnamon

Cooking Equipment

- 1 cutting board
- 1 adult knife
- 1 clean kitchen towel
- 1 large pot
- 1 colander
- 1 burner
- 1 bowl for ice bath
- 1 Slotted spoon
- Ice or cold water
- 1 cutting boards per camper
- 1 Knife per camper
- 3 clean dish towels
- 4 sets of measuring spoons
- 4 sets measuring cups
- * 4 large bowls
- 2 small bowls
- Bowls for eating
- 2 Serving/mixing spoons
- Cups, bowls, utensils, napkins, spoons per camper
- Tongs
- 10 test tubes with caps
- 2 test tube racks
- 8 8-ounce mason jars
- Dropping pipettes (3 ml): 4 per camper, 1 per instructor, plus 4 additional
- 8 timers
- Tasting spoons: 1 per camper plus 6 additional
- 2 plastic cups
- 1 magnifying glass per pair
- 1 camera per pair

Advanced Prep

- Cook 4 cups of dry red wheat berries according to package directions (makes 8 cups cooked, for recipes and Feature Food tasting). Save some raw for observation.
 - Clean and trim broccoli for blanching demonstration but allow portion of crown to remain intact to demonstrate appropriate washing techniques.
 - Use *Exploring our 5 Senses* food science resource to make 4 flavor solutions.
2. Using a food processor, mince all 12 cloves of garlic. Reserve 2 teaspoons for the Testing Emulsions Experiment and the rest (about 4 tablespoons) for the *Make It, Shake It!* activity sheet.
 3. Mince shallot and juice the oranges and lemons for the *Make it, Shake It!* activity sheet.
- Set up stations using the *Eat More Plants: Set Up* lesson resource.

Eat More Plants: Set Up

Use this sheet to prepare the classroom for cooking. Campers prepare each recipe in small cooking groups. Set up a cooking station for each small group with all food and equipment listed, separated by recipe. Prepare the shared ingredient station with the food and other equipment that are shared by all groups in a communal location. Prepare the demonstration and feature foods stations with the listed food and equipment.

Station: Cooking Group 1

A. Plant Parts Salad

Foods:

- 4 celery stalks, washed and cut
- ½ bunch fresh parsley, unwashed
- 3 scallions, unwashed
- 2 handfuls of microgreens and sprouts (pre-washed)
- 3 cups of cooked wheat berries
- Blanched broccoli (from demonstration)

Equipment:

- 1 knife per camper
- 1 cutting board per camper
- 2 sets of measuring spoons*
- 2 sets of measuring cups
- 1 large bowl
- 1 large mixing spoon
- 1 clean dish towel
- 1 colander
- 1 medium bowl

Preparation:

1. Cook 4 cups of dry, red wheat berries, following package directions, (enough for both group's recipes and the Feature Food tasting). Save some raw for observation.
2. Wash celery stalks and cut lengthwise into thirds or quarters.

B. Make It, Shake It!: Dressings

Foods:

- Minced garlic
- Minced shallots
- Juice of 2 oranges
- Juice of 2 lemons

Equipment:

- 2 sets of measuring spoons*
- 3 small bowls
- 3 small spoons
- 2 8-oz. mason jars
- Citrus juicer

Preparation:

1. Collect the remaining minced garlic from the Testing Emulsion experiment.
2. Use a food processor and mince 2 shallots. Set out into a small bowls.
3. Juice 2 oranges. Set out juice into a small bowl (should yield about ½ to 1 cups).

*Measuring spoon sets could be shared between the recipes

Eat More Plants: Set Up (continued)

- Juice 2 lemons. Set out juice into a small bowl (should yield about ½ cups).

Station: Cooking Group 2

A. Plant Parts Salad

Foods:

- 4 celery stalks, washed and cut
- ½ bunch fresh parsley, unwashed
- 3 scallions, unwashed
- 2 handfuls of microgreens and sprouts (pre-washed)
- 3 cups of cooked wheat berries
- Blanched broccoli (from demonstration)

Equipment:

- 1 knife per camper
- 1 cutting board per camper
- 2 sets of measuring spoons*
- 2 sets of measuring cups
- 1 large bowl
- 1 large mixing spoon
- 1 clean dish towel
- 1 colander
- 1 medium bowl

Preparation:

1. Cook 4 cups of dry, red wheat berries (enough for both group's recipes and the Feature Food tasting). Save some raw for observation.
2. Wash celery stalks and cut lengthwise into thirds or quarters.

B. Make It, Shake It!: Dressings

Foods:

- Minced garlic
- Minced shallots
- Juice of 2 oranges
- Juice of 2 lemons

Equipment:

- 2 sets of measuring spoons*
- 3 small bowls
- 3 small spoons
- 2 8-oz. mason jars
- Citrus juicer

Preparation:

1. Collect the remaining minced garlic from the Testing Emulsion Experiment.
2. Use a food processor and mince 2 shallots. Set out into a small bowls.
3. Juice 2 oranges. Set out juice into a small bowl (should yield about 4 tablespoons).
4. Juice 2 lemons. Set out juice into a small bowl (should yield about 2 tablespoons).

*Measuring spoon sets could be shared between the recipes

Eat More Plants: Set Up (continued)**Station: Shared Ingredients**

- 1 jar of Dijon mustard
- Balsamic vinegar
- Cider vinegar
- Tomato paste
- Honey
- Olive Oil
- Ground cumin
- Paprika
- Cinnamon

Preparation:

1. Put out remainder of tomato paste and Dijon mustard leftover from Testing Emulsions experiment.

Eat More Plants: Feature Foods

Wheat Berries, Sprouts, and Microgreens

The purpose of the feature foods is to introduce potentially new foods to the campers. Feature Foods highlight an ingredient in its raw or simply prepared form in order to expose campers to foods in their whole form.

Materials

- 1 burner
- 6-quart pot of water
- 4 cups of dry, winter red wheat berries
- 1 fine mesh strainer
- 2 medium bowls
- 1 serving spoon
- Table salt
- Tasting spoons
- Microgreens and Sprouts from Case 7
- Tongs

Wheat Berries

What are wheat berries? Wheat berry (or wheatberry) is the entire edible part of the wheat kernel; they truly are whole grains! And as such, wheat berries are loaded with all the nascent nutrients that otherwise gets stripped away in processing. Wheat berries can be ground to make whole wheat flour. Wheat berries are generally labeled as either spring or winter berries depending on when they are grown. They may also come in hard or soft, and red or beige varieties; all of which are delicious and suitable for eating in soups, salads or baked goods. However, since soft wheat berries have a toothsome starchiness and hard wheat berries retain their firm chewiness, typically hard red winter wheat berries are best for salads. Wheat berries have a nutty flavor so they pair well with fresh vegetables and dried fruits such as cranberries, raisins, and cherries.

How to Prepare Wheat Berries for Tasting:

Cook 4 cups of dry, winter red wheat berries in advance as indicated on package directions. Contrary to popular belief, they do not need to soak overnight before cooking. Make sure to sort through the wheat berries carefully to discard any stones before cooking. After the wheat berries have been cooked set aside 6 cooked cups, 3 cups for each cooking group. Store in a covered container for up to 2 days in the refrigerator. The remaining cooked wheat berries are for the Feature Food tasting. Simply add a little salt to taste. Allow the campers to taste it bare like this.

Tasting: Give each camper a tasting spoon and allow them one spoonful of cooked wheat berries.

Eat More Plants: Feature Foods (continued)**Sprouts & Microgreens**

What are Sprouts and Microgreens? Sprouts and Microgreens are simply the part of the plant that would shoot up above the soil. They are the smallest form of the plant; that grow from a miniature seed. The key difference between the two is that sprouts grow in water, and microgreens in the soil. They both have soft leaves, succulent little stems, and provide the subtle pleasant flavor of whichever varietal you are growing: radish, broccoli, peas, alfalfa etc. Sprouts and microgreens make great sandwich stuffers, can be added on top of almost any dish, and mixed into salads. Much like watercress, the stems are edible.

How to Prepare Sprouts & Microgreens for Tasting:

Campers harvest, wash, and dry sprouts prior to cooking during **Case 7 Gardening in the Classroom**. Take a couple of handfuls and place in a bowl.

Tasting: Using tongs, give each camper a small amount of sprouts to try.

Eat More Plants: Cooking Skills

Blanching

Materials

- 1 burner
- 6-quart pot of water
- Large bowl of ice water
- Broccoli
- Slotted spoon
- Colander
- Medium bowl

How to Blanch

Blanching is a cooking process whereby a food item, generally a vegetable or fruit, is plunged into boiling water for a short period of time and then plunged into an ice bath (a process called shocking) to halt the cooking process. Foods are blanched for the purposes of softening them, partially or fully cooking them, to remove strong flavors, decrease natural enzymatic activity (to preserve freshness before storing, such as freezing), remove skins or peels (as with nuts and tomatoes), and to preserve color, texture or flavor.

To blanch fill a pot with water and bring it to a boil. Fill a large bowl with ice water; keep a slotted spoon handy. Clean and trim your vegetable or fruit as necessary. For foods like broccoli or cauliflower, it is recommended to cut them into smaller florets in order to increase their surface area. You may also want to work in batches depending on the size of your pot and the amount of food items you are blanching. Immerse the pieces in the boiling water for 30 to 60 seconds. Use a slotted spoon to move them around to ensure that all surfaces are submerged. Use the slotted spoon to carefully transfer the fruits or vegetables to the bowl of ice water. Once they are cooled, drain and transfer the blanched broccoli to a clean bowl.

Plant Parts Salad

Serves 10 campers

Ingredients at station:

- Cooked wheat berries
- Celery sticks
- Scallions
- Blanched broccoli florets
- Parsley
- Various microgreens and sprouts

Ingredients at station:

- Dried cherries
- Ground cumin
- Paprika
- Cinnamon

Directions:

1. Place **scallions** and **parsley** in a large bowl. Bring the bowl, a clean dish towel, and a colander to the sink.
2. Wash **scallions**.
3. Wash **parsley** and pat dry with clean dish towel.
4. Wash **microgreens** and pat dry with clean dish towel.
5. Add **3 cups cooked wheat berries** to bowl.
6. Chop **all celery** into small bit-sized pieces and add them to the large bowl of wheat berries.
7. Tear **parsley** into small pieces. Measure out **1 heaping cup**. Add to large bowl.
8. Slice **all scallions** into 1 centimeter rounds. Add to large bowl.
9. Add **2 handfuls of microgreen and sprouts** to large bowl.
10. Take small bowl to shared ingredient station and measure out **1 cup dried cherries, 1/2 teaspoon of ground cumin, 1/4 teaspoon of paprika, and 1/8 teaspoon of ground cinnamon** and add to large bowl.
11. Add **blanched broccoli florets** to large bowl.
12. Mix **all ingredients** in the large bowl to combine.

Exploring our 5 Senses

Food is experienced through the five sense. We may first see a food that looks enticing, or our first contact may be through smell, like the aroma of freshly baked bread. Once we come in closer contact with the food, we can touch it with our fingers or even begin to gage its texture with our utensils. However, the main touch experience occurs when we put foods into our mouths and detect its texture and temperature as crunchy, chewy, soft, spongy, hot, cold, etc. Our taste buds identify one of the four tastes: salty, sweet, bitter, or sour, and also our pain receptors identify heat (spiciness and temperature). Additionally, we can hear foods as we bite into them or swirl them in our mouths.

This table lists the basics about the five senses to help in the discussions:

Sense:	Organ:	Allow to:	Provides information about:
sight	eye	glimpse, see, observe	color, form, aspect
touch	skin (including tongue and mouth)	touch, press, feel	texture, temperature, consistency, spiciness
smell	nose	smell	odor, odor intensity
hearing	ear	hear, listen	sounds, density
taste	tongue	taste	sweetness, saltiness, bitterness, sourness

How are we Different?

Each person has a different sensory experience even with the same food. First of all, genetically we are all different, for instance, some people perceive bitter compounds more intensely than others. Additionally, each of us has a different composition and placement of taste buds in our tongues and mouths. Also, our senses provide information to our brains, which gets processed differently from one person to another. For example, our brain associates our previous experiences with foods and brings emotions and memories back to identify with and react to the sensory experience. Since each of us have had different experiences, the sensory experience is highly individualized. Some campers may verbalize their likes and dislikes. Discussing how our experience with food is highly individualized may help campers be more accepting of others likes and dislikes, and help reinforce the kitchen rule “don’t yuck someone else’s yum.”

Exploring our 5 Senses (continued)

The Case for Tastes Experiment

In this experiment, campers explore the sense of taste. They examine their partner's taste buds with a magnifying glass, look at photos of their own taste buds, and distinguish between the four main tastes: sweet, salty, sour, and bitter.

Materials:

- 4 8-ounce mason jars
- 1 set measuring spoons
- 1 set measuring cups
- Granulated sugar
- Table salt
- White vinegar
- Instant coffee
- Water
- 4 small bowls of each solution (sweet, sour, salty, bitter)
- Magnifying glasses, 1 per pair
- Cameras
- Dropping pipettes, 4 per camper, 1 per teacher

Set-up

1. Gather all materials.
2. Make each of the four flavor solutions (sweet, salty, sour, and bitter) in mason jars so you can shake them to combine and dissolve them into uniform solutions. Divide each solution into four small bowls.
 - Sweet: granulated sugar - 2 teaspoons dissolved in $\frac{1}{2}$ cup of water
 - Salt: table salt - $\frac{1}{2}$ teaspoon dissolved in $\frac{1}{2}$ cup of water
 - Sour: white vinegar - 2 teaspoons dissolved in $\frac{1}{2}$ cup of water
 - Bitter: instant coffee, (can also use cold brewed coffee) - $\frac{1}{2}$ teaspoon dissolved into $\frac{1}{2}$ cup of water

Procedure

1. Allow campers to share what they might already know about taste buds and what those taste buds detect. What are taste buds? What types of flavors can they detect?
2. Using a dropping pipette demonstrate how to suck up and drop a single drop of liquid solution. Be sure to tell campers not to dip a pipette back into a solution after it has been used to release a drop in a

Exploring our 5 Senses (continued)

camper's mouth.

3. Campers work in pairs within small groups. Have one camper in a pair look at the other camper's taste buds with the magnifying glass. Then have them switch roles. Have them snap photos of each other's taste buds and examine their own taste buds. Ask campers to describe what they see in their i2 journals. You can prompt them to jot down what they see: the shape of taste buds' shape, color, how they are distributed, if they are different or the same in different areas of the tongue, and from their partner's.
4. Assign one camper in each pair to be the "taster" while the other is the "tester." The taster closes his/her eyes while the tester places a droplet of either the sweet, salty, sour, or bitter solution onto the taster's tongue and allows the taster to guess which set of taste buds are being stimulated by the sample. When the tester has tried all four solutions, allow campers to switch roles.
5. Once tasting and testing has been completed, hold a discussion to allow campers to reveal their findings.

Questions

1. *Which flavors did you detect in the solutions? What did you discover is similar about your taste buds and your partner's?*
2. *How might one person's taste differ from another's? If each of our taste experiences can be different, what does that tell us about our food experiences? What might this tell us about why people choose certain foods over others? What might this tell us about the foods of different cultures? Why is it OK if your friend likes something and you don't?*

Emulsions

Exploring Emulsions

Picture a cup of vinegar. What happens if you slowly pour oil into that cup? The oil floats on top of the vinegar as a separate phase. When two immiscible liquids (cannot be blended together easily) are mixed, the liquids tend to separate forming two layers, normally for instance, water and oil. To get these two liquids to mix, one has to apply some energy, for instance, by shaking, whisking, or stirring. Picture what happens if you whisk the liquids together? They start to mix together and tiny droplets of each liquid become suspended within each other. When they become uniformly mixed then you have an emulsion. An emulsion is, therefore, a mixture of two or more immiscible liquids. Milk is homogenized (sprayed at a high pressure against a surface) to get the fat and water to emulsify.

Emulsions are generally made of two phases: a continuous and a dispersed phase. Think of the continuous phase as the background and the dispersed phase as the droplets embedded in the background. Depending on the amount of each liquid in the mixture and the type of emulsifier used, the emulsion can either be a 'water-in-oil' emulsion (oil being the "background" or continuous phase) or an 'oil-in-water' emulsion (where water is the "background" or continuous phase). Oil-in-water (O/W) emulsions are more common in foods, for example, milk and mayonnaise. Water-in-oil (W/O) emulsions like butter or vinaigrettes are less common. The type of emulsion is important because our sense of taste identifies the continuous phase more readily, for instance, mayonnaise does not regularly have an oily taste while butter or vinaigrettes do.

Emulsions tend to separate over time because the water droplets tend to migrate towards other water droplets, and away from the oil droplets and vice versa. One can increase the stability (meaning how long it stays mixed together) of an emulsion by adding an emulsifier. An emulsifier consists of a water-loving (hydrophilic) portion and an oil-loving (hydrophobic) portion. The hydrophilic portion comes in contact with to the water phase and the hydrophobic portion of the emulsifier with the oil phase. Thus the emulsifier positions itself between the oil and the water to reduce the surface tension that is generated when two liquids, which would otherwise not be stable together, come in contact. Thus, the emulsifier has a stabilizing effect on the emulsion. In home cooking, there are few true emulsifiers, mainly egg yolks, mustard, and plant-wall parts of certain vegetables, beans/legumes.

When we rupture cell walls in vegetable purées they insulate the oil droplets from each other so the emulsion takes longer to separate. The thicker the purée, the more stable is the emulsion. Garlic purée works particularly well in dressings.

Testing Emulsions Experiment

What do milk, ice cream, salad dressing, and butter all have in common? They are all food emulsions!! In this experiment, campers use inquiry skills (observing, predicting, hypothesizing, experimenting, measuring, organizing data, and making inferences) to explore the properties of four different emulsions. One of these solutions will act as a control, without the addition of an emulsifier, and the others will include either mustard, tomato paste, or minced garlic as emulsifiers. Campers will compare the amount of time it takes for the oil and water phases to separate under each condition and record their observations and findings in their i2 journals.

Emulsions (continued)

Materials:

- 2 small bowls
- 1 food processor
- 12 cloves of garlic, finely minced
- 2 plastic cups
- ½ cup of water
- ½ cup of vegetable oil
- 10 test tubes with caps
- 2 test tube rack
- 4 dropping pipettes (3 ml)
- 8 timers
- 6 tasting spoons
- Tomato paste
- Dijon mustard

Set-up

1. Mince the garlic finely with the food processor and set it out into two small bowls, one for each station.
2. Set two stations, each with a test tube rack and 5 test tubes, 4 timers, 2 droppers and 3 tasting spoons.
3. Divide water and oil between the 2 stations: ¼ cup of water and ¼ cup of oil per station.

Procedure

1. Briefly review the basics about emulsions. Explain that they will be exploring what makes an emulsion more stable. Remind campers that emulsions result from an effort to mix two liquids that normally would not mix homogeneously: an oil-based liquid, and a water-based liquid.
2. Have campers brainstorm what would make the two liquids mix. After gathering their input, explain that in order to mix these liquids energy is required, in this case, mechanical energy from shaking the test tube.
3. Ask campers to predict what would happen to the emulsion over time. Explain that emulsions will quickly revert and separate, often within a few minutes.
4. Review the inquiry skills they will be using in this exploration: observing, predicting, hypothesizing, experimenting, measuring, organizing data, and making inferences. Comment that they already practiced predicting.

Emulsions (continued)

5. Have campers measure out 3 ml of water using the dropping pipette and add it to each of the 5 test tubes. Have campers measure out 3 ml of oil using the dropping pipette and add it to each test tube. Ask them to observe what happens when the water and oil come in contact. Have them record their observations onto their i2 journals. Explain that they are using their observation skills.
6. Ask campers to shake one of the test tubes, observe what happens, and then record their observations.
7. Have campers give ideas as to what they could do to make the emulsions stay uniform for a longer period of time. Acknowledge their ideas and then explain that there are ingredients that can be added to stabilize emulsions making them last longer, and that they are called emulsifiers. Comment that they will be using mustard, garlic, and tomato paste as emulsifiers.
8. Have three campers in each of the stations add one level tasting spoon of one of the emulsifiers to a test tubes that already contains water and oil. Each group will end up with 5 emulsions: the test tube that was already shaken (keep it separate from the rest), one test tube with oil, water and garlic; another with oil, water, and mustard; one more with tomato paste, oil, and water; and finally one (not shaken) with only oil and water. Ask campers to hypothesize which of these last four test tubes will separate the fastest. Ask them which ones they think will come second, third, and fourth.
9. Assign four campers per station with the task of timing the emulsions. These campers will each have a timer and be assigned to observe one emulsion each.
10. Reserve remaining minced garlic in two separate bowls for each Make It, Shake It!: Dressing Station.

Questions

1. *Which emulsifier was the most stable? How did you come to this conclusion? Which emulsifier was the least stable? What happened to the emulsions that were least stable?*

Vinaigrette Salad Dressing

Vinaigrettes are the diminutive form of the of the French word ‘vinaigre’ - vinegar, but it is commonly understood as a type of dressing in the United States. A vinaigrette is an emulsion, a water-in-oil emulsion, as previously mentioned. Typically a vinaigrette will consist of oil, vinegar (or other citrus), an emulsifier, and aromatics, such as herbs and spices. Sometimes the aromatics can also act to stabilize the dressing, such as with garlic puree, which provides flavor and stability, or honey.

The standard culinary ratio for vinaigrettes is 3 parts oil to 1 part vinegar; the 3-to-1 vinaigrette . If you prefer a sharper vinaigrette, you can use 2 parts oil to 1 part vinegar. If you use lemon as your acid, you may need slightly more oil.

To get a uniform mixture, it is important to whisk, stir, or mix your ingredients well. A mason jar can be handy for making dressings. You can add all your ingredients to the jar, secure the lid, and then give your dressing a good shake; whatever doesn't get used can remain in the mason jar for storage.

Emulsions (continued)

Below are some tested combinations that we find to work well, but this is a creative process and can be fun to experiment with.

Lemon-Dijon Vinaigrette*	Tomato-Balsamic Vinaigrette	Orange-Shallot Vinaigrette	Honey-cider Vinaigrette
¼ cup lemon juice ½ olive oil ¼ cup Dijon mustard Olive oil Salt and pepper to taste	3 Tbsp. balsamic vinegar ½ cup olive oil 1 Tbsp. tomato paste 1 tsp. of minced garlic Salt and pepper to taste	3 Tbsp. of fresh-squeezed orange juice ½ cup olive oil 1 Tbsp. minced shallot Salt and pepper to taste	3 Tbsp. of cider vinegar 3 Tbsp. of olive oil 1 Tbsp. of honey Pinch of cinnamon ½ tsp. of ground cumin ¼ tsp. of paprika

*Note for Lemon-Dijon Vinaigrette: Lemon juice is a strong acid, use 2 parts oil to 1 part lemon juice; equal part mustard to acid in order to balance the flavors.



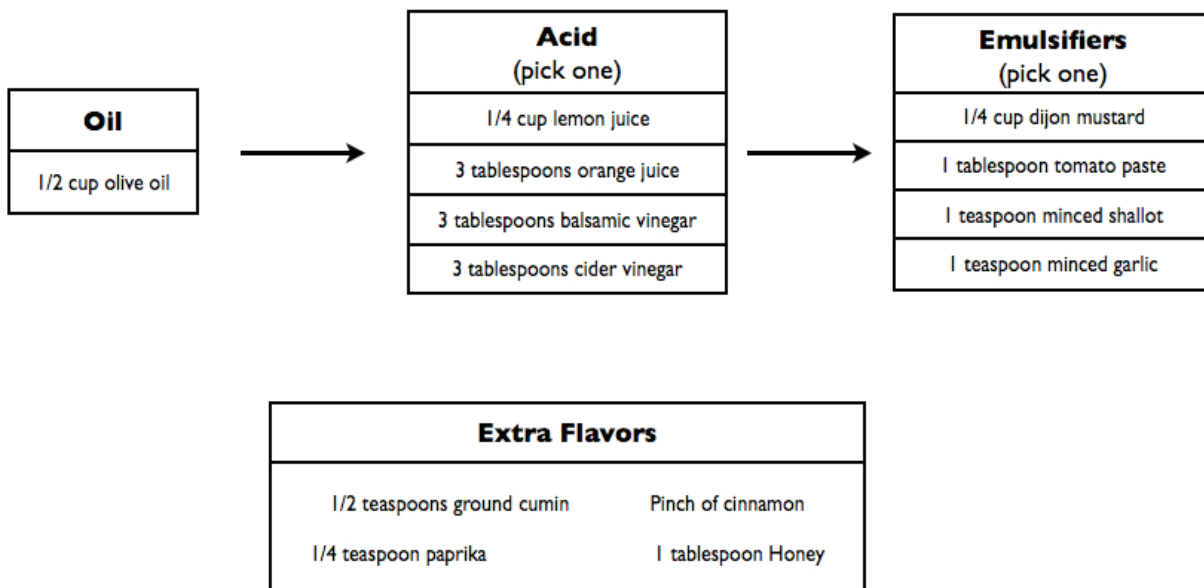
Camper:

Make It, Shake It!

Make it, then shake it! Now that you know that an emulsion is a mixture of two or more liquids that do not mix, and you know the types of ingredients that can make an emulsion stable, you can make your own dressing! Follow these 5 simple steps:

1. Measure out the oil into your mason jar.
2. Choose your acid and add it to your jar.
3. Pick your emulsifier and add it to the jar.
4. Select any other flavor-adding ingredients. Follow the chart to help you decide what might taste best.
5. Secure the lid tightly. Find some space, and shake it until it is all combined.

Work in small groups to make a dressing for your plant-part salad. Circle the emulsifier and the acid below that your group has selected. List any additional flavor ingredients that you wish to add.



Wheat Berry Salad

This sweet, tart, savory, and hearty salad is a winning combination of all the plant parts... and it only gets better with age. You can make and eat it right away, or let it marinate in the dressing over night (see *Honey, Cider, Cinnamon Vinaigrette* recipe). This recipe has been adapted from The Food TV Network's Healthy Appetite with Ellie Krieger.



Makes 10-12 servings

Ingredients:

- Water
- 1 ½ cups dried red winter wheat berries
- 2 cups blanched broccoli
- 4 stalks of celery, chopped finely
- 1 cup dried cherries
- 3 scallions, white and green parts, chopped finely
- 1 cup parsley, chopped finely
- 2 handful of sprouts, coarsely chopped
- 1/2 teaspoon salt

Directions:

1. Rinse red winter wheat berries carefully and follow package instructions to cook. 1 ½ cups dried will make approximately 3 cups cooked wheat berries.
2. Prep and wash the broccoli. Blanch in boiling water until broccoli is bright green (approx. 1 min). Immediately transfer broccoli to a bowl of cold or iced water.
3. In a large bowl combine wheat berries, celery, scallions, broccoli, parsley, dried cherries, pea shoots, and salt.
4. Toss ingredients to combine.
5. Dress with dressing and stir to incorporate.

Honey, Cider, Cinnamon Vinaigrette

Homemade vinaigrettes can be made in a flash and store well for future use. This dressing has warm hints of cinnamon and cumin that holds on to hearty grains, like wheat berries, making it a perfect match for our wheat berry salad.



Makes approx. 1 cup

Ingredients:

- 1 tablespoon honey
- 1/8 teaspoon of cinnamon
- ¼ teaspoon of paprika
- ½ teaspoon of ground cumin
- 3 tablespoons apple cider vinegar
- ¼ teaspoon of salt
- ¼ teaspoon of ground black pepper
- 3 tablespoons olive oil

Directions:

1. In a small bowl add honey, cinnamon, paprika, and cumin
2. Whisk in vinegar 1 tablespoon at a time.
3. Add a pinch of salt and pepper.
4. Continue whisking and add olive oil a little at a time.
5. Pour the dressing on the salad and mix to combine.

.....

Food Chemistry

Day 3



Less Processed



Portion Distortion

.....

Materials

In Guide:

- *Perfect Air Popped Popcorn* recipe p. 233
- *Popcorn Portion Distortion* experiment sheet p. 234
- *Portion Distortion* teacher note p. 237
- *Super Size Me* teacher note p. 238

Other Materials:

- *Super Size Me* movie clip from resource disk
- Bags of popcorn
- Smart Board
- Calculator
- Hot air popcorn popper
- 1 large bowl
- 1 set measuring cups
- Brown 100% Recycled Lunch Bags; Large: 6" x 11" x 3³/₄" for each camper
- 1 bag of high quality popcorn kernels
- Table salt
- i2 journals and pencils for each camper

Overview

Campers are now going to learn about the health benefits of eating more whole foods and less highly processed foods. In this activity, campers begin to analyze why it is important to eat less processed foods, especially those high in added fat, sugar, and salt with little or no other nutrients. Through a secret popcorn experiment, campers learn how the portion size we are served influences how much we eat. Campers view a segment of the film *Super Size Me* and discuss the impact of “supersizing” meals on internal hunger and satiety cues.

Objectives

Campers will be able to:

- describe how portion sizes in our food environment have gotten larger over the years;
- analyze how larger portion sizes and value-based pricing influence consumption; and
- explain how larger portion sizes can impact health.

Before You Begin:

- Review lesson plan and all instructor materials.
- Prepare popcorn for campers using the *Perfect Air Popped Popcorn* recipe.
- Prepare popcorn experiment using the *Popcorn Portion Distortion* experiment sheet.
- Load Clip from *Super Size Me* from the resource disk.

Clues collected:

- Photo of popcorn bar graph

1. Introduce Day 3

Welcome campers back to camp. Ask campers to share some big ideas that they learned in Days 1 and 2. Campers may discuss the industrial and community food systems and exploring why it is important to eat more whole foods, especially those that come from all different parts of plants. Explain that Day 3 is about processed food, and why it is important that we do not eat too much of it!

2. Introduce the Case

Tell campers that we will begin with watching scenes from the documentary film, *Super Size Me*. Ask campers to raise their hands if they have seen the film. If some campers have seen the film, ask a camper to give a brief summary of the film. Ask campers to watch closely for the portion sizes that Morgan Spurlock eats during the film.

3. Watch Super Size Me and Eat Popcorn

Tell campers you made some fresh air-popped popcorn for them to enjoy during the film. Complete procedure steps 1 through 3 on the **Popcorn Portion Distortion** experiment sheet.

After the film, tell campers they can keep eating their popcorn if they want as they discuss the film. Ask campers, *What are your thoughts on the clip? What was the purpose of Mr. Spurlock's experiment? What kinds of physical and emotional effects did the McDonald's diet have on Mr. Spurlock? Would you do what Mr. Spurlock did? Spurlock tried several times to speak to a spokesperson from McDonald's but nobody would speak with him. Why would McDonald's not want to talk to him? How do you think this film makes McDonald's look?*

Follow the procedure steps 4 through 9, "AFTER watching *Super Size Me Clip*," on the **Popcorn Portion Distortion** experiment sheet.

4. Reveal the Popcorn Experiment

Explain to campers that the popcorn they ate was part of an experiment. Follow procedure 4 through 7 and discuss the questions on the **Popcorn Portion Distortion** experiment sheet.

5. Close the Case

Remind campers that fast foods, sweetened beverages, and snack foods when served in large portions, make people eat more than they might actually want. Over time, overeating can make people sick.

Perfect Air Popped Popcorn

Air popped popcorn is fresh, delicious and allows you to control how much butter, salt, or additional toppings you want to add. Fresh popcorn is also delicious without anything added!

Total Time: 15 minutes

Ingredients

- 1 bag high quality popcorn kernels
- Salt to taste (optional)
- Olive oil in pump spray bottle (optional)

Directions

1. Follow factory instructions for the air popper and make the amount of popcorn you need based on the table below.
2. Spray popcorn with oil, just enough to help salt stick (optional).
3. Salt popcorn to taste (optional).

Serving conversions:

Campers	# of campers 1 cup portion	# of campers 2 cup portion	# of campers 3 cup portion	Total cups popcorn	Total cups kernels*
12	4 (4 cups)	4 (8 cups)	4 (12 cups)	24 cups	About 1
15	5 (5 cups)	5 (10 cups)	5 (15 cups)	30 cups	About 1 1/4
18	6 (6 cups)	6 (12 cups)	6 (18 cups)	36 cups	About 1 1/2
21	7 (7 cups)	7 (14 cups)	7 (21 cups)	42 cups	About 1 3/4
24	8 (8 cups)	8 (16 cups)	8 (24 cups)	48 cups	About 2

* Calculations based on ratio of 1/2 cup kernels yielding approximately 12 cups of popped corn

Popcorn Portion Distortion

In this experiment, campers are the subjects. They are each given a small bag of popcorn to eat while watching scenes from the documentary film, *Super Size Me*. Each bag is filled with differing amounts of popcorn in order to demonstrate that people generally stop eating when their food is finished, not when they are full. Typically, the larger the portion size, the more that they will eat.

Set-up

1. Prepare bags of air popped popcorn, enough for 1/3 of the class to have 1 cup each, 1/3 to have 2 cups each and 1/3 to have 3 cups of popcorn each.
2. Fill 1/3 of the bags with 1 cup of popcorn and use a pencil to mark the bottom of the bag with a small letter "A." Fill the next third with 2 cups of popcorn and mark with a "B." Fill the final third of bags with 3 cups of popcorn and mark with a "C." Be sure the markings are small and light so campers do not notice them.
3. Have the **Popcorn Experiment Tally** ready to display (either on a Smart Board or draw it on chart paper). This is where you will record the results and record the average amount of popcorn consumed.

Procedure

BEFORE watching Super Size Me Clip:

1. Have campers wash their hands before receiving their bags of popcorn.
2. Distribute bags of popcorn randomly.
3. As casually as possible, tell campers to only eat from their bag of popcorn and not to share!

AFTER watching Super Size Me Clip:

4. Ask campers, *What did you think of the popcorn? How was the amount you received? Too little? Just right? Too much?*
5. Reveal that the campers just participated in an experiment! Ask everyone to stop eating, if they have not done so already. Explain that different campers got different amounts (portions) of popcorn. Explain that the object of the experiment is to show that serving size influences how much we eat. Campers will now analyze the results of the experiment.
6. Have campers look on the bottom of their bags for the letters A, B, or C. Tell campers that anyone in group "A" received 1 cup of popcorn, bags in group "B" had 2 cups, and group "C" had 3 cups. Distribute measuring cups so campers can measure out any remaining popcorn in their bags. In their i2 journal, have campers record how much popcorn they started with and subtract how much they have left. This lets campers know how much they ate. For example, a camper with ½ cup left in her bag from group 'C,' would have consumed 2.5 cups of popcorn (3 cups - ½ cup). If campers ate their entire portion, have them record the full amount that was in their bag.

Popcorn Portion Distortion (continued)

7. Ask all campers in group “A” to share how much they ate and record amounts on the Popcorn Experiment Tally Sheet. Do the same for campers in groups “B” and “C.”
8. Calculate the average (mean) amount each group ate. Record the amounts on the **Popcorn Experiment Tally** prepared on the board.
9. Discuss the results. Ask, *how did the portion size served influence how much you ate?*

Questions

1. *What was shocking about the popcorn experiment? What do the results of the experiment tell you about the way people eat?*
2. *Did anyone feel like they weren't even hungry but ate the popcorn anyway?*
3. *How does this experiment relate to supersized portions?*
4. *Where do we see supersized portions, other than at McDonald's? Some examples are: soft drinks, snack foods, fast food/restaurant meals, already-prepared foods we buy in stores, and of course popcorn in movie theaters.*
5. *How might selecting supersized portions impact our health?*
6. *After watching this film and participating in the experiment will you look at portion sizes differently?*

Popcorn Portion Distortion (continued)

Popcorn Experiment Tally

Project this chart on a Smart Board or write it on a whiteboard/chalk board. The chart should be large enough for all campers to see and be able to discuss.

Campers provided 1 cup of popcorn (bag labeled 'A') Amount consumed		Campers provided 2 cups of popcorn (bag labeled 'B') Amount consumed		Campers provided 3 cups of popcorn (bag labeled 'C') Amount consumed
Average:		Average:		Average:

Portion Distortion

Since the 1970's portion sizes of packaged foods and restaurant meals have steadily increased. From restaurants and grocery stores to vending machines and concession stands, portions are getting bigger and bigger.

Some portions are explicitly called 'super size' or 'king size' while others have simply just grown in size, often without consumers even realizing. Portion sizes of everything from muffins to sandwiches have grown considerably larger and often provide enough food for at least two people, even though many of us consider them single servings. Unfortunately, these increased portion sizes translate to an excess intake of calories which can lead to overweight, obesity, and diet-related illnesses, such as diabetes and heart disease. In the 1970's, around 47 percent of Americans were overweight or obese; now 66% of Americans are.

While increased portions sizes are not the only contributor to the obesity epidemic, the high abundance of cheap and highly palatable "super-sized" foods have distorted our perceptions of what a typical meal or serving is supposed to look like.

Research has shown that portion size affects how much people unknowingly consume, such that people eat more when given more. A study conducted by Barbara Rolls (2002) observed how people responded to being served incrementally larger portions of macaroni and cheese over the course of a week. As serving sizes increased, so did the amount that people consumed. Participants consumed 30% more when offered the largest portion size as compared to the smaller portion size. When asked, less than half of the participants reported even noticing a change in the portions served throughout the week. They also reported similar rating of hunger and fullness after each meal, despite the differences in intake. Increased portion sizes have helped contribute to the fact that many people do not stop eating until their plate is empty, regardless of hunger and satiety cues. Thus, overeating occurs. An occasional episode will not likely do any harm. However, super sized portions have become the norm and the intake of excess sugar, fat and salt is no longer reserved for the occasional treat. Often consumers think they are getting a better deal by buying larger portions for seemingly less money. This is known as value-based pricing. Unfortunately, the cost of large portion sizes does not factor in the cost to our health. In our current food environment heavily processed foods are abundantly offered in large, inexpensive portions to the detriment of our health.

In a similar study (Wansink, 2005), researchers gave 158 moviegoers either a medium or large tub of free popcorn. Some individuals received fresh popcorn while others received popcorn that was 14 days old. Those who received the stale popcorn in large tubs ate 34% more than those who received the stale popcorn in the medium tubs. Those who received the fresh popcorn in large tubs ate 43% more than those given medium-sized tubs. This indicates that large portion sizes can lead to overeating foods even when they are stale and don't taste good! What's worse is we are unaware of this tendency and don't realize the impact of portion sizes. When the researchers asked the moviegoers if they thought they ate more because of the size of the container, 77% indicated they would have eaten the same amount if they were given the smaller container.

Super Size Me

Film Synopsis:

In *Super Size Me*, documentary filmmaker Morgan Spurlock embarks on a 30-day strict fast food diet. He restricts himself to eating only from the McDonald's menu for breakfast, lunch, dinner, and snacks. As a rule, he must consume everything on the menu at least once during the month and if asked to "supersize" his meal he must comply.

Spurlock wants to discover what, if any, is the physical and mental impact of consuming large amounts of fast food on a regular basis. He travels the country interviewing doctors, dieticians and loyal fast food fans to learn more about McDonald's meals. Throughout the film he reflects on American food culture as it relates to the growing obesity epidemic. Spurlock explores the National School Lunch Program; the decreased funding for health and physical education classes; and the extremes that people go through in order to lose weight. The film shines light on America's battle with obesity in the context of increasing portion sizes, the overabundance of highly palatable, unhealthy foods, and the decline of physical activity.

Implications of the film:

Super Size Me is a small budget film that makes a big impact. As a result of the film, more people now know that convenience foods, such as fast foods, soft drinks, snack foods, TV dinners and pre-made foods, are loaded with excess salt, sugar, and fat.

Viewers may now recognize the impact these convenience foods have on the nation's rising obesity rates. By highlighting the impact of marketing, large portion sizes, food ubiquity, and value – based pricing has on consumption rates, Spurlock exposes just how much consumers are manipulated by large food companies.

About the director:

Morgan Spurlock is a graduate of New York University, Tisch School of the Arts. *Super Size Me* is his first feature film. He was inspired to make the film after two teenagers attempted to sue McDonald's, and the two Bronx franchises that they frequented, for damages related to their diet-related health conditions.



Processed Food Overload

.....

Materials

In Guide:

- **Processed Food Overload Stations: Materials** lesson resource p. 241
- **Processed Food Overload Stations: Set Up** lesson resource p. 242
- **Fat Overload** experiment sheet p. 245
- **McDonald's Nutrition Facts Sheet** cards p. 247
- **Sugar Overload** experiment sheet p. 249
- **Increased Soda Size** card p. 251
- **Sweetened Beverage** cards p. 252
- **Nose Knows Best** experiment sheet p. 258
- **Hey Good Lookin!** experiment sheet p. 259
- **Apple Product** cards p. 260
- **Food Marketing Techniques** experiment sheet p. 262
- **Advertising Techniques that Target Youth** lesson resource p. 263
- **Sell This!** activity sheet p. 265
- **Analyze This!** activity sheet p. 267

Other Materials:

- All materials on the **Processed Food Overload Stations: Set Up** and **Processed Food Overload Stations: Materials** lesson resource

Overview

In this lesson, campers rotate through two stations to examine aspects of highly processed foods. At one station, campers discover the quantity of fat and sugar in processed foods of varying sizes. Campers brainstorm how to ‘small-size’ their selections when faced with choices of highly processed fast foods. At the other station, campers look at food marketing strategies that impact their consumption and preference for processed foods and fast foods. After completing both stations campers will have increased their ability to navigate the processed food environment.

Objectives

Campers will be able to:

- explain how portion sizes of commonly processed and fast foods have increased and can lead to excessive consumption of fat and sugar;
- calculate the amount of fat and sugar that can be found in common beverages and fast foods using nutrition facts labels;
- discuss plans for how to “small-size” their choices when choosing processed and fast foods;
- discuss how marketing and other factors influence their preferences, consumption, and willingness to pay for processed and fast foods; and
- identify marketing techniques used by food companies.

Before You Begin:

- Review lesson plan and all instructor materials.
- Identify two instructors who will direct each station.
- Gather and prepare materials for the stations using the **Processed Food Overload Stations: Set Up** and **Processed Food Overload Stations: Materials** lesson resource.
- Prepare copies of all activity sheets for each camper.

Clues collected:

- *Food Marketing Techniques* activity sheet
- *Analyze This* activity sheet

Go Deeper

Turning the Coca Cola bears ad campaign on it's head, the Center for Science in the Public Interest created a cartoon video demonstrating the health implications of drinking large quantities of soda

Watch the video with campers. Make sure to discuss not only the health implications highlighted in the video but the advertising techniques used in the video as well.

The video can be found at the following website, <http://www.therealbears.org/#video>.

1. Introduce the Case

Introduce campers to their next case, **Processed Food Overload**. Explain that campers will visit two stations. Station 1 is called, "Fat and Sugar." Station 2 is called, "Why We Eat What We Eat." At each station campers will conduct several experiments. Divide the class into two groups. Explain that half of the class will complete Station 1 while the other half completes Station 2. After 45 minutes, the groups will switch.

2. Conduct Station Experiments

Assign one group of campers to Station 1. Assign the other group of campers to Station 2.

At Station 1: Fat and Sugar, use the *Fat Overload* and *Sugar Overload* experiment sheets. Each experiment should take approximately 20 minutes.

At Station 2: Why We Eat What We Eat use the *Nose Knows Best* experiment sheet (about 5 minutes) followed by the *Hey Good Lookin!* experiment sheet (about 10 minutes). Lastly, complete the *Food Marketing Techniques* experiment sheet (about 30 minutes).

3. Close the Case

After both groups have completed the two stations, bring the class back together to discuss what the campers discovered in this case.

How does what you learned in these stations make you think about food differently? Describe how.

Did anything in the experiments surprise you?

Do you think it is hard for people to eat less processed foods? Why or why not? What could people do differently? What could they eat instead?

Processed Food Overload Stations: Materials

In Guide:

- *Fat Overload* experiment sheet
- *McDonald's Nutrition Facts* cards
- *Sugar Overload* experiment sheet
- *Increased Soda Size* and *Sweetened Beverage* cards
- *Nose Knows Best* experiment sheet
- *Hey Good Lookin!* experiment sheet
- *Apple Product* cards
- *Food Marketing Techniques* experiment sheet
- *Advertising Techniques that Target Youth* lesson resource
- *Sell This!* activity sheet
- *Analyze This!* activity sheet

Other Materials:

- 80 yellow 9" drinking straws
- 3 resealable sandwich bags
- 12 sticks of vegetable shortening
- 6 butter knives
- 6 large plates
- 1 small empty fast food french fry cup, ~ 2.5 oz.
- 1 medium empty fast food french fry cup, ~ 4.1 oz.
- 1 large empty fast food french fry cup, ~ 5.4 oz.
- Whiteboard or chart paper and markers
- 2 pounds of sugar
- 6 teaspoons
- 3 small bowls
- 7 clear plastic cups
- 5 sticks mint gum
- 1 box wheat crackers
- 1 package of pre-cut apple slices
- 1 whole apple
- Knife
- Lemon juice
- 2 plates
- Whiteboard or chart paper and markers

Processed Food Overload Stations: Set Up

Station 1: Fat and Sugar

Fat Overload Experiment

Materials:

- *Fat Overload* experiment sheet
- *McDonald's Nutrition Facts* cards
- 80 yellow 9" drinking straws
- 3 resealable sandwich bags
- 12 sticks of vegetable shortening
- 6 butter knives
- 6 large plates
- 1 small empty fast food french fry cup, ~ 2.5 oz.
- 1 medium empty fast food french fry cup, ~ 4.1 oz.
- 1 large empty fast food french fry cup, ~ 5.4 oz.
- Whiteboard or chart paper and markers

Preparation:

1. Cut all yellow 9" drinking straws in half. The straws will represent french fries. Evenly divide the straws between the three resealable sandwich bags.
2. Place 2 sticks of vegetable shortening and 1 knife on each plate.
3. Prepare 3 copies of *McDonald's Nutrition Facts* cards.

Sugar Overload Experiment

Materials:

- *Increased Soda Size* and *Sweetened Beverage* cards
- *Sugar Overload* experiment sheet
- 2 pounds of sugar
- 6 teaspoons
- 3 small bowls
- 7 clear plastic cups

Preparation:

1. Fill the three bowls with sugar and put a teaspoon in each bowl.
2. Prepare *Increased Soda Size* and *Sweetened Beverage* cards.

Setting Up the Processed Food Overload Stations (continued)

Station 2: Why We Eat What We Eat

Nose Knows Best

Materials:

- 5 sticks mint gum
- 1 box wheat crackers
- *Nose Knows Best* experiment sheet

Preparation:

1. One day before class, unwrap the five slices of mint gum and put them within the plastic liner of a box of wheat crackers.
2. Just before the case, take the gum out of the crackers box. Do not let campers see the gum.

Hey Good Lookin!

Materials:

- 1 package of pre-cut apple slices
- 1 whole apple
- Knife
- Lemon juice
- 2 plates
- Whiteboard or chart paper and markers
- *Apple Product* cards
- *Hey Good Lookin!* experiment sheet

Preparation:

1. Prepare *Apple Product* cards.
2. Keep pre-cut apple slices in packaging and place package onto a small plate.
3. Cut the whole apple into neat and uniform slices. Drizzle with lemon juice and toss in order to prevent apple slices from browning. Place apple slices onto a small plate.
4. The plates should appear as similar as possible.
5. Create a 5 - Point Scale on the whiteboard. The scale should progress as follows: 1 = very unappealing; 2 = somewhat unappealing; 3 = neutral; 4 = somewhat appealing; 5 = very appealing. You may also opt for a smiley face scale depicting a face that ranges from a frowning face to a smiling face.

Setting Up the Processed Food Overload Stations (continued)

Food Marketing Techniques

Materials:

- Whiteboard or chart paper and markers
- *Advertising Techniques that Target Youth* lesson resource
- *Sell This!* activity sheet
- *Analyze This!* activity sheet

Preparation:

1. Through online research and/or looking through print advertisements, collect examples of advertisements that highlight the following techniques:
 - Promotions
 - Ads everywhere
 - Celebrities
 - Claims
 - Looks good

Use the *Advertising Techniques that Target Youth* lesson resource as a guide when identifying advertisements to use.

2. Through online research and/or looking through print advertisements, collect additional examples of advertisements in order for campers to complete the *Analyze This!* activity sheet.

Fat Overload

In this experiment campers measure out the amount of fat in McDonald's sandwiches and french fries.

Set-up

1. Gather and prepare materials using the *Processed Food Overload Stations: Set Up* and *Processed Food Overload Stations: Materials* lesson resource.
2. Three of the prepared plates will be used for one half of the class and three of the prepared plates will be used for the second half.

Procedure

1. Divide the campers into three small groups.
2. Give each group a copy of the *McDonald's Nutrition Facts* cards. Show campers how to read the table. Specifically highlight where they can find the total grams of fat for each menu item. Have each group choose one sandwich from the menu. Each group should have a different sandwich.
3. Have each group calculate how many teaspoons of fat are in the sandwich they selected. Write the conversion factor on the whiteboard/flip chart:
5 grams of fat = 1 teaspoon fat
4. Give each small group 1 plate, 1 knife, and 1 stick of shortening.
5. Show campers how to use the markings on the sticks of shortening to measure the amount of fat in their sandwich. Measure the equivalent amount of shortening and place it on the plate. If the shortening does not have measurements on the wrapper, use teaspoons to measure.
6. Have campers compare the quantity of fat in their sandwich to other sandwiches. *Which sandwich has the most fat? Which one has the least?* Ask campers to imagine placing the shortening on a bun and eating it. *Does it seem appealing?*
7. Show campers the three french fry containers. Ask campers, *which container will hold more french fries? Which serving do you think will have more fat?*
8. Give one group the small french fry cup. Give the second group the medium french fry cup. Give the third group the large french fry cup.
9. Using the yellow straws to represent "fries," have campers see how many french fries they can fit into their cup.
10. Once full, have campers count the straws in their cup. Have the groups compare how the number of fries increases from a small to medium to large serving size.
11. Have groups use the *McDonald's Nutrition Facts* cards to look up how many grams of fat are in their portion size of fries. Then have campers calculate how many teaspoons of fat are in the fries, using the same conversion factor 5 grams of fat = 1 teaspoon.

Fat Overload (continued)

12. Have campers measure the amount of shortening that represents the fat in their fries. Groups compare.
13. Tell campers that it's recommended not to eat more than 65 grams (13 teaspoons) of fat in an entire day! Typically at a fast food restaurant customers order a sandwich and fries for a meal. Have campers count how many grams of fat are in the sandwich and fries together. Did they reach the limit for the day?
14. If time permits, campers can look at the *McDonald's Nutrition Facts* cards to see the amount of fat in other foods.
15. Ask campers for ideas on how to reduce the amount of fat they eat at fast food restaurants. Some ideas are 'small-sizing-it' (ordering a smaller size), sharing a menu item with a friend, or decreasing the frequency with which they buy fast food.

Questions

1. *Do you really think it makes a big difference to our health to have a small size instead of a large size? Why or why not?*
2. *What are some ways you might be able to eat smaller amounts of fast food and processed foods?*
3. *McDonald's now sells apple slices as a side item. Do you think a lot of people buy the apples? Why or why not? Would you buy the apples? Why or why not?*

McDonald's Nutrition Facts

Make 1 copy of each card and cut it out.



McDonald's USA Nutrition Facts for Popular Menu Items

We provide a nutrition analysis of our menu items to help you balance your McDonald's meal with other foods you eat. Our goal is to provide you with the information you need to make sensible decisions about balance, variety and moderation in your diet.

Nutrition Facts	Serving Size	Calories	Calories from Fat	Total Fat (g)	% Daily Value**	Saturated Fat (g)	% Daily Value**	Trans Fat (g)	Cholesterol (mg)	% Daily Value**	Sodium (mg)	% Daily Value**	Carbohydrates (g)	% Daily Value**	Dietary Fiber (g)	% Daily Value**	Sugars (g)	Protein (g)	% DAILY VALUE			
																			Vitamin A	Vitamin C	Calcium	Iron
Burgers & Sandwiches																						
Big Mac	7.6 oz (215 g)	550	260	29	45	10	51	1	75	25	970	40	46	15	3	13	9	25	4	2	25	25
Quarter Pounder® with Cheese+	7.1 oz (202 g)	520	240	26	41	12	61	1.5	95	31	1100	46	41	14	3	11	10	30	10	2	30	25
Quarter Pounder Bacon Habanero Ranch+	8.3 oz (235 g)	610	280	31	48	13	64	1.5	105	35	1180	49	46	15	3	14	10	37	8	20	25	30
Quarter Pounder Bacon & Cheese+	8 oz (227 g)	600	260	29	45	13	63	1.5	105	34	1440	60	48	16	3	12	12	37	6	15	25	30
Quarter Pounder Deluxe+	8.6 oz (244 g)	540	250	27	42	11	54	1.5	85	28	960	40	45	15	3	13	9	29	10	8	25	30
Double Quarter Pounder with Cheese++	10 oz (283 g)	750	380	43	66	19	96	2.5	160	53	1280	53	42	14	3	11	10	48	10	2	30	35
Hamburger	3.5 oz (100 g)	250	80	9	13	3.5	16	0.5	25	9	480	20	31	10	2	6	6	12	2	2	10	15
Cheeseburger	4 oz (114 g)	300	110	12	19	6	28	0.5	40	14	680	29	33	11	2	7	7	15	6	2	20	15
BBQ Ranch Burger	4.1 oz (116 g)	350	140	16	24	6	30	0.5	45	15	680	28	37	12	3	11	7	16	4	0	20	15
Grilled Onion Cheddar	4.1 oz (115 g)	310	120	13	21	6	30	0.5	40	14	660	27	33	11	2	8	7	15	2	0	20	15
Double Cheeseburger	5.8 oz (165 g)	440	210	23	35	11	54	1.5	80	27	1050	44	34	11	2	8	7	25	8	2	30	20
McDouble	5.3 oz (151 g)	390	170	19	29	8	42	1	65	22	850	35	33	11	2	7	7	23	6	2	20	20
Bacon McDouble	5.8 oz (165 g)	460	210	24	37	10	52	1	85	28	1120	47	34	11	2	7	7	28	6	10	20	20
Daily Double†	6.8 oz (194 g)	440	220	24	37	9	47	1.5	70	24	770	32	33	11	2	9	7	23	6	6	20	20
Premium Crispy Chicken Classic Sandwich	7.5 oz (213 g)	510	200	22	33	3.5	18	0	45	16	990	41	55	18	3	13	10	24	4	6	15	20
Premium Grilled Chicken Classic Sandwich	7 oz (200 g)	350	80	9	13	2	9	0	65	22	820	34	42	14	3	13	8	28	4	8	15	20
Premium Crispy Chicken Club Sandwich	8.8 oz (249 g)	670	300	33	51	9	44	0	85	29	1410	59	58	19	3	14	11	36	8	20	30	20
Premium Grilled Chicken Club Sandwich	8.3 oz (235 g)	510	180	20	31	7	36	0	105	35	1250	52	44	15	3	13	9	40	8	20	30	20

McDonald's Nutrition Facts (continued)

Make 1 copy of each card and cut it out.



McDonald's USA Nutrition Facts for Popular Menu Items

We provide a nutrition analysis of our menu items to help you balance your McDonald's meal with other foods you eat. Our goal is to provide you with the information you need to make sensible decisions about balance, variety and moderation in your diet.

Nutrition Facts	Serving Size	Calories	Calories from Fat	Total Fat (g)	% Daily Value**	Saturated Fat (g)	% Daily Value**	Trans Fat (g)	Cholesterol (mg)	% Daily Value**	Sodium (mg)	% Daily Value**	Carbohydrates (g)	% Daily Value**	Dietary Fiber (g)	% Daily Value**	Sugars (g)	Protein (g)	% DAILY VALUE			
																			Vitamin A	Vitamin C	Calcium	Iron
Salads																						
Premium Bacon Ranch Salad (without chicken)	7.9 oz (223 g)	140	70	7	11	3.5	18	0	25	9	300	12	10	3	3	13	4	9	160	30	15	8
Premium Bacon Ranch Salad with Crispy Chicken	11.3 oz (319 g)	390	190	22	33	6	29	0	70	23	870	36	24	8	4	15	7	26	160	35	15	10
Premium Bacon Ranch Salad with Grilled Chicken	10.8 oz (306 g)	230	80	9	13	4	20	0	85	29	700	29	10	3	4	15	5	30	160	35	15	10
Premium Southwest Salad (without chicken)	8.1 oz (230 g)	140	40	4.5	7	2	9	0	10	3	150	6	20	7	6	24	6	6	160	25	15	10
Premium Southwest Salad with Crispy Chicken	12.3 oz (350 g)	450	190	21	33	4.5	21	0	50	17	820	34	42	14	7	27	13	23	160	30	15	15
Premium Southwest Salad with Grilled Chicken	11.8 oz (335 g)	290	70	8	13	2.5	12	0	70	23	650	27	28	9	7	27	11	27	160	35	15	15
Side Salad	3.1 oz (87 g)	20	0	0	0	0	0	0	0	0	10	0	4	1	1	6	2	1	45	25	2	4
Snacks & Sides																						
Small French Fries	2.5 oz (71 g)	230	100	11	18	1.5	8	0	0	0	160	7	29	10	3	12	0	3	0	8	2	4
Large French Fries	5.4 oz (154 g)	500	220	25	38	3.5	17	0	0	0	350	15	63	21	6	26	0	6	0	20	2	8
Medium French Fries	4.1 oz (117 g)	380	170	19	29	2.5	13	0	0	0	270	11	48	16	5	20	0	4	0	15	2	6
Kids Fries	1.1 oz (31 g)	100	45	5	8	0.5	4	0	0	0	70	3	13	4	1	5	0	1	0	4	0	2
Beverages																						
1% Low Fat Milk Jug	1 carton (236 ml)	100	20	2.5	4	1.5	8	0	10	3	125	5	12	4	0	0	12	8	10	4	30	0
Fat Free Chocolate Milk Jug†	1 carton (236 ml)	130	0	0	0	0	0	0	5	2	135	6	23	8	0	0	22	9	10	0	30	8
Minute Maid® 100% Apple Juice Box	6.8 fl oz (200 ml)	100	0	0	0	0	0	0	0	0	15	1	23	8	0	0	22	0	0	100	10	0
Minute Maid® Orange Juice (Small)§	12 fl oz cup	150	0	0	0	0	0	0	0	0	0	0	34	11	0	0	30	2	0	130	2	0

Sugar Overload

In the experiment campers see how portion sizes of sodas and other sweetened beverages have increased over the years. Campers measure out how much sugar is in various beverages and compare these amounts to the maximum recommended sugar intake for the day.

Set-up

1. Gather and prepare materials using the *Processed Food Overload Stations: Set Up* and *Processed Food Overload Stations: Materials* lesson resource.

Procedure

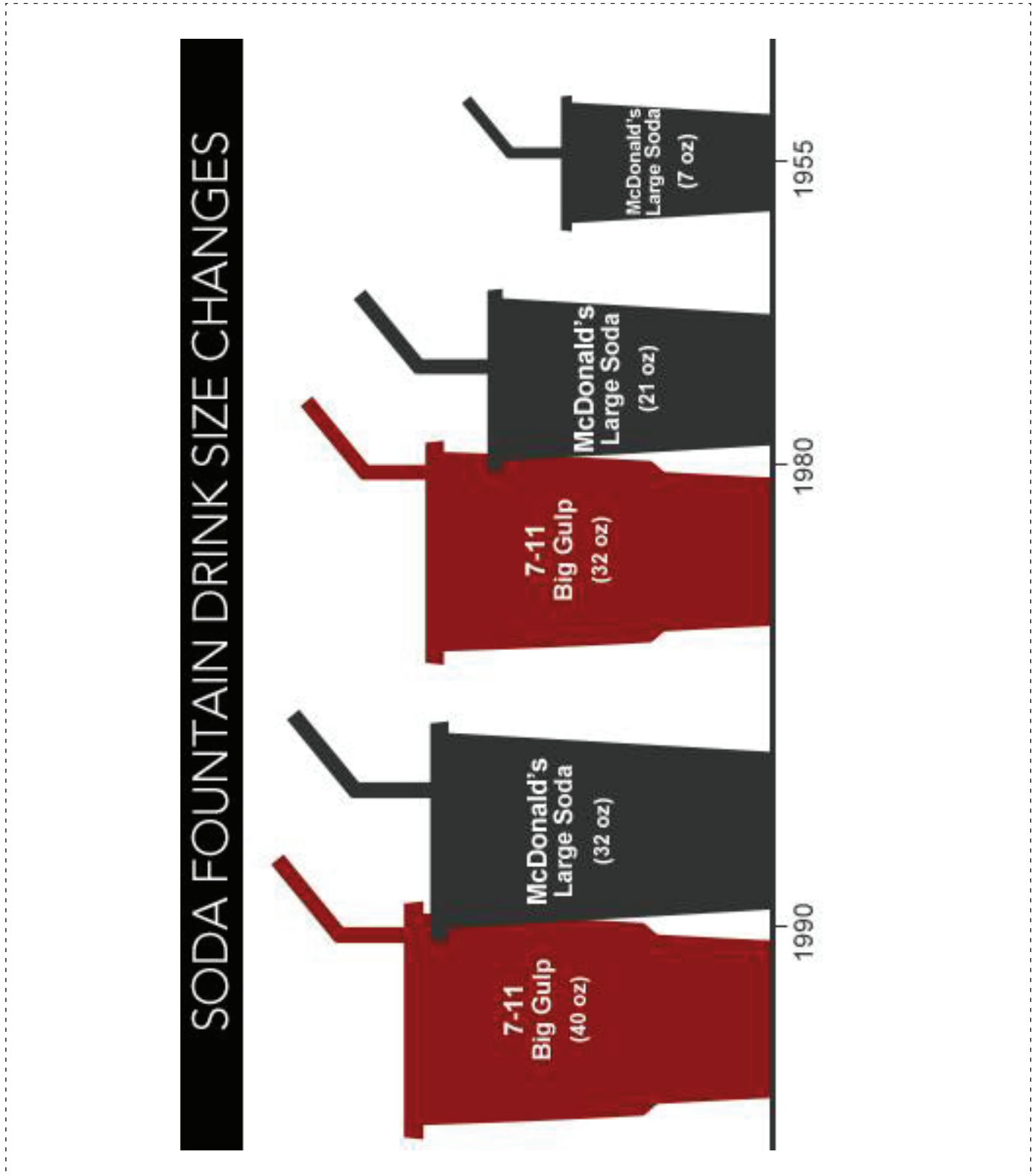
1. Invite a few campers to help you measure out 10 teaspoons of sugar from one of the bowls of sugar and put it into a clear plastic cup. This is a good opportunity to remind campers how to measure accurate amounts using measuring spoons. Make sure the teaspoon is full but not heaping.
2. Show campers the cup with 10 teaspoons of sugar. Explain that this is the maximum amount of sugar that should not be exceeded in a day. Share with campers that some medical professionals actually recommend a lot less by suggesting a maximum of about 6 teaspoons of sugar a day.
3. Use the *Increasing Soda Size* card to show campers how sizes of soda have increased over the years. Ask campers, *why do you think soda sizes have become so large?*
4. Explain that sugar is not just in soda. Sugar is found in lots of beverages including sports drinks, teas, and juices. Showing campers the *Sweetened Beverage* cards, explain that campers will now determine how many teaspoons of sugar are in each beverage.
5. Write the conversion factor on the whiteboard/flip chart: 4 g. of sugar = 1 teaspoon of sugar. Explain that grams are a unit of weight and teaspoons are a unit of volume therefore, the conversion is slightly different for fat than for sugar.
6. Divide campers into three groups. Give each group two *Sweetened Beverage* cards, a bowl of sugar, a teaspoon, and a clear cup. Show campers how to read the nutrition label on each beverage, specifically looking for the amount of sugar. Tell campers to take special note of the serving size listed on the nutrition label. For example, the Gatorade is actually 2.5 servings in the bottle. This means campers will need to multiply the total amount of sugar listed by 2.5 in order to calculate the full amount of sugar in the bottle.
7. Have each group measure how many teaspoons of sugar are in their beverages.
8. Have each group share the number of teaspoons of sugar in their beverages. How do they compare? Finally, compare the amount of sugar in each beverage to the 10 teaspoon limit for the day. *Do any beverages exceed the 10 teaspoon limit? What if someone had 2 sodas a day? Would that exceed the limit?* In general, the larger the beverage, the more sugar there is. Challenge campers to revisit their findings from the popcorn experiment. *How might portion sizes contribute to the consumption of sugar in the diet?*

Sugar Overload (continued)**Questions**

1. *How can we use nutrition labels to help monitor our sugar content?*
2. *Do you think companies should be able to sell beverages with more than one serving in the bottle?*
3. *How do bigger portion sizes of processed foods contribute to poor health? When discussing this question remind campers of all the processed foods that have been discussed so far: snack foods/popcorn, french fries, fast food sandwiches, and sweetened beverages.*
4. *How does this experiment make you think about your own choices? Does anyone think they might make a change in what they choose to drink? Why or why not? What types of things make it difficult to make changes?*

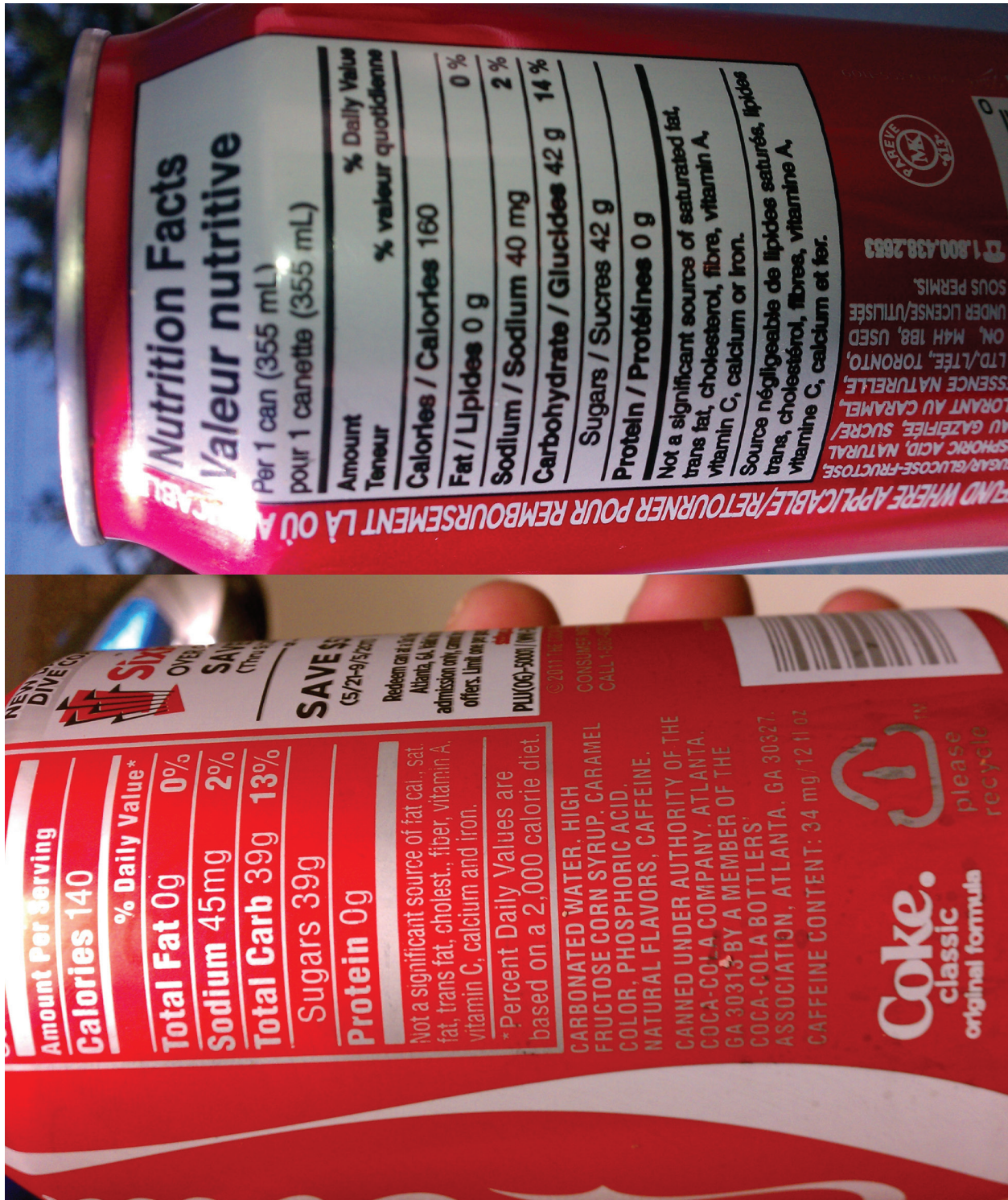
Increased Soda Size

Make 1 copy of card and cut it out.



Sweetened Beverage

Make 1 copy of each card and cut it out.



Sweetened Beverage (continued)

Make 1 copy of each card and cut it out.



Sweetened Beverage (continued)

Make 1 copy of each card and cut it out.



Sweetened Beverage (continued)

Make 1 copy of each card and cut it out.

Welch's
SINCE 1869

100% Grape Juice

CONTAINS 100% JUICE

Nutrition Facts
Serving Size: 8 FL. OZ. (240mL)
Servings Per Container: 8

Amount Per Serving	
Calories 170	
% Daily Value*	
Total Fat 0g	0%
Sodium 20mg	1%
Total Carb 42g	14%
Sugars 40g**	
Protein 0g	
Vitamin C	100%

Not a significant source of fat, cal., sat fat, trans fat, cholest., fiber, vitamin A, calcium, and iron.

*Percent Daily Values are based on a 2,000 calorie diet.

****CONTAINS NATURAL FRUIT SUGARS ONLY**

INGREDIENTS: GRAPE JUICE FROM CONCENTRATE (FILTERED WATER, GRAPE JUICE CONCENTRATE), GRAPE JUICE, ASCORBIC ACID (VITAMIN C); NO ARTIFICIAL FLAVORS OR COLORS ADDED.

©2007 **Welch's** CONCORD, MA 01742
MADE IN USA

Comments or Questions?
Call 1-800-340-6870
Weekdays 9 am-4 pm ET
www.welchs.com

The most delicious thing you can do for your heart!

- ✓ More than twice the antioxidant power of orange juice! That's because of our own Concord Grapes.†
- ✓ No sugar added, no fat and no cholesterol.
- ✓ An 8 oz. glass counts as two servings of fruit!

†Per GRAC lab testing

Maintaining the highest standards for taste and goodness is the top priority of Welch's.

American Heart Association
Meets American Heart Association food criteria for saturated fat and cholesterol for healthy people over age 2.

While many factors affect heart disease, diets low in saturated fat and cholesterol may reduce the risk of heart disease.

PASTEURIZED
Refrigerate After Opening

PROOF OF PURCHASE

0 41800 20750 3

HI-ME DEP. 5¢

Sweetened Beverage (continued)

Make 1 copy of each card and cut it out.



Sweetened Beverage (continued)

Make 1 copy of each card and cut it out.



Nose Knows Best

In this experiment campers recognize how smell impacts our food preferences and consumption.

Set-up

1. Gather and prepare materials using *Processed Food Overload Stations: Set Up* and *Processed Food Overload Stations: Materials* lesson resource.

Procedure

1. Give each camper a couple of wheat crackers. Do not tell them that the crackers have been exposed to mint gum.
2. Without sharing their thoughts out loud, have campers look at and smell the crackers. Have campers write down their observations in their i2 journals.
3. Have campers eat the crackers and record how they taste in their i2 journals.
4. Discuss the campers observations of the crackers.

Questions

1. *How did you feel about tasting a food item with an unexpected smell? Confused? Worried?*
2. *How do you think the smell of a food influences how much you will eat? If you were eating next to a stinky garbage can, how would that impact your appetite?*
3. *What types of smells make you feel hungry? Where do you typically find these smells? If you ran a bakery, what would you want your customers to smell when they came in and why?*

Hey Good Lookin!

Manufacturers spend a lot of time and money in order to make packaged foods seem more appealing. This activity helps campers recognize how marketing can convince us into thinking a product looks better and is worth more money.

Set-up

1. Gather and prepare materials using *Processed Food Overload Stations: Set Up* and *Processed Food Overload Stations: Materials* lesson resource.

Procedure

1. Divide campers into pairs.
2. Assign one camper in each pair to be in 'group 1' and the other to be in 'group 2.' Have a teaching assistant escort everyone in 'group 1' out of the classroom for a few minutes.
3. Show the remaining campers in 'group 2' the cut apple slices with lemon juice. Using the i2 journals, have campers write down how tasty the product looks on a scale of 1 to 5. 1 is very unappealing and 5 is very appealing. Have campers also list the maximum price they would be willing to pay for the apple.
4. Put the apple slices away. Allow 'group 1' to come back into the room while 'group 2' leaves. Show the campers in 'group 1' the package of pre-sliced apples.
5. Have campers rate how tasty the product looks on a scale of 1 to 5. Have them write down the maximum price they would be willing to pay for the packaged apple slices in their i2 journals.
6. Bring 'group 2' back into the classroom. Have campers compare with their partners their taste ratings and the prices they were willing to pay for their apple samples. Display both apple samples. Allow each group to explain their reasoning for their prices and ratings.
7. Explain that how a product is packaged has a big influence on consumer preference. Show campers the *Apple Product* cards. Ask them to explain the similarities and differences between each product and what they find attractive about each product's packaging.

Questions

1. *What types of things do restaurants and food manufacturers do to make their food more attractive? How does this impact our food choices?*
2. *Other than the look of a food, what other factors affect your opinion of a food? How can food companies make you think something is tastier and worth spending more money on?*
3. *When you sit down to a meal, what helps you decide whether the food you're about to eat is going to taste good?*
4. *If you wanted to impress guests at a meal, what could you do to make the food seem tastier?*

Apple Product

Make 1 copy of each card and cut it out.



Apple Product (continued)

Make 1 copy of each card and cut it out.



Food Marketing Techniques

In this activity campers discover how food companies use various marketing techniques to influence us to buy and consume their products. Some of the techniques used may be obvious in their intention to sell the product, while others are less explicit.

Set-up

1. Gather and prepare materials using *Processed Food Overload Stations: Set Up* and *Processed Food Overload Stations: Materials* lesson resource.

Procedure

1. Ask campers, *what are some of your favorite food commercials? What do you like about them?* Record what campers say on a whiteboard or chart paper.
2. Give campers copies of the *Food Marketing Techniques* activity sheet. Using the *Advertising Techniques that Target Youth* lesson resource, discuss the different advertising techniques. Ask campers to think of the commercials they just shared, *how do food companies encourage us to buy their products using these techniques? Why do food companies have Facebook pages and games on their websites?* Through discussion, help campers understand that it is all in the interest of selling their products. Companies want “us” all to think that their products are “just for us.”
3. Using a Smart Board or projector, project a variety of advertisements that have been prepared in advance. Ask campers to identify which advertising technique(s) are used in each ad. *Is more than one technique being used? Which technique is predominantly used?* Using these ads, have campers complete the *Food Marketing Techniques* activity sheet.
4. Ask campers how they feel after analyzing these ads. Explain that people often feel like they have been tricked after learning advertising techniques. However, the more we understand the techniques that advertisers use, the more we can make sure that we don’t let ads convince us to eat things that we really don’t want to eat.
5. Distribute the *Analyze This!* activity sheet. Explain that campers are going to complete the activity sheet by analyzing an advertisement in pairs. Provide campers with an advertisement. Allow campers 5-10 minutes to navigate the site and complete the activity sheet.

Questions

1. *Do you think you have been influenced by ads? Which of the techniques impacts you the most?*
2. *How do advertisements get us to eat larger quantities? To eat more often? To eat in more places? What else are the ads selling besides food?*
3. *Many companies like Coca Cola are claiming to no longer advertise to children under the age of 12? Why do you think that is? Do you think it’s possible to not advertise to children?*
4. *What types of foods do we see advertising for? What types of food do we not see advertising for?*

Adapted from Nourish Curriculum “Analyzing Food Ads” activity.

Advertising Techniques That Target Youth

Food companies are in the business to make money. Highly palatable, processed foods are inexpensive to produce and, with all the added fat and sugar, they are easy to sell. Food companies use various techniques to encourage people to buy their products. These techniques include the use of: ads everywhere, promotions, celebrities, claims, and looks good.

Advertising Techniques

Ads Everywhere

Almost everywhere you look you see advertisements for food. Ad ubiquity constantly reminds us not only to eat, but to eat certain foods; namely those high in sugar, salt, and fat. Companies saturate the market by advertising through various forms of multi-media including television, radio, websites, and product placement in movies and video games. Attractive product packages, displays, billboards, advertisements on buses, in magazines, branded clothing and other merchandise all serve as constant reminders to buy and consume. Food product Facebook pages, for example, encourage youth to promote their products by “liking” images that will then appear on their own personal pages for all of their friends to see. This viral element and the often unsupervised nature of internet activity has attracted many food companies to social media.

Promotions

These popular marketing methods are often used in food marketing to youth. Premiums, sweepstakes, and contests have been around since Dick Tracy decoder rings. Promotions are now viral and many food companies promote their products online. Youth can play “advergames” featuring food items like candy. Company websites allow consumers to enter contests, receive redeemable “points,” and even engage their friends through food product social networking sites.

Celebrities

Some ads use celebrities and put a familiar face on the product making it easily recognizable and more attractive, thereby increasing branding associated with the product. For kids and youth, these “celebrities” may include cartoon, movie or TV characters, and sports athletes. For example, Yoplait worked with the popular Nickelodean character, Dora-the-Explorer to sell its “kid-friendly” yogurt. Gatorade has a diverse collection of over 30 athletes promoting their sport drinks, including popular young skateboarder Chaz Ortiz, football’s Manning brothers and tennis champion Serena Williams.

Claims

Many ads claim or imply that their product is good for you. This can be done through images, messages and or partnerships with sports organizations that are used to associate their product with health and fitness. These claims can be convincing but are often ambiguous or inaccurate. Ads also describe the deliciousness or popularity of a product to make it more appealing. Often these claims are exaggerated or unsupported. Consider the following examples: Snapple’s slogan, “Made from the Best Stuff on Earth,” or Doritos ads use “Snack Strong.” These slogans give little substantiated information about the product. Ads may also show

Advertising Techniques That Target Youth (continued)

product irresistibility. The Pringles slogan, “Once you pop, you can’t stop,” accompanies images of people biting into tall stacks of Pringles chips.

Looks Good

Food ads use professional stylists to make foods look incredibly appealing. The use of close-ups, lighting, digital editing and food “stylizing” triggers our senses of taste and smell, making us crave that food. Consider what a burger purchased from a fast food restaurant looks like, compared to a hot, piping, juicy burger featured in a commercial.

Common Advertising Terms

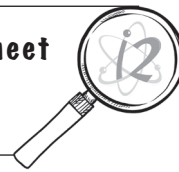
Marketing: Selling products and services.

Advertising: Publicly promoting a product or service, typically done by a company that is trying to sell the product or service.

Target Audience: The key people that advertising is trying to reach, for example an ad may be trying to reach teenagers living in cities.

Viral Marketing: Marketing that specifically tries to sell the product or service by passing information from person to person, usually uses the internet and e-mail to spread the message.

Social Media: Websites and other online forums that are used by a large number of people as a platform to communicate with each other.



Camper:

Sell This!

Below are some techniques food companies use to make you want to eat their foods. Review each technique and list some examples of ads that use that technique.

Ads Everywhere

Ads can be found in magazines, games and the internet; on buses, billboards, packaging, and clothing. Ads are everywhere to ensure consumers are always reminded of the product.

Promotions

Ads use prizes, contests, points, premiums, sweepstakes, and clubs to entice you to like and buy their product.

Celebrities

Ads use familiar faces like celebrities, cartoon characters, movie or TV characters and athletes

Claims

Many ads claim their product is good for you or that it is the tastiest and most popular product. But often these claims have no proof.

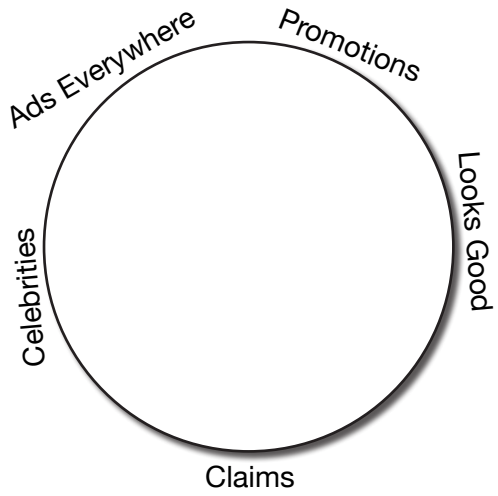
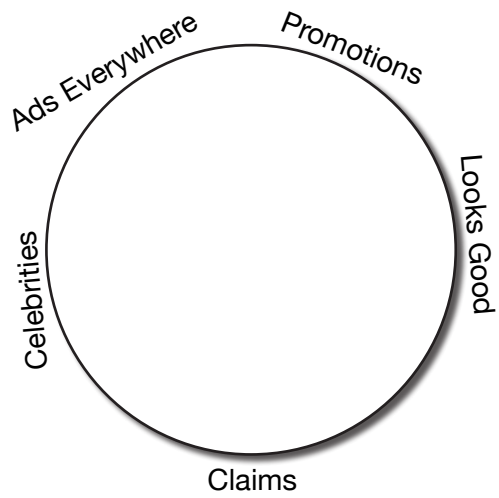
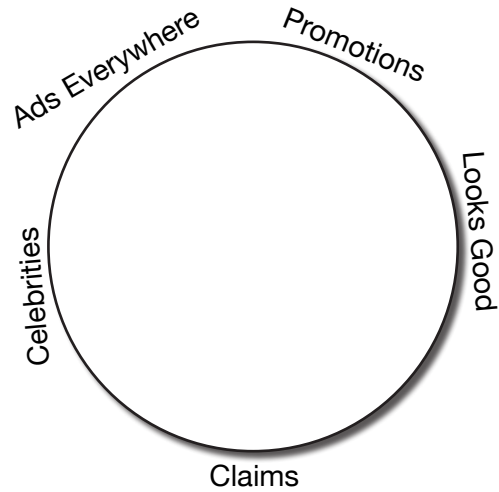
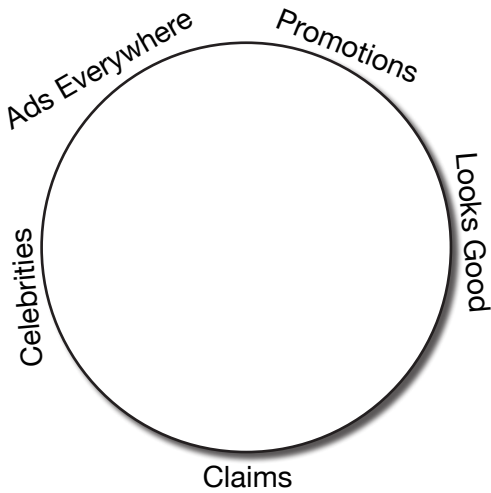
Looks Good

Food ads use extreme close-ups, fancy lighting, editing, and cool tricks to make the food look better than it would in real life.



Sell This!

Write the names of the food items being advertised in the circle. Draw a line to the technique(s) that are used in this ad.



**Camper:**

Analyze This!

Food ads use many techniques to encourage you to buy their products and eat more of them. As food detectives it's important to know when ads are trying to convince us to buy their products. Using the ad provided answer these questions and collect clues to help you crack the case!

1. What is the product that the ad is selling? _____

2. Who do you think is the target audience. (Circle all that apply)

Parents Adults Teens Kids Other _____

3. How do you know this is the audience the advertisers are targeting? What clues have you found in the ad? List three:

4. Where might you see this ad? _____

5. What marketing techniques does the ad use? (Circle all that apply)

Promotions Claims* Celebrities Make Food Look Good

6. What is the ad selling besides the product?



Analyze This! (continued)

7. How do you think the ad will encourage people to buy or eat more of the product?

8. Do you think this ad is effective? Why or Why not?

9. Describe how you will think differently after what you have learned.



Finding Balance

.....

Materials

In Guide:

- **Finding the Balance** experiment sheet *p. 273*
- **Calibrating Pedometers** experiment sheet *p. 275*
- **Investigative Checklist** activity sheet *p. 277*
- **Tracking Steps in our Environment** teacher note *p. 278*

Other Materials:

- Timer
- Smart Board
- Permanent markers
- 1 large nail
- 1 pedometer (for you)
- 2 clear plastic cups
- 3-4 cups of water
- Plastic bus bin
- Food coloring
- iPads/Digital cameras
- Pedometers *for each camper*
- i2 journals and pencils *for each camper*

Overview

In this case, campers explore the relationship between energy intake and energy expenditure. They participate in a simulation to understand the relationship between energy intake and energy output in the human body. They gather personal information and information about their environment that they use to help set physical activity goals. Next, campers receive pedometers and learn to calibrate and operate them. Lastly, campers do a physical activity audit of their current learning environment and determine ways to integrate more physical activity into their daily lives.

Objectives

Campers will be able to:

- describe what it means to maintain energy balance in their bodies;
- investigate environmental factors that influence physical activity choices;
- create a plan for increasing physical activity in their daily lives;
- describe how to record data on physical activity with the use of pedometers; and
- express motivation for using a pedometer.

Before You Begin:

- Review the lesson plan and all in guide materials.
- Prepare copies of the activity sheet for each camper.
- Put on your calibrated pedometer.

Clues collected:

- Pedometer
- *Investigative Checklist* activity sheet

1. Introduce the Case

Introduce campers to the next case, **Finding Balance**. Ask campers to share their own definitions of balance. Explain to campers that in this case they will discover what it means to be in energy balance.

2. Introduce Energy Balance

Ask campers, *what is energy?* Write camper's responses on the whiteboard. Share with camper's the scientific definition, energy is the ability to do work. Ask campers who has heard of the word energetic? *What do the notice about this word?* It has the root, energy! Energetic implies more energy is better but scientifically, we want to be in balance. When we are in balance our bodies are at their best and we can do the things we love to do. We take in energy from food and we use that energy to keep our body functioning and moving. *How do you feel when you do not take in enough energy?* When we take in less energy than we need, we feel hungry, tired and cannot think clearly. *How do you feel when you take in too much energy?* When we take in too much energy our body has to store it as fat. After large meals, people often feel sluggish and also cannot think clearly.

3. Conduct Energy Balance Simulation

Repeat the idea that our bodies work best when we are in energy balance. Tell campers that they will now see a demonstration of how energy is taken in and utilized in the body. Use the **Finding the Balance** experiment sheet to conduct the energy balance demonstration.

4. Discuss Reasons to Stay Active

Engage campers in a discussion of physical activity. *What happens to us when we are physically active on a regular basis? Why is it important to stay active?* Generate a list of reasons to stay active on the whiteboard. It is important for campers to reflect on why physical activity is important and to generate personal reasons that will resonate with them.

5. Explore How to Measure Physical Activity

Tell campers that now that we know why being active is so important, we are going to determine if we get enough physical activity. Ask campers to share ideas as to how we could measure the amount of physical activity we do. Accept all answers, and explore some of the pros and cons to the different methods the campers suggest.

6. Introduce Pedometers

Draw attention to the pedometer on your waistband and ask campers if they are familiar with the instrument. Explain that it is a pedometer used to count the number of steps that you take. *Why would you use a pedometer instead of counting the steps yourself?*

7. Distribute Pedometers

Share with campers that they will each get a pedometer to wear daily. This will help them track their physical activity. Emphasize that the pedometer is an important data-collection tool and that shaking it can artificially increase step count and, more importantly, damage it. Remind campers to take good care of their pedometers and not to lose it. Hand out a pedometer to each camper. Allow them to write their initials on the back of their pedometers with permanent marker.

8. Calibrate Pedometers

Some campers may want to place their pedometer in their pockets, on their shoelaces or other places that may provide inaccurate measurements. Explain that in order to get accurate measurements they should place their pedometers on their waistband. Point out that wearing the pedometer on a high or low waistband may even produce inaccurate results. It is important that the pedometer sits at the waistline, halfway between the belly button and the hip bone. Check to make sure all the campers are wearing their pedometers correctly before you begin doing the 100 step test to calibrate the pedometers. Use the *Calibrating Pedometers* experiment sheet to help campers learn how to calibrate their pedometer.

9. Calculate Goal for Increased Steps

Now that the campers have their pedometers, tell them that exercise and fitness scientists recommend people get 10,000 steps a day to be healthy. A mile is about 2,000 steps, so 10,000 steps is 5 miles. Are campers surprised? Does that seem like a lot or a little? Explain that steps add up quicker than they think. For example, getting ready for camp in their home and then coming to camp will probably be at least several hundred steps. Tomorrow campers can wear their pedometers all day and collect data on how many steps they usually get in a day.

Explain that once they know their usual step count, they can set a goal if they are not meeting the 10,000 steps a day recommendation. Encourage campers to add 10% onto their step counts each day. Give campers an example of adding 10% more steps. If a camper was taking 2,500 steps a day, adding on 10% would be taking 250 more steps or 2,750 total steps in

a day. Share other possible step counts and how to calculate a 10% increase.

10. Explore Camp Environment

Campers should have their pedometers calibrated and on. Explain to them that it is time to go on an exploratory investigation to find how the physical environment influences their activity choices within the camp setting. Distribute the *Investigative Checklist* activity sheet. In small supervised groups walk through the school to find each item. If possible, have campers photograph the items on the list. Afterwards, return to the classroom and discuss the findings. *What was on the list? What was missing? What additional ways to get physical activity were found?*

11. Close the Case

Remind campers that the pedometers are scientific tools. It is their responsibility to take care of the pedometers and to make sure they are not lost or broken. Campers may wear their pedometers for the rest of the day. You may want to check in right before campers leave for the day to see how many steps they have walked. This will also give you the chance to make sure everyone's pedometers are working correctly.

Remind campers to wear their pedometers from the moment they get out of bed in the morning to the moment they go to sleep at night but of course, take them off to shower!

Congratulate campers on completing another case. They have just discovered the importance of staying in balance and some tools and tips to help them.

Finding the Balance

Campers observe a simulation of the relationship between energy intake and energy output within the context of the human body. Complete this as a demonstration at the front of the class with a few volunteer campers.

Materials:

- Permanent marker
- 2 clear plastic cup
- 1 nail
- 3-4 cups water
- Plastic bus bin
- Stop watch
- Food coloring (optional)

Set-up

1. Gather the materials for classroom demonstration.
2. With a dark permanent marker, draw a line about an inch from the rim of one plastic cup. This line represents the energy-balance level. Write “Human Body” on the side of this cup. Use a nail to punch a small hole in the center of the bottom of the cup. Use the marker to label the bottom of the cup “Energy Out.” Label the other plastic cup “Energy In.”
3. Put 3-4 cups of water in the plastic bus bin.
4. Add a little food coloring to the water to make it easier to see the water in the cup.

Procedure

1. Tell the class that in this simulation of energy balance, the water represents energy that we get from food, and the plastic cup with the hole in it represents the human body.
2. Ask for three volunteers. Assign one camper the job of “energy in,” assign another the job of “energy out;” the third camper is the timer.
3. Have the “energy out” camper place a finger over the hole at the bottom of the plastic cup so no water/“energy” can escape. Have the “energy in” camper fill this cup to the top with water.
4. Have the “energy out” camper hold the water/energy-filled plastic cup over the bus bin. Instruct your volunteer to take his/her finger away from the hole so that water/“energy” flows out of the cup. At the same time, have the “energy in” camper pour water into the cup so that the level of the water stays between the energy-balance line and the top of the cup. The goal is to keep the water at the energy-balance and not to let it get below the line or to overflow. Tell campers to keep the energy balance for 20 seconds. Have the timer watch the clock.

Finding the Balance

5. Repeat the simulation. This time, once the “Human Body” cup is full, have the “energy in” camper pour water/energy in as slowly as she can, so that the water flows out of the hole at a faster rate than she is pouring it into the cup. The water will drop below the energy-balance mark on the cup. *What does this mean in terms of food/energy intake? Is the person eating a lot or a little?*
6. Repeat the simulation again. Have the “energy in” camper pour the water/energy in as fast as she can, so that the water flows into the cup faster than it flows out of the hole. The cup will overflow over the bus bin. *What does this mean in terms of food/energy intake? Is the person eating a lot or a little?*
7. Explain that when we eat food, they provide us energy. This is the “energy in.” When we are physically active we use energy. This is “energy out.” Explain that our bodies also use energy when we aren’t physically active. It takes energy to keep our minds thinking, our heart pumping, and our lungs breathing. Ask campers, *if we take in energy from food and use energy to be physically active and keep our bodies running, how can we stay in energy balance?*

Questions

1. *What did we have to do to make sure the water/energy stayed in energy balance for 20 seconds?*
2. *What action can we take to make the “energy in” less than the “energy out?”*
3. *What action can we take to make the “energy in” greater than the “energy out?”*
4. *Based on this demonstration, if we want to maintain energy balance in our own bodies, what should we do?*

Calibrating Pedometers

Pedometers

A pedometer is a small device that calculates the number of steps taken throughout the day. Once you calibrate it to the length of your stride, the little machine will keep track of how far you walk. Some also calculate distance and calories burned. Press “reset” each morning, and the pedometer starts all over again.

For the remaining days at camp, campers will keep track of their steps. The goal is to reach 10,000 steps a day. It’s important for them to learn how to calibrate the pedometer, and why. They will be using the pedometers to track their personal data. Be sure to emphasize that the accuracy of their personal data is what counts. This is not a competition. Remind campers that they are detectives collecting clues about their personal activity cases.

Using the Pedometer

The best place to wear the pedometer is on your waist, attached to your waistband or belt. If your pedometer has a cover, make sure it is closed and that it is not hanging at an angle. Keep the pedometer as straight as possible. Remind campers to put it on when they get dressed in the morning, to take it off when they go to bed at night, and to reset it to zero at the start of each day. Pedometers work like pendulums, moving back and forth with each step that is taken. Encourage campers to test the limits of their pedometers. Challenge them to design investigations to see how accurate the pedometer is when they run, bike, climb stairs, or if they carry it in a pocket. Remind them to keep careful records of their investigations. Join your campers — clip on a pedometer and see how active you are each day! How close do you come to the 10,000 step goal?

Set up

1. Clear an area in the classroom where campers can walk 100 steps in a straight line. Alternatively, plan to take campers into the hallway, cafeteria or outside on a playground.
2. Distribute pedometers to campers. Allow campers to write their initials on their pedometer with a permanent marker.

Procedure

1. Very gently have campers move the pedometer up and down. Observe how it records movement. Establish a rhythm so the pedometer continues to count. Do not vigorously shake the pedometer, it is a delicate tool.
2. Campers place the pedometers at their waists, halfway between the belly button and hip bone. Have campers do a quick sketch in their i2 journals of where they placed it on their body so they know exactly where to place it the following day.
3. Have campers reset the pedometers to zero. Campers must now walk in a straight line and count out 100 steps. Tell campers to count in their heads so not to disturb each others counting.
4. Have campers look at the number of steps recorded. Is it the same amount of steps they counted? If the

Calibrating Pedometers (continued)

pedometer is calibrated accurately, it will read between 90 and 110. If it does not, adjust the placement of the pedometer and try again. Use the 100-step test anytime campers want to make sure their pedometers are working properly.

Questions

1. *What do you notice when you move the pedometer up and down?*
2. *What happens when you wear a pedometer when you run?*
3. *Where did you place your pedometer? Did the location affect the accuracy of the count?*
4. *Did you observe any factors that made the pedometer more or less accurate?*
5. *Why is it important to calibrate the pedometer?*

**Camper:**

Investigative Checklist

Do you have any of these at your school? Go on a scavenger hunt to find each item.

Basketball hoop

Bike rack

Things to climb up

Running/walking track

Tennis courts

Volleyball nets

Playing field (football, baseball, soccer, field hockey)

other _____

other _____

Tracking Steps in our Environment

Similar to the many food decisions that we make throughout the day, we also make decisions about what activities to do. One's physical activity environment influences activity choices. Environmental factors include things like the availability and accessibility of safe, affordable places to exercise as well as social practices, norms, and expectations. The focus of this case should be on the factors that make up the camper's "world," in which he/she has some control over physical activity decisions.

Availability refers to the variety of activity options that surround us. Accessibility refers to the readiness and convenience of these options; therefore is it safe, pleasant and easy to be physically active in the community. The availability and accessibility of many new technologies, such as cars, computers and appliances make it easy to remain physically-inactive throughout the day. In addition, the availability and accessibility of environments that promote physical activity, such as parks, bike paths and indoor recreation spaces are often limited. It is often these aforementioned elements of the "built environment" – the man-made world, of cities, neighborhoods, streets, parks and paths that influence our daily levels of physical activity. Lastly, social surroundings are also important. This refers to a supportive familial, school or workplace culture that makes it easier for people to engage in activity.

For kids, a school environment that promotes physical activity is important, as nearly all adolescents spend a good part of their days in school. Active travel to school is a great way to ensure physical activity during the day. In 1969, approximately half of U.S. middle school children either walked or biked to school, this figure has changed drastically with only 13% now doing so.

We all know that being physically active is important, but it is not always easy to know if we are getting enough. Guidelines recommend that adolescents get 60 minutes or more of physical activity a day, coming from aerobic, muscle-strengthening and bone-strengthening activities. Aerobic activity refers to moderate- or vigorous-intensity physical activity like running. Muscle-strengthening activities include push-ups, pull-ups and weight lifting exercises. Bone-strengthening exercises include hopping, skipping, jumping and sports like gymnastics, basketball and tennis. What's most important is that young people are encouraged to participate in physical activities that are age-appropriate, enjoyable and that offer a variety of ways to be active.



Cooking to Eat Whole Foods

.....

Materials

In Guide:

- **Eat Whole Foods: Getting Ready** cooking resource p. 284
- **Eat Whole Foods: Set Up** cooking resource p. 285
- **Food Preservation** food science resource p. 288
- **Pickles** camper's recipe sheet p. 290
- **Aromatics** food science resource p. 292
- **Eat Whole Foods: Cooking Skills** cooking resource p. 295
- **Eat Whole Foods: Feature Food** cooking resource p. 297
- **Tasting Bell Peppers** activity sheet p. 299
- **Hummus Dip** camper's recipe sheet p. 300
- **Lentil Dip** camper's recipe sheet p. 301
- **Peter's Peck of Pickles** take home recipe p. 303
- **Roasted Pepper Hummus** take home recipe p. 304
- **French Lentil Dijon Dip** take home recipe p. 305

Other Materials:

- All ingredients and equipment listed on the **Eat Whole Foods: Getting Ready** cooking resource
- i2 journals and pencils
1 per camper

Overview

In this lesson, campers explore the theme of the day “not too much,” referring to heavily processed and fast foods. Campers learn more about processed foods, and home processing techniques to make preserves. They recognize, explore, and use principles of sensory science to build flavor. Campers see a demonstration on cutting, de-seeding, and roasting peppers and then practice using descriptive words to compare the sensory differences in today's feature food, seasonal bell peppers! They learn about roasting techniques that apply to peppers as well as other vegetables across seasons, and make delicious dips to incorporate the roasted peppers.

Objectives

Campers will be able to:

- recognize food preservation methods;
- describe and demonstrate cutting, de-seeding and roasting vegetables;
- use descriptive words to compare subtle differences in foods;
- describe and demonstrate safety skills involving blender and oven use;
- demonstrate ability to make a simple snack using real foods.

Before You Begin:

- Review lesson plan and all in guide materials.
- Gather ingredients and equipment and complete food preparation and cooking station set up using **Eat Whole Foods: Getting Ready** and **Eat Whole Foods: Set Up** cooking resources.
- Review **Eat Whole Food: Cooking Skills** and **Eat Whole Food: Feature Food** cooking resources and **Food Preservation** and **Aromatics** food science resources.
- Make copies of **Pickles**, **Hummus Dip**, and **Lentil Dip** camper's recipe sheets, **Peter's Peck of Pickles**, **Roasted Pepper Hummus**, and **French Lentil Dijon Dip** take home recipes, and **Tasting Bell Peppers** activity sheet for each camper.

Clues collected:

- *Peter's Peck of Pickles* take home recipe
- *Roasted Pepper Hummus* take home recipe
- *French Lentil Dijon Dip* take home recipe
- *Tasting Bell Peppers* activity sheet

1. Introduce the Case

Introduce the case of **Cooking to Eat Whole Foods** to the campers. Ask campers to give examples of ways in which they have observed food spoilage (dark marks on fruits/vegetables, odor, brittleness or hardness, as in stale bread or crackers, shriveling up or shrinking of foods, as in lettuce etc.). *What types of foods do we often see these signs of spoilage in?* (Fresh, minimally-processed foods tend to spoil faster.) *What types of foods do we rarely see these signs of spoiling in?* (Packaged and processed goods generally have many additives to promote shelf stability.)

2. Exploring Food Preservation

Using the **Food Preservation** cooking resource explain ways in which preservatives prevent the alteration of foods. Explain that the purpose of preservation is to decrease natural processes of food spoilage. Ask campers, *What causes food to spoil and breakdown?* Have them consider the decomposition cycle reviewed in Day 2 for insight on the role that decomposers play in breaking down foods. Explain that in heavily processed snack and fast foods, like the ones discussed in previous cases, the addition of large amounts of unhealthy ingredients halts the natural decomposition of food. Many of these products can therefore sit on shelves for years without changing. After the morning's discussion of added ingredients (salt, sugar, and fat) campers may be able to list these ingredients as preserving agents found in heavily processed foods. Additionally, processed snacks tend to be heavily packaged and encourage people to consume larger quantities more frequently.

Explain to campers that they are going to learn about preservation methods and then make an after-school snack from minimally processed whole seasonal ingredients. Ask, *how can making your own snacks, allow you to take control over your food choices?* By making your own food, you know what the ingredients are and how it was prepared, and you can more easily regulate how much you eat. Campers may enjoy snacks, but they can do so and still be Real Eaters by selecting and making less processed, less packaged snack foods. Using *Peter's Peck of Pickles* take home recipe, for your reference, discuss the process of pickling with campers. Point out the ingredients and techniques used in pickling that play a role in preservation (white vinegar, salt, heating, and jarring).

3. Explore Aromatics

To introduce the other ingredients (the aromatics) in the *Peter's Peck of Pickles* take home recipe bring campers up to the station where the Savor the Flavor experiment will be conducted. Use the **Aromatics** cooking resource to conduct this experiment. Ask campers, *how do you think the smell of foods contributes to its taste? What kinds of ingredients do you think*

are used to provide aroma? Encourage campers to consider ingredients used in past recipes that may have been added to provide aroma and to contribute to taste (e.g. cumin, cinnamon, garlic, onions, paprika, etc).

4. Make Pickles

Campers work in small groups to make their own individual jars of refrigerator pickles that they can take home. Distribute mason jars to each of the campers for them to label with their names or initials. Distribute the *Pickles* camper’s recipes sheet. Campers may select from a variety of farmers market fresh produce to stuff into their individual jars, while an instructor prepares the brine for the pickles in the Hot Zone.

Designate a teaching assistant to make the brine following directions in *Peter’s Peck of Pickles* take home recipe. The teaching assistant will boil the water, collect the vinegar and salt mixture, and garlic from campers to heat, and carefully pour the hot brine into the camper’s stuffed mason jars when ready.

Once jars have been stuffed and the hot brine has been poured into them, seal them and set them aside for campers to take home at the end of the camp day. There should be some fresh vegetables left over from this recipe that can be served to eat with the hummus and lentil dips.

Turn up the Heat!

If working with older campers, it may be appropriate to assign some campers to help make the brine and check on the roasting peppers. Make sure there are enough pot holders for everyone.

5. Practice Cooking Skills

The featured food today is the bell pepper and the cooking skills are how to de-seed and roast bell peppers. Ask campers, *have you ever eaten roasted vegetables? Which types of roasted vegetables have you tried? What other vegetables might you be able to roast?* Using the *Eat Whole Foods: Cooking Skills* cooking resource explain that roasting is a simple process that lets the oven do most of the work while enhancing the natural sweetness in the vegetables. Demonstrate how to cut and de-seed a bell pepper. Provide cutting boards and knives to campers. Allow campers to wash, cut, de-seed and chop the peppers (for both the roasted peppers and in preparation for the pepper tasting) and place them into a large bowl. Allow campers to coat the cut peppers with olive oil and salt, spread the peppers evenly on a small baking sheet to roast at 425 degrees for 30-35 minutes. Designate a teaching assistant to check on the peppers periodically and turn them halfway through cooking. These roasted peppers will be used for the hummus dip and the lentil dip recipes.

6. Highlight Feature Food

While the peppers are roasting, use the *Eat Whole Foods: Feature Food* cooking resource to conduct a pepper tasting of the feature food. Explain that bell peppers are vegetables that get their name because of their shape. They are also called sweet peppers because they are not hot. Distribute *Tasting Bell Peppers* activity sheet to each camper. Allow campers to taste, smell, feel, and describe the different peppers using descriptive words to draw distinctions between the pepper varieties. Once campers have completed their activity sheets, explain the differences between all the peppers. Allow campers to share their own descriptions. There may be cut-up peppers left over from the pepper tasting that can be served and eaten with the hummus and lentil dips

7. Review the Recipes

Each cooking group will make a different recipe. Decide which group will do which recipe and distribute copies of *Hummus* and *Lentil Dip* camper's recipe sheets. Explain that since each group will be making a different recipe from start to finish, they need to pay attention to the steps, ingredients, and skills that they will learn so that they can teach the other group how to make the recipe upon completion. Indicate that each group will have 10 minutes before they all sit down to eat, to explain how they made their respective dips. With the help of a teaching assistant, work with each individual cooking group to review the group's recipe. Introduce each ingredient. Ask campers to identify which ingredients are whole foods and which are semi-processed; which ingredients are used to impart aroma to contribute to flavor; which ingredients may help preserve freshness. Review the recipe directions.

8. Make and Present Dips

Allow each group to make their respective dips. Provide each group 10 minutes to present their dip, and demonstrate to the other cooking group how they prepared it! Each group may want to give their dip a name. Ensure that each group reveals which ingredients were used to impart aroma, which act to preserve, and which are whole vs. semi-processed.

9. Eat!

Once the dips are prepared and the pitas are cut up, sit down and eat together as a large group. Be sure to serve the leftover pickling and pepper-tasting vegetables alongside the dips. Encourage campers to talk about what they like or perhaps dislike about the recipe. Remind them to use descriptive words whenever possible. Encourage campers to think about other ways they could eat these dips besides with pita and raw veggies.

If campers did not like something that they tried, encourage them to consider changes that they would make to improve the flavor.

Are there other flavors, spices, or herbs that you could add to the dips next time? What kinds of flavors do you think the roasted peppers introduced? Will you make these recipes at home? Why or why not? Will you share the recipe with anyone else?

10. Clean-up

Once everyone is finished it is time to clean up. Everyone should be involved in the cleaning process. Make sure that all cooking and eating surfaces are wiped down and floors are swept. If possible, have campers wash their own dishes. Cleaning will go faster if some washing has already been done throughout the activity.

11. Close the Case

Ask campers the following questions:

When would you want to preserve foods?

What other things could you preserve?

How is home preserving different from processing of heavily-processed foods you see at fast food restaurants and in stores?

Ensure that campers are able to recognize the difference in home preserving versus large-scale preserving. When you preserve or alter foods at home, you are aware of the ingredients that you add and the amounts that are added. Also, home preservers are restricted to using common food ingredients. Therefore we wouldn't be adding many of the unpronounceable ingredients that the campers saw in the ingredients lists in Case 2.

Similarly, ensure that campers recognize how making their own snacks might also help them avoid large amount of unhealthy ingredients (like excess sugar, salt, and fat) found in heavily-processed snack foods.

Distribute *Peter's Peck of Pickles*, *Roasted Pepper Hummus*, and *French Lentil Dijon Dip* take home recipes to each camper to take home. Congratulate campers for completing the case. By learning how to snack on less processed foods they are one step closer to becoming "Real Eaters."

Eat Whole Foods: Getting Ready

These are all the ingredients and supplies you need to make all the recipes and complete all cooking demonstrations and activities for 20 campers.

Shopping list

- 6 pickling (Kirby) cucumbers
- 1 pound of yellow wax beans
- 1 pound of green beans
- 1 head white cauliflower
- 1 head purple cauliflower
- ½ pound small sweet peppers
- 5 heads of garlic (47 cloves)
- 12 cups distilled white vinegar
- 12 Tbsp. Kosher salt
- 1 bunch of fresh dill
- 5 Tbsp. celery seed
- 2 Tbsp. dill seed
- 6 tsp. coriander seeds
- 6 tsp. mustard seeds
- 6 Tbsp. black peppercorns
- 2 15-oz. cans of chickpeas
- 2/3 cup tahini paste
- 4 lemons
- 14 bell peppers (3 green; 3 red; 4 orange; 4 yellow)
- Table salt
- 2 pkgs. 100% Whole wheat pita
- 6 Tbsp. olive oil
- 1 ½ cups of French lentils, uncooked
- 3 Tbsp. ground flaxseed
- 3 scallions
- 3 Tbsp. Dijon mustard
- 3 Tbsp. soy sauce
- 1 tsp. ground pepper
- 2 Tbsp. chopped celery

Cooking Equipment

- 20 8-ounce Mason jars with lids
- 2, 6 quart stock pot
- 1 fine mesh strainer
- 1 large heat resistant funnel
- 5 large heat resistant pitchers
- 3 large bowls
- 4 medium bowls
- 14 small bowls
- 1 food processor
- 1 can opener
- 2 colanders
- Cutting board for instructor
- Adult knife for instructor
- 4 plates
- Knives for campers
- Cutting boards for campers
- 5 sets of measuring cups
- 5 sets of measuring spoons
- 4 pairs of tongs
- 2 medium-sized serving bowls
- 1 toaster oven with toaster oven baking sheets
- 2 silicon spatulas
- Pot holders
- 2 large mixing spoons
- 1 citrus juicer
- 2 burners
- Cups, utensils, napkins, serving spoons, small plates

Advanced Prep

- Roast 2 bell peppers in advance for the Bell Pepper Tasting.
- Cook 1 ½ cups dry lentils for the 'lentil dip' cooking group according to package directions and set aside in a small bowl.
- Set up stations using the *Eat Whole Foods: Set Up* cooking resource.

Eat Whole Foods: Set Up

Use this sheet to prepare the classroom for cooking. Campers prepare the *Pickles* recipe individually but work in small groups to make two batches of the brine. Campers prepare their assigned dip in small cooking groups. Set up a cooking station for each small group with all the food and equipment listed, separated by recipe. Prepare the shared ingredient station with the food and equipment that is shared by all groups in a communal location. Prepare the Hot Zone with the listed food and equipment.

Station: Cooking Group 1

A. Pickles

Foods:

- 3 pickling (Kirby) cucumbers, quartered into spears
- ½ pound of yellow wax beans
- ½ pound of green beans
- ½ head of white cauliflower
- ½ head of purple cauliflower
- ¼ pound small sweet salad or other small mild peppers
- ½ bunch of dill, thoroughly washed and patted dry
- Garlic cloves (20 cloves)

Preparation:

1. Divide cucumbers, beans, cauliflower, and peppers evenly into medium bowls.

Equipment:

- 2 small bowls
- 3 medium bowls
- 1 knife per camper*
- 1 cutting board per camper*
- 1 citrus juicer
- 1 large bowl
- 1 silicon spatula
- 1 large mixing spoon
- 2 sets measuring spoons*
- 2 sets measuring cups*
- 2 large pitchers

B. Hummus

Foods:

- 2 15-oz. cans of chickpeas
- 2/3 cup tahini paste
- 4 lemons
- 2 cloves garlic
- 1 cup roasted peppers (from cooking skills demonstration)
- 1 package 100% Whole wheat pita

Preparation:

1. Open, drain and wash cans of chickpeas and place in a large bowl.

Equipment:

- 2 small bowls
- 1 knife per camper*
- 1 cutting board per camper*
- 1 citrus juicer
- 1 silicon spatula
- 1 large mixing spoon
- 2 sets of measuring spoons*
- 2 sets of measuring cups*
- 1 medium bowl

* Cutting boards, knives, measuring cups and measuring spoon sets can be shared between the recipes

Eat Whole Foods: Set Up (continued)

Station: Cooking Group 2

A. Pickles

Foods:

- 3 pickling (Kirby) cucumbers, quartered into spears
- ½ pound of yellow wax beans
- ½ pound of green beans
- ½ head of white cauliflower
- ½ head of purple cauliflower
- ¼ pound small sweet salad or other small mild peppers
- ½ bunch of dill, thoroughly washed and patted dry
- Garlic cloves (20 cloves)

Preparation:

1. Divide cucumbers, beans, cauliflower, and peppers evenly into 4 small bowls for cooking group 2.

B. Lentil Dip

Foods:

- 3 cups of cooked French lentils (prepared in advance)
- Ground flaxseed
- 3 scallions
- 2 cloves of garlic
- Dijon mustard
- Soy sauce
- Ground black pepper
- ¼ cup of roasted peppers (from roasted pepper demonstration)
- 1 package 100% Whole wheat pita

Equipment:

- 2 small bowls
- 3 medium bowls
- 1 knife per camper*
- 1 cutting board per camper*
- 1 citrus juicer
- 1 large bowl
- 1 silicon spatula
- 1 large mixing spoon
- 2 sets measuring spoons*
- 2 sets measuring cups*
- 2 large pitchers

Equipment:

- 1 knife per camper*
- 1 cutting board per camper*
- 1 silicon spatula
- 1 large mixing spoon
- 2 sets of measuring spoons
- 2 sets of measuring cups
- 1 small bowl
- 1 medium bowl

* Cutting boards, knives, measuring cups and measuring spoon sets can be shared between the recipes

Eat Whole Foods: Set Up (continued)

Station: Shared Ingredients

Foods

- Distilled white vinegar
- Kosher salt
- Celery seed
- Coriander seeds
- Mustard seeds
- Black peppercorns
- Olive oil
- Table salt
- Ground black pepper

Equipment:

- Food processor

Station: Hot Zone

Foods and Equipment:

- 1 small strainer
- Oven mitts/pot holders
- 1 heat resistant pitcher
- 1 large heat resistant funnel
- 2 burners
- 2 6-quart stock pots.

Preparation:

1. Add 12 cups of water to each of the stock pots.

Food Preservation

Food preservation is the process of treating and handling food to stop or slow down spoilage (loss of quality or nutritional value, and improve edibility). Preservation usually involves preventing the growth of undesirable bacteria, yeasts, fungi, and other micro-organisms, as well as retarding the oxidation of fats which cause rancidity, and other kinds of unwanted reactions that can occur during food preparation.

The food preservation methods work by slowing down or stopping food from deteriorating, blocking the activity of microorganisms that cause spoilage (bacteria, yeasts, and mold), and preventing recontamination that causes spoilage.

It helps to think about what the agents that promote spoilage (insects, microorganisms, and enzymes) need to thrive to try to prevent them from developing or acting. In general, they need:

- Sufficient moisture
- Adequate temperature (not too high or too low)
- Oxygen
- Nutrients

Many processes designed to preserve food will involve a number of food preservation methods. Preserving fruit, by turning it into jam, for example, involves boiling (to reduce the fruit's moisture content, and to kill bacteria, yeasts, etc. with the high temperature), adding sugar (to prevent their re-growth) and sealing within an airtight jar (to prevent recontamination).

Maintaining or creating nutritional value, texture, and flavor are important goals of food preservation, although, some methods drastically alter the character of the food being preserved. In many cases, these changes have come to be seen as desirable qualities – cheese, yogurt, and pickles being common examples. However, in many cases, the nutritional value of foods is not maintained or enhanced by food preservation methods, but rather adulterated with heavy preservatives, as in commercial processing.

Pickling as an example of Preservation:

Acidification - In this type of preservation, the environment created is too acidic to for microorganisms to grow. A change in pH prevents the microorganisms from functioning properly. This method is different from fermentation where the acidic environment occurs as a result of fermentation. When adding acid (normally vinegar) foods taste very acidic and can only be eaten in small quantities, but this is a quick, easy, and safe method used to preserve foods. As such, it has been used for a long time, mainly for aromatic herbs and vegetables.

Food Preservation (continued)

Adding preservatives - technically many preservatives are also acids that end up acidifying the food and therefore this would be the same method as acidification, but they are considered preservatives if added as powders. Also, many preservatives have other functions, as antioxidants or antimicrobial agents. Preservatives can be categorized into three general types: antimicrobials that inhibit growth of bacteria, yeasts, or molds; antioxidants that slow air oxidation of fats and lipids, which leads to rancidity; and a third type that blocks the natural ripening and enzymatic processes that continue to occur in foodstuffs after harvest.

Reduction of water activity - By adding solutes (such as salt and sugar), water is removed by osmosis. Microorganisms cannot grow or digest the food without water. Also, the environment becomes toxic since the solutes remove water also from the microorganisms bodies. By concentrating the brine, there is less water available.

Sterilization - Using high temperatures, all microorganisms are killed. This method generally accompanies one of the previously mentioned methods to keep all microorganisms from growing in the food. Canning is the most common sterilization method, heating the food and vacuum packaging it afterwards is another.

Cooking - Heating food kills heat sensitive microorganisms and inactivates enzymes that cause food spoilage. Generally speaking, a temperature above 60^o Celsius (140^o F.) is considered suitable to kill most microorganisms in a food, although some heat resistant microorganisms, spores and toxins can remain.

Pickles

*Serves 10 campers***Ingredients at station:**

Pickling (Kirby) cucumbers, cut into spears

Yellow wax beans

Green beans

Pickling cucumbers, quartered into spears

Fresh dill

Cauliflower (white and purple cauliflower)

Small sweet salad peppers

Garlic cloves

Ingredients and equipment at shared station:

Celery seed

Coriander seeds

Mustard seeds

Black peppercorns

White vinegar

Kosher salt

Ingredients in Hot Zone:

Hot Brine

Directions:

1. Take 2 large pitchers, and a set of measuring spoons and cups to the shared ingredients station. Add **3 cups of white vinegar** to each pitcher. Add **3 tablespoons of kosher salt** to each pitcher. Gently stir to combine. Bring both pitchers to the teacher in the Hot Zone.
2. Smash the **garlic** and peel of the skin. Place all the garlic into a small bowl. Bring the garlic to the teacher in the Hot Zone.
3. Wash **yellow wax beans** and **green beans** in a colander.
4. Cut the ends off the **yellow and green beans**. Place the beans into a medium bowl.
5. Break the **cauliflower** into smaller florets and wash them in colander. Place cauliflower florets into a medium bowl.
6. Wash **peppers** in a colander. Place washed peppers into a medium bowl.
7. Take a small bowl and a set of measuring spoons to the shared ingredients station. Add **3 teaspoons each of celery seeds, coriander seeds, and mustard seeds** to the bowl. Add **3 tablespoons of black peppercorns** to the small bowl and mix to combine. Bring the small bowl back to your cooking station.
8. Collect the **cooked garlic** from the teacher in the hot zone.
9. Place **two cloves of garlic** into each 8 ounce jar.

Pickles (continued)

- 10. Select a jar and write your initials on the side.
- 11. Add **1 teaspoon of the seed mixture** and **a sprig of dill** to your jar.
- 12. Stuff your jar with your **choice of vegetables (cucumber spears, beans, cauliflower, and/or peppers)**. Be sure that your jar is packed so that the vegetables don't move when you shake your jar.
- 13. When your jars are stuffed, bring your jar to the hot zone where the teacher will fill it with **hot brine** and set it aside.

Aromatics

Exploring Aromas

Flavor is the blend of sensations evoked by putting a substance in the mouth. Flavor is equal to taste (what the mouth perceives including mouth-feel and trigeminal sensations such as heat or texture) combined with the aroma (what the nose perceives), plus the memories and emotions evoked by the experience.

The aroma of a dish can be modified by adding aromatic substances which will thus impact the flavor. Taste can also be altered by changing the texture, and heat of the food.

Aromatic substances are compounds that have a smell or odor. Their smell or odor comes from their “volatility,” referring to the concentration of odor-releasing particles that are released into the air from the food item. The volatile molecules are picked up and detected by the nose if they are present in a concentration that exceeds the odor threshold. This odor threshold is different across species. Some species, like dogs, have a greater sense of smell (they have a lower odor threshold) than humans. Volatility increases with temperature and is also affected by the medium in which the volatile compounds are embedded; so the aroma changes when food is heated or by the addition of different ingredients. There are two ways to detect aromas. The first one is through the nostrils, as when you inhale something (orthonasal path), the second is through the back of your mouth (retronasal path). There is a passage that connects the back of your mouth with the base of your nose where the olfactory receptors are. When we eat, first we experience the food’s aroma through our nostrils; then we put it in our mouths and after chewing and warming the food in our mouths we release more volatile compounds. These volatile compounds are detected in the retronasal portions of our mouth.

Usually, foods have one compound that provides its characteristic aroma. This compound is known as the key odorant.

In food preparation or cooking, ingredients that change the aroma of foods are added to enhance the flavor of a dish. Commonly these are vegetables, herbs and spices. The most common vegetables used to enhance aroma are carrots, onions, and celery but others such as ginger or fennel are also used. Herbs and spices provide foods with very distinctive aromas depending on the type of cuisine.

A spice is a dried seed, fruit, root, bark, or vegetable substance primarily used for flavoring, coloring or preserving food. Sometimes a spice is used to hide other flavors. Spices have always been valued for their ability to add flavor, color and aroma to dishes, but before the advent of refrigeration they were also an important means of food preservation, and in some cultures their medicinal and antiseptic characteristics are revered.

Herbs are fragrant plants whose leaves (and sometimes stalks) are used in cooking to add flavor to dishes.

Different cuisines rely on different varieties of herbs and spices, depending on which plants grow natively or are cultivated in that country: for example, basil is synonymous with Italian food, while coriander is widely used in Indian, South-east Asian, and Latin American dishes.

Dill is an herb whose leaves are widely used either fresh or dried in Europe and Central Asia. Dill is often added to soups, fish and pickles.

Aromatics (continued)

Savor the Flavor Experiment

In this experiment, campers explore the properties and varieties of aromatics that are added to food to enhance their flavor through their aromatic properties... the properties that are sensed by our noses. They will get a chance to compare the flavor of a sample while plugging their nose versus when their nose is unplugged.

Materials:

- 2 tablespoons of celery seed
- 2 tablespoons of dill seed
- 2 tablespoons of chopped fresh dill
- 2 tablespoons of chopped fresh celery
- 1 knife
- 1 cutting board
- 8 small bowls
- 8 tasting spoons
- 4 dish towels or paper towels

Set-up

1. Chop or tear fresh dill and divide it between 2 small bowls; repeat for celery.
2. Divide dill seed into 2 small bowls (1 tsp. in each); repeat for celery seed .
3. Set all 8 small bowls aside, covering them with a dish towel to conceal them.

Procedure

1. Briefly review the function of an aromatic as a flavor enhancer in foods and discuss the role that the nose plays in sensing flavor.
2. Demonstrate how to plug your nose while chewing. Explain to campers that they will be asked to close their eyes, plug their nose with one hand, and hold out their other hand palm face up to receive a sample. Once they have received the sample, they must keep their nose plugged and eyes closed and chew on the sample to try and detect flavor from the sample.
3. With the help of a teaching assistant, distribute first a few pieces of celery to each camper, while their eyes are closed, so that they do not see what they are given. Ask the campers to hold the sample in their mouth, then chew without swallowing, and then try to determine what flavors the sample has. Finally, ask the campers to release their noses, take a breath with through their nostrils, and continue chewing and swallowing.
4. Allow campers to reflect on the differences in their experiences with their noses plugged and then

Aromatics (continued)

unplugged.

5. Repeat the process using the chopped dill and then the celery seed.
6. Finally, repeat the process using the dill seed. Instruct campers to place the seeds in their mouths and crack them between their teeth. They don't have to chew them. They have a very strong flavor and the campers may want to spit them out. Ensure they have sensed the cracked seed both before and after unplugging their noses.
7. See if campers can identify which leaf and seed belong together based on the flavors that they detected.

Questions

1. *How did plugging your nose effect your perception of flavor? What do you think that this tells you about your sense of smell? What other senses did you use while your nose was plugged help you determine what the sample was?*
2. *Which seed went with which leaf?*

Eat Whole Foods: Cooking Skills

De-seeding and Roasting

Materials:

- 1 green bell pepper
- 1 red bell peppers
- 1 orange bell pepper
- 1 yellow bell pepper
- Olive oil
- Kosher salt
- Cutting board for teacher
- Knife for teacher
- Cutting boards for campers
- Knives for campers
- 1 large bowl
- 1 set of measuring spoons
- Toaster oven
- Toaster oven baking sheet
- Pot holders

How to De-seed a Pepper

De-seeding a bell pepper is easy. After washing the pepper, lay it on a flat surface on its side. Cut off the top where the stem is. Make another cut through the pepper crosswise. This will allow you to remove the seeds easily and discard them. You can scrape out the seeds using your hands or a spoon. There are different culinary, however this one tends to be the quickest and easiest method.

How to Roast a Pepper

Roasting is a cooking technique that applies high heat in order to bring out complex flavors and natural sweetness in the vegetables through caramelizing and browning. To roast, all that is needed is salt, olive oil, heat, and surface area. There is very little prep work or clean up.

Procedure:

1. Preheat toaster oven to 425 degrees Fahrenheit.
2. Wash, de-seed and chop 4 bell peppers, one of each color. Place chopped peppers into a large mixing bowl.
3. Add 2 tablespoons olive oil and 1/2 teaspoon of Kosher salt and mix to combine.

Eat Whole Foods: Cooking Skills

4. Spread evenly over a baking sheet and roast in a toaster oven for 30-35 minutes until browned. Stir once halfway through roasting.

Why heat?

At a very high temperature, the natural sugars will caramelize (and the proteins will brown) revealing complex and sweet flavors.

Surface area:

The more surface area, the more caramelizing you'll get. When putting your vegetables on the baking sheet don't pile your vegetables on top of one another, spread them out in one layer. Also, size matters! If you cut the vegetables into small strips there is more exposed surface area as opposed to large chunks. An elongated shape, like a domino will have more surface area than a cube. For peppers, cut them long lengthwise and then in half, so that they are about the size of a domino.

Eat Whole Foods: Feature Food

Bell Peppers Tasting

Materials:

- 2 green bell peppers
- 2 red bell peppers
- 2 orange bell peppers
- 2 yellow bell peppers
- 2 roasted peppers (pre-roasted by instructor in advance)
- 1 cutting boards per campers
- 1 knife per campers
- 4 large plates
- 4 pairs of tongs

Tasting:

In the summer, bell peppers are plentiful at farmers markets. This activity allows campers to rate various pepper varieties for sensory properties and practice using descriptive words effectively. Complete the tasting before sharing with campers why the peppers are different colors.

With campers, wash, de-seed, and cut bell peppers of different colors into strips. Separate by color and place them on separate plates for raw tasting. Place roasted peppers together on a separate plate. Place tongs on each plate for campers to take their sample. Load the *Descriptive Words* activity sheet from Day 1 (Case #5) onto the Smart Board or provide a few paper copies. Give each camper a *Tasting Bell Peppers* activity sheet and review the activity with the campers. Instruct campers that they will be tasting each pepper variety and using their 5 senses and descriptive words to describe the differences between each sample. Allow campers time to write some of their descriptions down onto their activity sheets. Discuss some of the differences.

Ask campers: *What differences did you notice between the varieties of peppers? Which peppers were sweeter? What textural differences did you notice between the pepper varieties. If a pepper has to travel a long distance to get to the supermarket, when would it likely be picked? What impact might this have on the flavor?*

Reflecting on Day 1 and conversations about the industrial food system, remind campers that produce that travels longer and ripens off the vine tend to be less flavorful. Draw on the flavor differences experienced in this activity between the green and red peppers to exemplify how flavor differences may exist between a tomato from Chile versus and tomato from New York.

What are bell peppers and why do they come in different colors?

Bell peppers (also called ‘sweet peppers’) commonly come in green, red, yellow, and orange varieties. However, white, lavender, dark purple, brown and even rainbow peppers exist. The color of a pepper is related to its stage of ripeness. As fruits ripen they develop sweeter flavors due to an increase in the fruit’s natural sugars with age. While unripe fruits contain some sugar, they contain higher amounts of starch

Eat Whole Foods: Cooking Skills (continued)

which does not impart sweetness. Consider the difference between an unripe, green banana and a ripened yellow banana. Typically, green peppers are the unripe fruit. Green peppers are less sweet, have thinner skin and have a slightly more bitter taste. As green peppers ripen, they become red peppers. Red peppers are noticeably sweeter and have thicker skins. Yellow and orange peppers are picked between these two stages, after the green pepper starts to ripen, but before it fully ripens and turns red. Thus, colored bell peppers are all the same vegetable just at a different stage in the ripening process.

The taste associated with ripe peppers varies with growing conditions and post-harvest conditions. When fruits are able to ripen naturally, on the plant in full sunshine, they impart more flavor. In the industrialized food system we know that fruits and vegetables travel great distances and are often picked prematurely. These fruits and vegetables are either forced to ripen upon arriving at their destination with the use of gases or they will ripen slowly in the produce departments when they arrive in grocery stores across the country.



Camper:

Tasting Bell Peppers

Taste the 4 varieties of raw bell peppers. Use your all 5 sense to describe them and how they compare. Use words from the Descriptive Words list to help you. Write them on the lines below.

	Green	Red	Yellow	Orange
Sight				
Smell				
Touch				
Sound				
Taste				

Roasted peppers

Roasted peppers are sweet because when they are heated the natural sugars in the fruit come out. Write a description of how they taste to you.

Roasted Peppers: _____

Hummus

*Serves 20 campers***Ingredients at station:**

Medium bowl of chickpeas

Garlic

Tahini paste

Lemons

100% whole wheat pitas (2 packages)

Ingredients and equipment at shared station:

Salt

Olive oil

Food processor

Ingredients in Hot Zone:

Roasted red peppers (from cooking skills demonstration)

Directions:

1. Juice **4 lemons** into a small bowl. Measure out **2/3 cup** of the **lemon juice** and add to bowl of chickpeas.
2. Smash and peel **2 cloves** of **garlic**. Add smashed garlic to bowl with chickpeas and lemon.
3. Measure **2/3 cup tahini paste** and add to bowl with chickpea and lemon.
4. Retrieve **1 cup** of **roasted peppers** from the teacher in the hot zone.
5. Take a small bowl to the shared ingredient station. Measure **1/4 teaspoon of salt**.
6. Take bowl of **chickpea, garlic, lemon juice, tahini mixture** and bowl of **salt** to the shared ingredient and equipment station. Add the contents of both bowls and **1 cup roasted peppers** to the blender. Use a spatula to scrap the contents of the bowls clean.
7. Secure lid of blender. Pulse the mixture 3-4 times.
8. Add **2 tablespoon** of **olive oil**, secure lid and pulse mixture 3-4 times. Again, add **2 tablespoon** of olive oil, secure lid and pulse until mostly smooth.
9. Use a rubber spatula to carefully remove all the hummus from the blender into a medium-sized bowl.
10. Cut **pitas** into triangles
11. Use the **pitas** and **vegetables** as dippers to scoop up the hummus. Enjoy!

Lentil Dip

Serves 20 campers

Ingredients at station:

- French lentils, cooked
- Ground flaxseed
- Scallions
- Dijon mustard
- Soy sauce
- Roasted bell peppers
- Garlic
- 100% whole wheat pita

Ingredients and equipment at shared station:

- Ground black pepper
- Salt

Directions:

1. Wash the **3 scallions** and cut them into **1-inch pieces**.
2. Smash **2 cloves of garlic** and remove the cloves from the skin.
3. Add **scallions** and **garlic** to large bowl of cooked lentils.
4. In a medium bowl, add **3 tablespoons of ground flaxseed, 3 tablespoons of Dijon mustard, 3 tablespoons of soy sauce, and ½ cup roasted peppers**, and stir to combine.
5. Add **contents of medium bowl** to **large bowl of lentils, scallions, and garlic**.
6. Take the large bowl with all ingredients to the shared station along with a rubber spatula. Add **half the contents** of the bowl to the food processor.
7. Secure the lid on the blender. Pulse the mixture 3-4 times.
8. Add the **second half** of the mixture to the food processor and blend. Use a spatula to scrape the contents of the bowl clean.
9. In a small bowl measure out **½ teaspoon of salt** and **1 teaspoon of ground black pepper**.
10. Add the **salt and pepper** to the mixture and blend.
11. Taste to ensure that it is seasoned properly. If not, add another **½ teaspoon of salt**.

Lentil Dip (continued)

- 12. Look at the consistency, if the mixture is too thick, add **1 tablespoon of water**.
- 13. Use a rubber spatula to carefully remove all the **lentil dip** from the food processor into a bowl.
- 14. Cut up **pitas** into triangles.

Peter's Peck of Pickles Recipe

You can get creative in this quick and easy pickle recipe and choose from a variety of colorful fresh farmers market vegetables. There is no need to blanch the veggies, or boil the jars. The brine is light and simple and works well with many foods: Kirby cucumbers, of course, but also carrots, cauliflower, green or yellow wax beans, peppers, and turnips. The pickles can last stored in the refrigerator for 2–3 weeks!



Makes 10–12 8-ounce bell jars

Ingredients:

- 12 cups of water
- 20 cloves of garlic, smashed and peeled
- 6 cups distilled white vinegar
- 6 tablespoons kosher salt
- 3 teaspoons of celery seed
- 3 teaspoons of coriander seeds
- 3 teaspoons of mustard seeds
- 3 tablespoons of black peppercorns
- ½ pound yellow wax beans
- ½ pound green beans
- 3 pickling cucumbers, quartered into spears
- ½ bunch of fresh dill
- ½ head of white cauliflower
- ½ head of purple cauliflower
- ½ pound small sweet salad peppers (or other small mild peppers)

Directions:

Making the Brine

1. In a medium stock pot, bring 12 cups of water to a boil. Once boiled, reduce the water to a simmer and add the garlic. Cook the garlic for 5 minutes.
2. Add the vinegar and salt and raise the heat to bring the water back to a boil. Stir until the salt dissolves, then remove the pot from the heat.

Preparing the Jars

1. In a small bowl, mix the celery seeds, coriander seeds, mustard seeds, and black peppercorns. Set aside.
2. Wash all vegetables.
3. Prepare vegetables for pickling: trim the ends off the wax and green beans so that they will fit in the 8-ounce jars; break the cauliflower into smaller florets; cut the ends off the cucumbers and quarter them into spears; leave the small peppers whole and de-seed and slice larger peppers into rings.
4. Place a few springs of dill, 1 teaspoon of the seed mixture, and 2 cloves of garlic (from brine) into each jar, and then pack the jars with veggies. You want them to be tightly stuffed.
5. Bring the brine back to a boil, and pour it over the vegetables in the jar. Fill the liquid to the top of the jars.
6. Let the brine cool in the jars before putting the lid on and refrigerating them. The pickles are ready in just a few hours, but will taste better after a couple of days.

Roasted Pepper Hummus

Paired with warm, whole wheat pita bread triangles and a variety of raw vegetables this Middle Eastern dip makes a great healthy after school snack.



Makes 4 cups

Ingredients:

- 2 15 oz. can of chickpeas, well drained and washed
- 4 cloves of garlic, smashed
- 2/3 cup lemon juice
- 2/3 cup tahini sesame paste
- 6 tablespoons olive oil, divided
- ½ teaspoon salt
- 4 bell peppers, any color
- 100% whole wheat pitas, cut into triangles
- Assorted vegetables to dip into hummus

Directions:

1. Pre-heat oven to 425 degrees.
2. Cut up peppers uniformly and place them into a bowl. Drizzle 2 tablespoons of olive oil and sprinkle salt and stir to combine.
3. Spread peppers evenly on a baking sheet and roast in oven for 25 minutes, stirring part way through to ensure heat is evenly distributed.
4. In a blender or food processor add garbanzo beans, smashed garlic, lemon juice and tahini paste. Pulse to combine. Add olive oil, 1 tablespoon at a time pulsing in between. Blend until mixture is fairly smooth with some chunks.
5. Scoop hummus with dippers and enjoy!

French Dijon Lentil Dip

Lentils, roasted peppers, and savory elements like soy sauce and Dijon mustard make for a wonderful concoction that is perfect as a dip or as a spread. This very simple dish refrigerates well, and is delicious and versatile.



Makes 4 cups

Ingredients:

- 1 ½ cups of French lentils, uncooked
- 3 tablespoons of ground flaxseed
- 3 scallions
- 3 tablespoons of Dijon mustard
- 3 tablespoons of soy sauce
- ½ cup roasted bell peppers
- 2 cloves of garlic
- 1 teaspoons of ground black pepper
- 1 teaspoon of salt

Directions:

1. Cook French lentils following package instructions. (Should yield approximately 3 cups of lentils, cooked.)
2. In a food processor, combine all the ingredients and blend until smooth.
3. Taste and adjust seasoning and consistency as needed. If the mixture is too thick, add a little water and blend again.

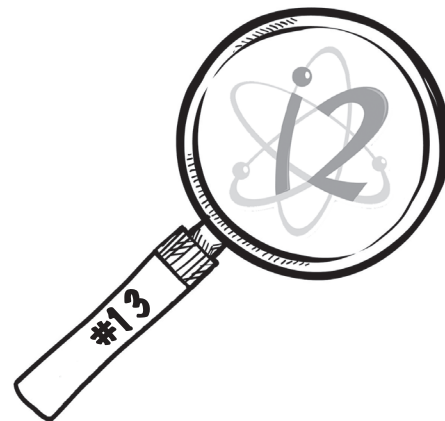
.....

Food Chemistry

Day 4



Navigate the Environment



Farmers Market Exploration

.....

Materials

In Guide:

- **Farm Graph** lesson resource p. 312
- **Farmers Markets 101** lesson resource p. 313
- **Farmer's Market Case Book** activity sheet p. 314

Other Materials:

- Clipboards 1 per camper
- Pencils 1 per camper
- Magnifying glasses 1 per camper
- Cameras

Overview

Campers travel to a farmers market for a firsthand experience of the community food system at work. Campers meet farmers and learn about their farms and growing practices. They discuss the benefits of eating seasonally and supporting local economies while also exploring some of the barriers to purchasing local foods. Campers purchase items from the farmers market to cook in their daily cooking activity.

Objectives

Campers will be able to:

- identify what whole, unprocessed fruits and vegetables look like;
- demonstrate increased value and appreciation for the people involved in local food production; and
- discuss the strengths and limitations of shopping at a farmers market.

Before You Begin:

- Review lesson plan and all in guide materials.
- Prepare copies of the **Farmer's Market Case Book** activity sheet for each camper.
- Gather materials for field trip.
- Make sure campers know what to bring for field trip.

Clues collected:

- Photos from farmers market
- *Farmers Market Case Book* activity sheet

Go Deeper

Share these additional facts on farming in the United States:

- Over the last 25 years we have lost more than 23 million acres of farmland to development. This is roughly the size of the entire state of Indiana.
- It is estimated that we need at least 13 million more acres of farmland fruits and vegetables in order for Americans to meet the daily requirement of fruit and vegetable intake.
- 1 out of 3 U.S. farms are planted for export.
- Farmers receive only 16 cents out of every dollar spent on food; the rest goes to wages and materials for production, processing, marketing, transportation, and distribution. In 1980, farmers received 31 cents.

1. Introduce the Case

Introduce campers to their next food detective case, **Farmers Market Exploration**. Share with campers that they will be taking a trip to a local farmers market to see firsthand how food is locally produced and distributed. Explain that campers will meet the farmers who produce local foods and learn about nearby farms while discovering what is in season and learning about what it takes to get food from the farm to the market.

2. Discuss Farmers Market

Before leaving for the market ask campers who has visited a farmers market before. Ask campers, *what types of foods have you bought at farmers markets before? What types of foods do you think you will find? Does anyone have any farm experiences (i.e. apple picking, family farms, etc.)? What is the image of a “farmer” that you think of (old or young, men or women etc.)?* Using the **Farm Graph** lesson resource, show campers how the numbers of family farms and therefore farmers have decreased over the years. At the farmers market, campers will be able to meet some of the remaining small, scale farmers in their region. They will uncover clues in order to discover what role the farmers market plays in community food systems. Use the **Farmers Market 101** lesson resource to share additional facts and information on farmers markets. Distribute and review the **Farmers Market Case Book** activity sheet at camp before travelling to the market.

3. Travel to the Market

Gather materials and have campers get ready to leave (bathroom, water bottles, sunblock, etc). Review field trip ground rules. Depart for the market.

4. Explore the Farmers Market

If you are meeting a tour guide, report to the designated meeting location. Campers can complete the **Farmers Market Case Book** activity sheet while on the tour. If time and the market allows, let campers explore the market in small groups after the tour is complete.

If you are not meeting a tour guide, divide campers into three small groups (one group for each adult). Determine a meeting place and a time to return by. Allow campers to have 45 minutes to explore the market and fill out their activity sheets.

5. Close the Case

During the travel time back to camp or once you have arrived back in the classroom, have a conversation that includes the following questions:

How does the farmers market fit into the community food system?

What items were you surprised to find at the market?

What are the benefits of a farmers market? Of eating food bought at a farmers market? (Discuss seasonality if campers don't mention it.)

How many people do you think will visit the market today?

What is something you learned from one of the farmers?

Did anything about the farmers themselves surprise you?

What are some of the barriers to shopping at a farmers market?

Using the **Farmers Markets 101** lesson resource, make sure everyone understands what SNAP is and that nation wide more and more farmers markets accept SNAP and WIC benefits.

Campers have now discovered the center of the community food system: the farmers market. Congratulate them on completing the case.

Farm Graph:

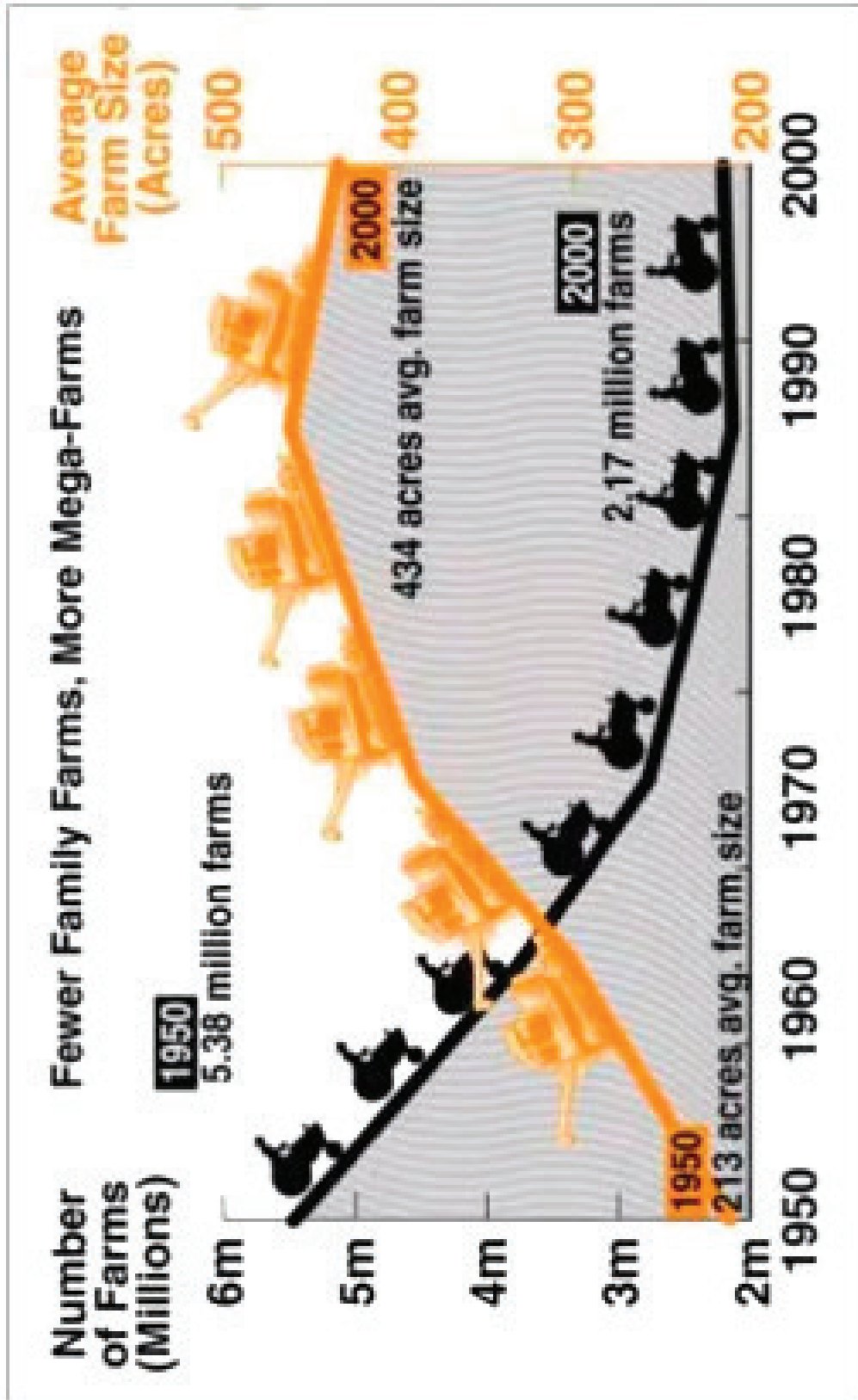


Image from: Small Farm Fresh

Farmers Market 101

A farmers market is a public commerce space where farmers or their representatives sell produce and processed goods directly to the consumers. Farmers markets operate all over the country all year round. Farmers markets provide a space where personal connection is developed between the public and the men and women who grow our food. These relationships are mutually beneficial to both the farmers and the public. Selling at farmers markets allows farmers to have a larger, more equitable rate of return while the public benefits from knowing where their food is coming from and who is producing it. Typically, it is the small and mid-size farms that participate in farmers markets. By supporting these farms we are supporting diversified agriculture, eating seasonally and locally, and strengthening local economies. Farmers markets provide a variety of products including: fruits, vegetables, nuts, bread, dairy products, eggs, meat products, and prepared foods like jams and baked goods. Flowers, wool, yarn, soaps, and other agricultural products can also be found. Typically farmers markets only carry locally-grown, locally-processed foods and have a system of guidelines to ensure that vendors are producing what they are selling. Because farmers markets allow consumers to speak directly with the seller, if you have a question about how the product was grown or produced, all you have to do is ask! Farmers markets are a community experience where you can meet your neighbors, friends, and farmers, and where more of your dollar will stay in the community.

In recent years farmers markets have started to accept the Supplemental Nutrition Assistance Program (SNAP) and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) benefits in order to offer farmers market goods to those receiving government assistance. The number of farmers markets authorized to accept SNAP has increased 360% between 2010 and 2011 alone. In 2011 there were 2,445 farmers markets and individual farmers authorized to accept SNAP benefits. In addition, more than 4,070 markets accept Women, Infant, and Children (WIC) Farmers Market Nutrition Program vouchers. In 2011, the USDA Food and Nutrition Service reported that over \$38 million was spent at farmers markets through these two programs alone. In order to encourage shopping at farmers markets by SNAP recipients some markets have developed their own currency programs like HealthBucks in New York. In the HealthBucks program for every \$5 spent at a farmers market using SNAP benefits, the shopper receives an additional \$2 to spend on fruits and vegetables at the market.

SNAP

The Supplemental Nutrition Assistance Program (SNAP), formally known as the Food Stamp program, currently provides food assistance to 45 million low-income Americans. SNAP eligibility is based on a household's total monthly income. A household must have some form of income to qualify for SNAP. SNAP benefits across the country are being converted into electronic debit card system known as EBT. Farmers markets are getting wireless point of sale machines to process credit, debit, and EBT purchases.

WIC

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) supports low-income pregnant, breast feeding, and non-breast feeding postpartum women and their children up to the age of five. WIC serves women and children who are found to be at nutritional risk. WIC provides additional funding to purchase specific food items associated with increased nutritional benefits like whole grain products, fruits, vegetables, and low-fat dairy products.

**Camper:**

Farmers Market Case Book

Welcome to the Farmers Market! As food detectives, you will investigate what food is available at a farmers market in the summer time. You will discover how these foods were grown while meeting the men and women who are responsible for their production and distribution. Remember, as detectives it is important to ask questions and dig deep into the evidence. Read each case carefully before proceeding. Make sure to document your findings with drawings, photographs, notes, and samples when appropriate. Be careful not to disturb any shoppers or farmers as they are working. Remember a farmers market is part of the farmer's job; these men and women are at work!

Subcase #1: Who are you?

Look around you, there is food everywhere! But, who grew it and where did it come from? Your assignment is to track down a farmer and discover where all this food came from. Not everyone you see working at the market is a farmer. Some people work with the farmers just to help sell. You will have to use your detective skills to find a farmer. Here are some questions to guide your discovery but feel free to ask your own questions too!

Name of Farmer: _____

How long have you been farming? _____

Where is your farm? How far away is it? _____

How many people work on your farm? _____

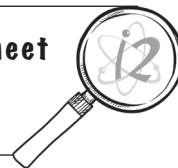
What do you grow on your farm? _____

Can you tell me a little about how you grow the food? _____

Do you sell goods all year round? _____

What do you like about coming to the farmers market? _____

What time did you have to wake up to get here this morning? _____



Farmers Market Case Book (continued)

What is your favorite thing to grow? _____

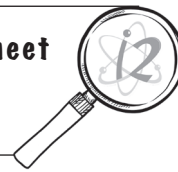
What is your favorite thing about being a farmer? _____

What is the most challenging thing about being a farmer? _____

Make up your own question to ask the farmer: _____

Answer: _____

When you are finished speaking with the farmer, ask if it would be okay to take his or her picture. If it is, take a photo of the farmer by his or her farm stand.

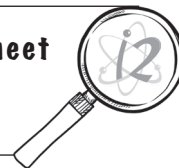


Farmers Market Case Book (continued)

Subcase #2: WHAT is it and WHERE can I get it?

From what you told the i2 camp chef after your visit to the community garden, the chef is finally convinced that we can eat all parts of the plant: stems, roots, fruits, leaf, flowers, and seeds. However, the chef doesn't think it's possible to find foods that have been grown in or close to our city. Your assignment is to show the chef that it is possible to find an edible seed, root, stem, leaf, flower, and fruit right here in your city's farmers market to serve in your cafeteria. Write the name of a food found at the market under each plant part. Write a recipe idea of how these foods can be incorporated into the camp menu.

Foods that are each plant part	Recipe Idea
Seed: _____	
Root: _____	
Stem: _____	
Leaf: _____	
Flower: _____	
Fruit: _____	



Farmers Market Case Book (continued)

Subcase #3: Why are you here?

A famous news television show has asked you to be a guest speaker this afternoon! They want you to talk about why people shop at farmers markets. To prepare for your prime-time TV segment, you want to talk to some of the men and women who are shopping at the market to learn why they are shopping here. Remember, as a professional detective you need to be polite and respectful. Make sure to first ask people if they would like to be interviewed and always thank people for answering your questions.

Shopper Profile #1:

Name: _____

Age: _____

What are you shopping for today? _____

How often do you shop at the farmer's market? _____

Why did you choose to come to the market today? _____

Shopper Profile #2:

Name: _____

Age: _____

What are you shopping for today? _____

How often do you shop at the farmer's market? _____

Why did you choose to come to the market today? _____



Farmers Market Case Book (continued)

Subcase #4: Fruit, Vegetables, Jams oh my!

Your new client, Sunny P. Flower, loves eating fruits and vegetables and buying them locally from the farmers who grow them. However, Sunny isn't sure what fruits and vegetables are available this time of year. She has hired you to find out what produce is available at this time of year. She tells you she likes to eat all different color foods, so choose as many colors as you can find! Photograph or draw a fruit or vegetable at the market to show her what is seasonally available. Also, photograph or draw an example of a food item found at the market that isn't a whole fruit or vegetable. Make sure to tell Sunny which farm produces the item.

Food	Farm	Color	Food Type
			<input type="checkbox"/> Whole <input type="checkbox"/> Minimally processed
			<input type="checkbox"/> Whole <input type="checkbox"/> Minimally processed
			<input type="checkbox"/> Whole <input type="checkbox"/> Minimally processed
			<input type="checkbox"/> Whole <input type="checkbox"/> Minimally processed
			<input type="checkbox"/> Whole <input type="checkbox"/> Minimally processed
			<input type="checkbox"/> Whole <input type="checkbox"/> Minimally processed
			<input type="checkbox"/> Whole <input type="checkbox"/> Minimally processed
			<input type="checkbox"/> Whole <input type="checkbox"/> Minimally processed
			<input type="checkbox"/> Whole <input type="checkbox"/> Minimally processed

Marketville



Materials

In Guide:

- **Marketville: Set Up** lesson resource p. 322
- **Market Food** cards p. 324
- **Marketville Shopping Plan** activity sheet p. 352
- **Family Profile** cards p. 354
- **Store Circular** cards p. 358
- **Marketville Money** cards p. 361
- **Discovering Food Access Discussion Guide** lesson resource p. 364
- **Food and Physical Activity Access and Food Justice** teacher note p. 366

Other Materials:

- All materials listed on **Marketville: Set Up** lesson resource
- Chart paper
- Markers
- Tape
- 12 journals & pencils
1 per camper

Overview

Campers explore “Marketville,” a food buying simulation in which campers assemble into families each with a unique background, budget, and set of dietary needs. Campers figure out which stores they want and/or need to shop at to feed their family based on proximity to food outlets, transportation costs, dietary needs, and food budget. During the case debrief, campers identify various barriers to both eating healthy and getting enough physical activity as they experienced them in the “Marketville” simulation. Finally, campers brainstorm solutions to overcoming some of the barriers they have identified.

Objectives

Campers will be able to:

- identify barriers to accessing healthy, fresh, local food and opportunities for physical activity in an urban environment;
- discuss solutions to overcoming these barriers; and
- compare and contrast various food markets in terms of accessibility, price, available products, and convenience.

Before You Begin:

- Review lesson plan and all in guide materials.
- Prepare **Market Food** and **Marketville Money** cards.
- Prepare copies of **Marketville Shopping Plan** activity sheet and **Family Profile** and **Store Circular** cards for each small group.
- Using the **Marketville: Set Up** lesson resource, prepare the classroom for the Marketville activity.

Clues collected:

- *Marketville* activity sheet
- Notes from discussion

1. Introduce the Case

Introduce campers to their next food detective case, **Marketville**. Campers will notice that “stores” are set up around the classroom. Welcome them to Marketville! Split campers up into groups of 3-4 and hand out a different **Family Profile** card to each group as well as a **Marketville Shopping Plan** activity sheet. Explain that for this food detective case they will be going undercover as families to explore what is available at different food markets. Tell them that their task is to try to get all the items on their shopping list but they must consider their proximity to the different food markets, how much they can afford to spend on transportation, their families’ dietary needs or restrictions, and their food budget. Like any family, their goal is to get the best food but also the best deal. Give them time to familiarize themselves with their family profiles including dietary needs, shopping list, transportation information and the **Store Circular** cards. Distribute Marketville Money from the **Marketville Money** cards to each group, making sure they receive the amount that corresponds to their family budget. Using the **Marketville Shopping Plan** activity sheet, have each family make a plan for how, what, and where to shop.

2. Let the Shopping Begin!

Have a staff member act as a shopkeeper for the different food outlets. Let the families walk around and purchase food using their Marketville Money. Make sure each shopkeeper has sufficient change to give. Each time a family visits a store they must pass by the “Transportation Station” and pay a transportation cost, either bus fare or gas money, into the box/envelope; however, they only need to pay once for the family unit and not for each individual in the family. When families have purchased all of their items or run out of money the families should sit down and fill out the questions on the back of the **Marketville Shopping Plan** activity sheet.

3. Identify the Barriers

Have each family present their scenarios to the large group. Families explain where they chose to go shopping, why they made those choices, and what food items they bought and why. Families share any challenges or barriers they faced. When each group has presented, ask the campers: *Did you recognize any trends in the ease or difficulty that the families faced?* Write them on the board. Expected trends are:

- My local bodega and/or grocery store didn’t have all the food I needed/wanted.
- Food at the Real Organic Groceries was too expensive
- It costs more and takes longer to get to Real Organic Groceries
- Families with less money were unable to get everything on their list.

4. Discovering Food Access

Discuss food access with the group as appropriate. Use the *Discovering Food Access Discussion Guide* lesson resource to guide the conversation.

6. Close the Case

If you haven't already, ask campers, "*Who is responsible for solving this problem?*" Together brainstorm solutions to some of the problems the families faced during Marketville. Campers have now discovered some of the challenges to purchasing food within the industrial food system. Congratulate campers on completing the case.

Marketville: Setup

This activity will help give campers a hands-on look at the challenges of sourcing fresh, healthy food. Use this lesson resource to gather materials and prepare the classroom for Marketville:

Materials:

- *Market Food* cards
- *Family Profile* cards
- *Store Circular* cards
- *Marketville Money* cards
- *Marketville* activity sheet
- Paper
- Markers
- Tape
- Cardboard box or manilla envelope

Set Up:

1. Prepare *Market Food*, *Family Profile*, *Store Circular*, and *Marketville Money* cards using the directions at the top of each page.
2. Prepare *Marketville* activity sheets for each group.
3. Using paper and markers, make the following signs: Transportation Station, My Cornerstore Bodega, Neighborhood Groceries, and Real Organic Groceries.
4. Set up 3 different tables around the room: one for each food store. Set out the appropriate *Market Food* cards and store signs at the respective tables.
5. In a central location place the Transportation Station sign and a cardboard box with a slit or manilla envelope. This is where campers will deposit their bus fare or gas money needed to get to and from each store.
6. Instructors should act as store cashiers and should make sure they have enough Marketville Money to give change to campers.

Market Food

Make 6 copies and cut out each card for the My Cornerstore Bodega store.

My Cornerstore Bodega



Canned Tuna - \$1

My Cornerstore Bodega



Deli Meat - \$4

Market Food

Make 6 copies and cut out each card for the My Cornerstore Bodega store.

My Cornerstore Bodega



Frozen Chicken Nuggets - \$3

My Cornerstore Bodega



Fruit Loops - \$4

Market Food

Make 6 copies and cut out each card for the My Cornerstore Bodega store.

My Cornerstore Bodega



Frosted Flakes - \$4

My Cornerstore Bodega



Eggs - \$2

Market Food

Make 6 copies and cut out each card for the My Cornerstore Bodega store.

My Cornerstore Bodega



Wonder Bread - \$2

My Cornerstore Bodega



Whole Milk - \$3

Market Food

Make 6 copies and cut out each card for the My Cornerstore Bodega store.

My Cornerstore Bodega



Bananas - \$2

My Cornerstore Bodega



Oranges - \$2

Market Food

Make 6 copies and cut out each card for the My Cornerstore Bodega store.

My Cornerstore Bodega



Potatoes - \$2

My Cornerstore Bodega



Onions - \$2

Market Food

Make 6 copies and cut out each card for the Neighborhood Groceries store.

Neighborhood Groceries



Chicken Breast - \$4

Neighborhood Groceries



Ground Beef - \$4

Market Food

Make 6 copies and cut out each card for the Neighborhood Groceries store.

Neighborhood Groceries



Frozen Chicken Nuggets - \$2

Neighborhood Groceries



Frozen Fish - \$2

Market Food

Make 6 copies and cut out each card for the Neighborhood Groceries store.

Neighborhood Groceries



Snacks - \$1

Neighborhood Groceries



Lentils - \$2

Market Food

Make 6 copies and cut out each card for the Neighborhood Groceries store.

Neighborhood Groceries



Fruit Loops - \$3

Neighborhood Groceries



Special K - \$2

Market Food

Make 6 copies and cut out each card for the Neighborhood Groceries store.

Neighborhood Groceries



Soy Milk - \$4

Neighborhood Groceries



Large Eggs - \$2

Market Food

Make 6 copies and cut out each card for the Neighborhood Groceries store.

Neighborhood Groceries



100% Whole Wheat Bread - \$2

Neighborhood Groceries



2% Milk - \$2

Market Food

Make 6 copies and cut out each card for the Neighborhood Groceries store.

Neighborhood Groceries



Lettuce - \$1

Neighborhood Groceries



Whole Milk - \$3

Market Food

Make 6 copies and cut out each card for the Neighborhood Groceries store.

Neighborhood Groceries



Bananas - \$1

Neighborhood Groceries



Apples - \$1

Market Food

Make 6 copies and cut out each card for the Neighborhood Groceries store.

Neighborhood Groceries



Oranges - \$1

Neighborhood Groceries



Strawberries - \$1

Market Food

Make 6 copies and cut out each card for the Neighborhood Groceries store.

Neighborhood Groceries



Potatoes - \$1

Neighborhood Groceries



Carrots - \$1

Market Food

Make 6 copies and cut out each card for the Neighborhood Groceries store.

Neighborhood Groceries



Broccoli - \$1

Neighborhood Groceries



Tomatoes - \$1

Market Food

Make 6 copies and cut out each card for the Real Organic Groceries store.

Real Organic Groceries



Free-range Organic Chicken- \$5

Real Organic Groceries



Organic Ground Beef - \$5

Market Food

Make 6 copies and cut out each card for the Real Organic Groceries store.

Real Organic Groceries



Fresh Fish - \$3

Real Organic Groceries



Tofu - \$2

Market Food

Make 6 copies and cut out each card for the Real Organic Groceries store.

Real Organic Groceries



Lentils- \$3

Real Organic Groceries



Whole Grain Cereal - \$4

Market Food

Make 6 copies and cut out each card for the Real Organic Groceries store.

Real Organic Groceries



Granola - \$4

Real Organic Groceries



Organic Free-Range Eggs - \$3

Market Food

Make 6 copies and cut out each card for the Real Organic Groceries store.

Real Organic Groceries



7-Grain Bread - \$3

Real Organic Groceries



Organic 2% Milk - \$4

Market Food

Make 6 copies and cut out each card for the Real Organic Groceries store.

Real Organic Groceries



Soy Milk - \$4

Real Organic Groceries



Almond Milk - \$4

Market Food

Make 6 copies and cut out each card for the Real Organic Groceries store.

Real Organic Groceries



Organic Whole Milk- \$4

Real Organic Groceries



Bananas - \$3

Market Food

Make 6 copies and cut out each card for the Real Organic Groceries store.

Real Organic Groceries



Organic Apples - \$3

Real Organic Groceries



Oranges - \$3

Market Food

Make 6 copies and cut out each card for the Real Organic Groceries store.

Real Organic Groceries



Local Strawberries - \$3

Real Organic Groceries



Organic Potatoes - \$3

Market Food

Make 6 copies and cut out each card for the Real Organic Groceries store.

Real Organic Groceries



Organic Carrots - \$3

Real Organic Groceries



Organic Broccoli - \$3

Market Food

Make 6 copies and cut out each card for the Real Organic Groceries store.

Real Organic Groceries



Local Tomatoes - \$3

Real Organic Groceries



Mixed Greens - \$3

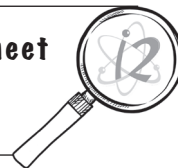
Market Food

Make 6 copies and cut out card for the Real Organic Groceries store.

Real Organic Groceries



Local Peaches - \$3



Marketville Shopping Plan (continued)

Once you are finished shopping please reflect on the following questions with your group:

1. Were you able to get all the items on your list? _____

2. Did you have any money left over? How much? _____

3. List any problems that you had obtaining all your items: _____

4. List any other things about your family that help or limit your ability to eat real: _____

Family Profile

Make one copy and cut out.

The Johnson Family Profile

Family Background:

Amelia Johnson is a single mother with three children, Andrew age 13, Suzie age 9, and Candace age 5. Amelia works as a secretary at a local doctor's office and cleans houses on the weekends. Andrew helps take care of his younger brother and sister after school and on the weekends. They live in a two bedroom apartment in Marketville with a small kitchen equipped with a small stove, oven, and fridge. There is something wrong with their stove and it needs to be fixed often. The landlord doesn't live in Marketville so it is difficult for the Johnson's to keep it maintained. Amelia cooks as much as her schedule allows. The kids eat lunch at school and Andrew often prepares easy snacks and meals for the family. Often they eat out at one of the many fast food restaurants in their neighborhood. The Johnson's have \$22.00 dollars to spend on groceries this week, including the cost of transportation.

Shopping List:

- 1 meat item
- 1 loaf of bread
- 1 dozen eggs
- 1 grain
- 2 fruits
- 3 vegetables
- 1 gallon of milk - Suzie is lactose intolerant. Make sure to get her a non-dairy substitute.
- 1 box of cereal

Stores and Transportation:

The Johnson's do not own a car. They either walk or take public transportation to school, work, and for shopping. They live within walking distance of a My Cornerstore Bodega, one bus from Neighborhood Groceries, and two buses away from Real Organic Groceries. Bus fare is \$1.00 round trip.

Family Profile (continued)

Make one copy and cut out.

The Love Family Profile

Family Background:

The Loves are a family of four, Mr. and Mrs. Love and their two children, Aaron age 11 and Sarah age 8, living in a two bedroom house in Marketville. Mr. Love works full time as a professor at Marketville Community College and Mrs. Love works part-time as a bank teller. Mr. and Mrs. Love are vegetarians and feel strongly about raising their children on a meat-free diet. Sometimes this is challenging since there aren't very many vegetarian restaurants in their neighborhood. Mrs. Love takes extra time shopping and cooking to make sure her family gets a balanced diet full of complete protein. The Love's have \$32.00 to spend on groceries this week, including the cost of transportation.

Shopping List:

- 1 meat-substitute item - make sure to get either tofu or lentils instead of a meat item.
- 1 loaf of bread
- 1 dozen eggs
- 1 grain
- 2 fruits
- 3 vegetables
- 1 gallon of milk
- 1 box of cereal

Stores and Transportation:

The Love's do not own a car. They either walk or take public transportation to school, work, and for shopping. They live within walking distance of a My Cornerstore Bodega, one bus from Neighborhood Groceries, and one bus away from Real Organic Groceries. Bus fare is \$1.00 round trip.

Family Profile (continued)

Make one copy and cut out.

The Richardson Family Profile

Family Background:

The Richardson's are a family of four living in a three-bedroom apartment in Marketville. Anna Mae lives with her mother, Grandma Richardson, and her two sons Malcom, age 15, and Lawrence, age 6. Anna Mae is a school teacher at an elementary school across town. Grandma Richardson recently moved from Georgia to live with her daughter and help take care of her grandchildren. Anna Mae isn't confident in her cooking skills, particularly preparing whole foods from scratch, but Grandma Richardson has a part time job cooking southern soul food for their church and also does most of the cooking around the house. Grandma Johnson has a special love of Georgia peaches since they remind her of home. The Richardson's have \$27.00 to spend on groceries this week, including the cost of transportation.

Shopping List:

- 1 meat item
- 1 loaf of bread
- 1 dozen eggs
- 1 grain
- 2 fruits - try to get Grandma Richardson some peaches!
- 3 vegetables
- 1 gallon of milk
- 1 box of cereal

Stores and Transportation:

The Richardson's own a used car that Anna Mae uses to get to her job everyday. They live within walking distance of a My Cornerstore Bodega. It is 4 miles round trip to Neighborhood Groceries, and 8 miles round trip to Real Organic Groceries. Gas costs 25 cents per mile.

Family Profile (continued)

Make one copy and cut out.

The Ortiz Family Profile

Family Background:

The Ortiz family lives in a three bedroom house on the edge of Marketville. Mr. Ortiz is a lawyer for a well known local law firm. Mrs. Ortiz is a part-time nurse. Their twin 10-year-olds, Juan and Maria, go to a private school in the next town over. Mrs. Ortiz is very health conscious and only purchases and eats organic produce. She does most of the food shopping and cooking, as her husband works long hours at the law firm. They try to sit down for family dinner most nights of the week. Mr. Ortiz prepares one special, traditional meal on the weekends for his family. The Richardson's have \$54.00 to spend on groceries this week, including the cost of transportation.

Shopping List:

- 1 meat item
- 1 loaf of bread
- 1 dozen eggs
- 1 grain
- 2 fruits - only organic!
- 3 vegetables - only organic!
- 1 gallon of milk
- 1 box of cereal

Stores and Transportation:

Mr. and Mrs. Ortiz both have cars. They live within walking distance of a My Cornerstore Bodega. They live four miles round trip from both Neighborhood Groceries and Real Organic Groceries. Gas is 25 cents per mile.

Store Circular

Make one copy per group and cut out.

My Cornerstore Bodega



Canned Tuna - \$1



Potatoes - \$2



Deli Meat - \$4



Onions - \$2



Frozen Chicken Nuggets - \$3



Snacks - \$1



Fruit Loops - \$4



Frosted Flakes - \$4



Eggs - \$2



Wonder Bread - \$2



Whole Milk - \$3



Bananas - \$2



Oranges - \$2

Store Circular

Make one copy per group and cut out.

Neighborhood Groceries



Chicken Breast - \$3



Ground Beef - \$4



Frozen Chicken Nuggets - \$2



Frozen Fish - \$2



Lentils - \$2



Fruit Loops - \$3



Special K - \$3



Large Eggs - \$1



100% Whole Wheat Bread - \$2



2% Milk - \$3



Soy Milk - \$3



Apples - \$1



Whole Milk - \$3



Bananas - \$1



Carrots - \$1



Oranges - \$1



Strawberries - \$1



Potatoes - \$1



Lettuce - \$1



Broccoli - \$1



Tomatoes - \$1

Store Circular

Make one copy per group and cut out.

Real Organic Groceries



Free-range organic chicken - \$5



Organic Ground beef - \$5



Fresh fish - \$3



Tofu - \$2



Lentils - \$3



Whole-grain Cereal - \$4



Granola - \$4



Organic free-range eggs - \$3



7-grain bread - \$3



Organic 2% milk - \$4



Soy milk - \$4



Almond milk - \$4



Organic whole milk - \$4



Bananas - \$3



Organic apples - \$3



Oranges - \$3



Local strawberries - \$3



Organic potatoes - \$3



Organic carrots - \$3



Organic broccoli - \$3



Local tomatoes - \$3



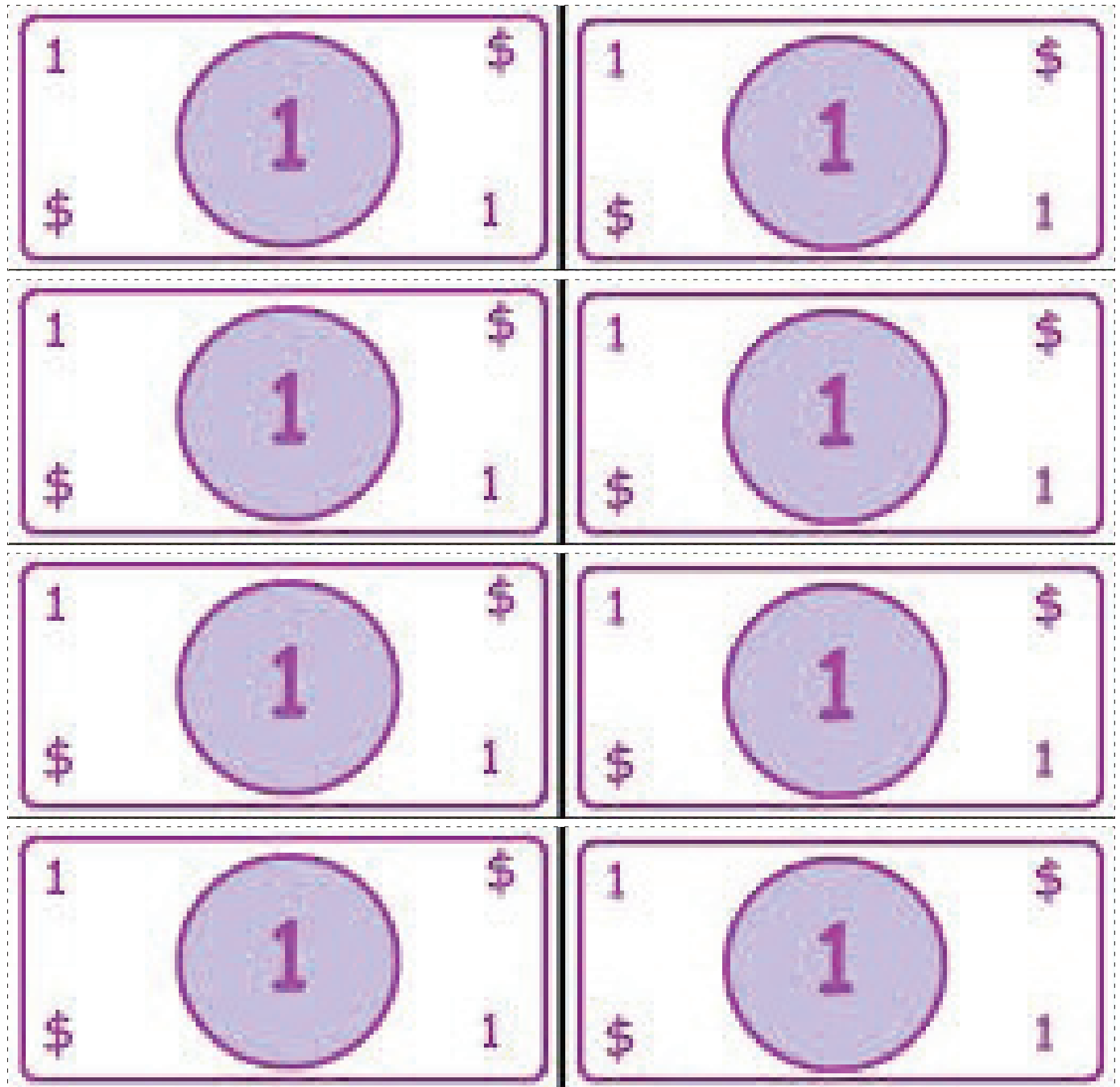
Mixed greens - \$3



Local peaches - \$3

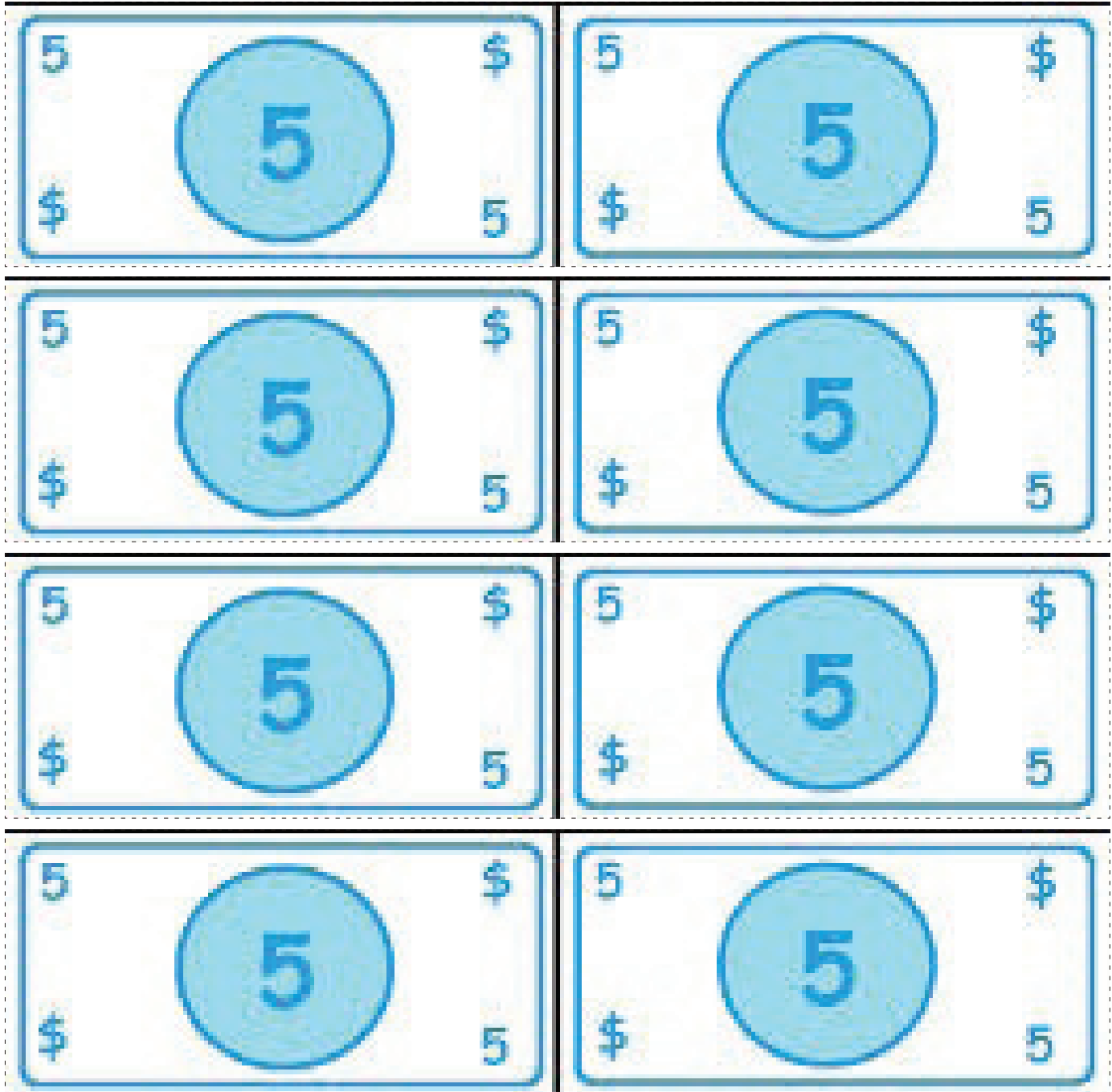
Marketville Money

Make 10 copies and cut out money. Give each family allotted amount and make sure cashiers have change.



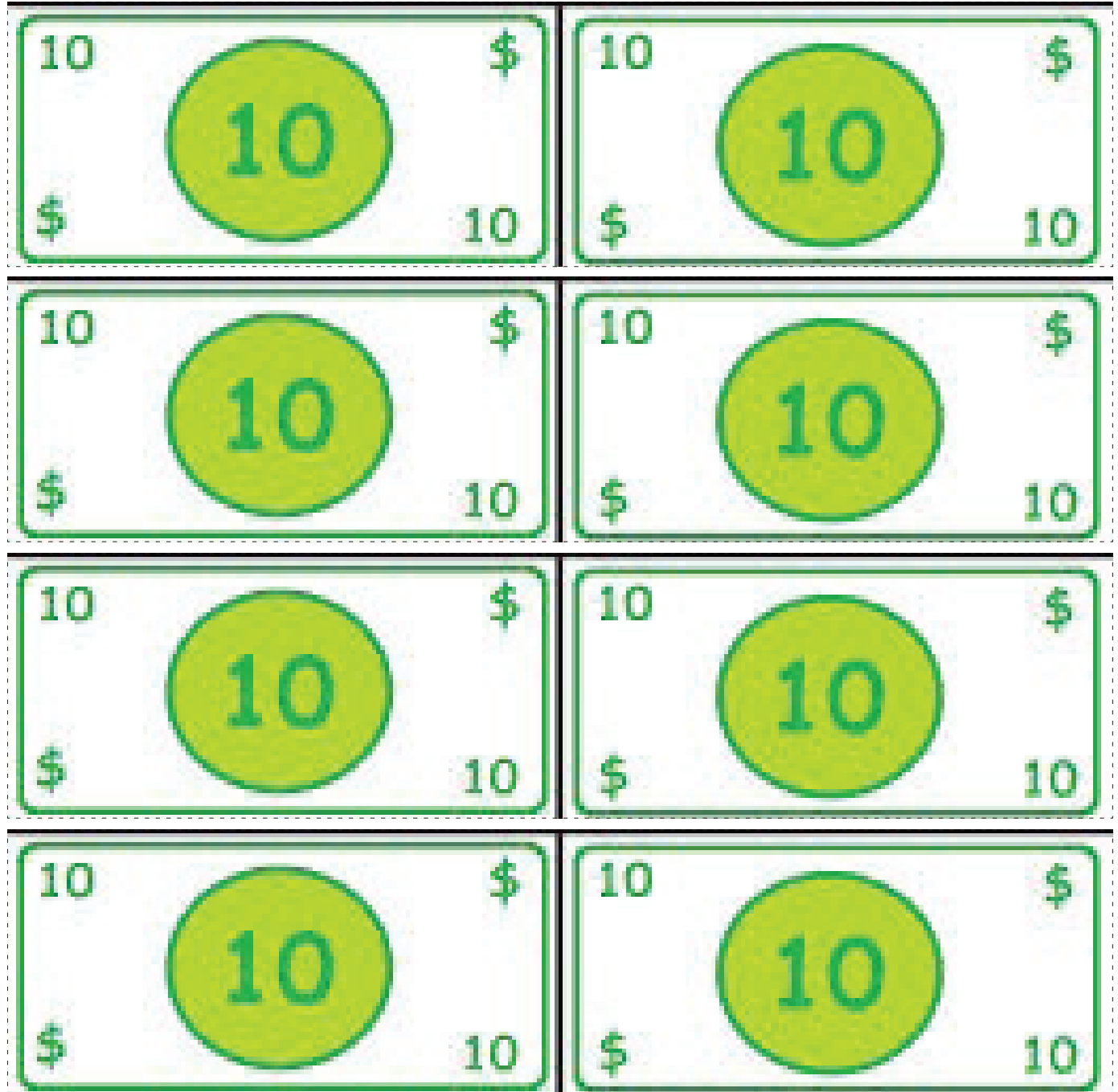
Marketville Money (continued)

Make 5 copies and cut out money. Give each family allotted amount and make sure cashiers have change.



Marketville Money (continued)

Make 1 copy and cut out money. Give each family allotted amount and make sure cashiers have change.



Discovering Food Access Discussion Guide

Food Access

Write the word “Access” on the board. Have campers give their definitions of the word. Access is the ability to get what you need. Add the word “Food” in front of the word “Access,” and have campers define what “Food Access” is. Food access is the ability to obtain healthy, affordable food in one’s community. Ask campers, *how does the Marketville activity bring up issues of “Food Access?”*

Barriers to Eating Real

Remind campers that they have spent the past four days learning about the importance of eating real. Ask campers, *given all the reasons for eating real, healthy, whole foods, why do so many people eat unhealthy diets full of processed foods?* Within their family units give them 5 minutes to brainstorm barriers to eating real using what they observe around them everyday, and what they learned from **Marketville**. Give each family a piece of chart paper to record their thoughts. Encourage them to think about their family scenarios and consider things that may not have directly effected their shopping trips, but effect the family’s ability to eat real (i.e. number of care givers in the family, free time to prepare foods, neighborhoods they live in, etc). Have campers take turns sharing ideas from their brainstorming session. Write their ideas on the board under the heading of “Barriers to Eating Real.” Make sure your list includes some variation of the following barriers:

- Lack of healthy food in your neighborhood
- Too many unhealthy options
- Not enough money to purchase healthy food
- Not enough money to get to places that sell healthy food
- Not enough time to prepare “real” food
- Not knowing how to cook “real” food
- Lack of proper kitchen equipment
- Everyone around you eats processed junk food
- Media encourages unhealthy diets

Discovering Food Access Discussion Guide (continued)

Barriers to Physical Activity

Make a second column titled “Barriers to Physical Activity.” Remind campers that part of living a healthy life is also getting proper exercise. Review the benefits of physical activity learned on Day 3. Ask campers, *what are some barriers to getting enough exercise?* List their responses on the board. Make sure your list includes some variation of the following barriers:

- Too much TV and video games
- Unsafe neighborhoods where kids can’t go outside
- Not enough parks, green spaces, sports fields to play
- No after-school sports options
- No gym at school
- Can’t afford gym membership
- Not enough time

Video Clip

Sharing a video clip with the campers about food access could be very powerful. The Food Project, a youth-based non-profit organization from the Boston area created a YouTube video called “A Convenient Injustice” (http://www.youtube.com/watch?v=LzfD_eydrk) discussing the challenges related to a lack of access to healthy, affordable food faced by urban populations and whether access to good food is a right. Try to find a similar video reflecting food access issues in your area to share with the campers.

Solutions

Ask campers, *“who is responsible for solving this problem?”* Hopefully you will get a combination of: us, the government, communities, schools, parents, etc. Now give campers 5 minutes to brainstorm solutions to overcoming some of these barriers. Share as a large group and record ideas on the board next to each column under the heading “Solutions.” After the conversation is over, have campers jot down any notes from the board that they found particularly interesting or inspiring into their i2 journals.

Food & Physical Activity Access and Food Justice

Food Access

Food access is a term that describes the ability to obtain and consume healthy food in sufficient amounts. Many different factors affect your access to healthy food: where you live; what stores, restaurants, and other food distribution options are close to you and the quality, quantity, variety, and cost of what they offer; how much money you have to spend on food; your physical and monetary ability to get to and from food distributors; your knowledge and value of what good food is; cultural norms surrounding food; your ability to grow your own food; your ability to prepare food; and your lifestyle. For cost and convenience most people like to shop in their own neighborhoods. However, some neighborhoods, particularly in low-income urban and rural areas, lack sufficient food distributors that sell healthy, affordable, appropriate food for the community, particularly fresh fruits and vegetables. A lack of access to affordable, healthy food has been linked to disproportionately high rates of chronic, diet-related diseases.

Physical Activity Access

Physical activity is important to everyone in order to stay healthy. Some people choose to participate in sports, others join gyms, some people run or bike, and others simply walk to and from work or school. Physical activity for youth and children might take the form of playing in a park, recess, participating in organized sports, martial arts, dance, playing, walking, skating, or biking around the neighborhood. Some neighborhoods or areas are more conducive to getting exercise, in other words there is more access to physical activity opportunities. For example, things like sports fields, parks, and playgrounds provide free opportunities for kids and adults to enjoy physical activity. The safer the streets are for bikers and pedestrians, the more likely people will use those forms of movement to stay healthy. Amenities like biking and walking paths also encourage physical activity. The perceived and actual safety of an area will affect people's willingness to utilize outdoor spaces and allow their kids to do so. Concerns regarding drug use, violence, physical and sexual abuse, and kidnapping cause people to stay indoors rather than partake in outside activities. Something as simple as whether or not your building has an elevator or how far you live from your train or bus might affect your health in terms of movement. Often, price can also be a barrier for physical activity. Gyms, fitness programs, classes, and organized sports often cost money and are therefore not accessible to everyone. Time can also be a barrier. Some community resources choose to offer free or low-cost exercise opportunities at times that are most convenient for their residents as a way to lower the barriers to accessing physical activity.

Food and Environmental Justice

Food Justice describes a movement working towards access to healthy, affordable, appropriate food for all, sustainable food systems that benefit people and the planet, and fair wages and treatment of laborers within food systems. The food justice movement works towards an equal sharing of the benefits and risks of food production, distribution, and consumption. This is in contrast to our current industrial food system where those who have more money and power tend to make decisions regarding food access and treatment of workers, and often base decisions on what increases profit and minimizes personal risk. Environmental justice is a similar movement which seeks to ensure that there is a fair distribution of environmental benefits and burdens, including access to natural and built areas to engage in physical activity.



Cooking to Eat Local

.....

Materials

In Guide:

- **Eat Local: Getting Ready** cooking resource p. 371
- **Eat Local: Set Up** cooking resource p. 372
- **Exploring Protein Changes** food science resource p. 375
- **Eat Local: Cooking Skills** cooking resource p. 379
- **Ricotta** camper's recipe sheet p. 380
- **Compote** camper's recipe sheet p. 381
- **Eat Local: Feature Food** cooking resource p. 382
- **Parfait** camper's recipe sheet p. 384
- **Creamy Homemade Ricotta** take home recipe p. 385
- **Lemon-Cinnamon Stone Fruit Compote** take home recipe p. 386
- **Maple- Vanilla Ricotta Parfait** take home recipe p. 387

Other Materials:

- All ingredients and equipment listed on the **Eat Local: Getting Ready** cooking resource
- World map
- i2 journals and pencils
1 per camper

Overview

In this lesson, campers explore the theme of the day “navigating the environment.” Campers learn about what their local food environment has to offer and about certain key foods that cannot be found locally and thus, must be imported. Campers use foods from the farmers market and learn how to make an ecologically healthy and minimally-processed dessert. They learn about processes that allow milk to become cheese and then make their own homemade ricotta for their dessert. They discover a new feature food, vanilla beans, and use the feature food in the preparation of their recipe. Lastly, campers sit down to enjoy their fruit and ricotta parfaits.

Objectives

Campers will be able to:

- describe and demonstrate safety skills of cutting and pitting stone fruits;
- describe how to handle and use fresh vanilla beans;
- understand the basics of food science involved in cheese making;
- make homemade ricotta from scratch; and
- demonstrate increased confidence in their ability to make a simple dessert using real, mostly local foods.

Before You Begin:

- Review lesson plan and all in guide materials.
- Gather ingredients and equipment, and complete food preparation and cooking station set up using **Eat Local: Getting Ready** and **Eat Local: Set Up** cooking resources.
- Review **Eat Local: Cooking Skills** and **Eat Local: Feature Food** cooking resources and **Exploring Protein Changes** food science resource.
- Make copies of **Ricotta**, **Compote**, and **Parfait** camper's recipe sheets, **Creamy Homemade Ricotta**, **Lemon-Cinnamon Stone Fruit Compote**, and **Maple-Vanilla Ricotta Parfait** take home recipes for each camper.

Clues collected:

- *Maple-Vanilla Ricotta Parfait* take home recipe
- *Lemon-Cinnamon Stone Fruit Compote* take home recipe
- *Creamy Homemade Ricotta* take home recipe

1. Introduce the Case

Introduce campers to their next case, **Cooking to Eat Local**. Allow campers to reflect on the foods they saw during their trip to the farmers market. If you have done the **Seasonality Wheel** optional case, you may also want to refer back to it here. Ask campers, *which foods can we find locally and which foods can we not?* (Typically, heavily processed foods and foods not grown geographically nearby that are not found in the farmers market.)

2. Review the Recipes

Review the ingredients in the recipes, allowing campers to point out all the ingredients that were purchased locally. Ask campers, *what are the taste benefits of buying local? Why would producers exporting fruits and vegetables from far away need to pick their produce early? How might this change the flavor of those foods?* If campers do not mention this, remind them that foods that travel far distances are picked prematurely so that they ripen on the way to grocery stores. This changes the flavor of the food. If fruits are picked when they are unripe, the natural sugars in the foods don't develop. Campers experienced this while tasting green versus red peppers in the **Case 12 Cooking to Eat Whole Foods**. Furthermore, as soon as a food is harvested its cells begin to shrink making the food less juicy and flavorful.

3. Explore Protein Changes & Conduct “Eggsperiment”

Explain to campers that although it is important to eat locally as much as possible, some ingredients are often imported. Imported foods may be culturally specific or simply foods that grow in different climates and/or soil types. Consider the importance of some imported foods. Ask campers, *what value might some imported foods provide?* (i.e. they can allow people of different ethnic groups to enjoy foods that they are familiar with; they can preserve cultural practices; they can allow us to experience different foods and practices that we may not otherwise be exposed to.)

Explain that today we are following a practice that originated outside the United States, but are using local ingredients to make it here. A familiar cheese made in Italy is ricotta. Explain that as part of the cooking activities today, we will make ricotta, but first we are going to explore the science behind the cheese-making process. Use the *Exploring Protein Changes* food science resource to guide campers through the Eggsperiment demonstrations in order to gain an understanding of what happens to proteins when they are exposed to heat and acid.

4. Practice Cooking Skills

Using the *Eat Real: Cooking Skills* cooking resource, lead campers through a demonstration of today's cooking skills: safely cutting stone fruits and zesting. Briefly discuss ways that compotes are made and used. Don't allow campers to practice at this time and instead move on to making ricotta.

5. Make Ricotta

Ask the group, *has anybody ever made cheese or yogurt from scratch before?* Ask campers, *what affect will the heat and lemon juice play in the process?*

Divide the class into two cooking groups allowing each group to make their own batch of ricotta using the *Ricotta* camper's recipe sheet. Instructors should reference the *Creamy Homemade Ricotta* take home recipe as it contains the full instructions for what to do in the Hot Zone. Allow the groups to each get their batch of milk onto the burner for slow warming (about 30 minutes). This is a slow process that requires patience and regular stirring by the instructor to ensure that the milk does not burn. Bring small groups (of 2-3 campers) into the Hot Zone and allow them to observe the warming milk and take turns stirring for a few minutes. Alternate out so that everybody gets a chance to participate. Campers can continue practicing their cooking skills, including cutting the stone fruits for the compote while this is happening. Bring the group back together when the lemon juice is ready to be added (when the milk mixture has reached a slow rolling boil). This is an exciting step, where all the action happens, and campers will not want to miss it! Complete the rest of the recipe and allow the ricotta to rest.

6. Make Compote

A compote is a mixture of whole or chopped fruit in a warmed sugary syrup. Separate campers into their respective cooking groups. Using the *Compote* camper's recipe sheet, campers prepare the stone fruit compote.

7. Highlight Feature Food

While the compote is stewing bring campers together to highlight today's feature food. Using the *Eat Real: Feature Food* cooking resource introduce campers to vanilla beans. Ask campers, *where have you seen vanilla before?* (e.g. an ingredient in ice cream, yogurt, cookies, vanilla extract). Ask campers to guess what part of the plant vanilla comes from, the hint is in its name! Using the world map, show campers the region of the world where vanilla is grown. Explain that vanilla beans are very delicate and must be handled with care. Put the bean on a plate and allow campers to

pass it around. Campers may see and smell the bean, but they should not touch the bean. Explain to campers that both fresh vanilla and vanilla extract are used in the recipe. Pass around the bottle of vanilla extract for campers to smell. *How does it compare to the vanilla bean?* As directed on the **Eat Real: Feature Food** cooking resource demonstrate how to cut and remove the vanilla seeds. Preserve the seeds from the two pods for use in the Parfait recipe. Divide the seeds equally into two small bowls, one for each cooking group. Add the vanilla bean pods to the stewing compote. Discuss additional uses for the vanilla pods.

8. Make Ricotta Parfaits

Have campers rewash their hands. Separate campers back into their cooking groups. Give each small group a bowl of vanilla bean seeds. Using the **Parfait** camper's recipe sheet, campers make their ricotta parfaits.

9. Eat!

Once campers have assembled their parfaits, sit and eat as a group. Have the campers use descriptive words to talk about the foods they are eating.

10. Clean Up

Once everyone is finished it is time to clean up. Everyone should be involved in the cleaning process. Make sure that all cooking and eating surfaces are wiped down and floors are swept. If possible, have campers wash their own dishes. Cleaning will go faster if some washing has already been done throughout the activity.

11. Close the Case

Ask campers the following questions:

What are some descriptive words to describe the foods that you ate today?

What did you think of the ricotta parfait?

Which component was your favorite?

Will you make this at home?

Will you share the recipe with anyone else?

Have campers record their impressions in their i2 journals. Distribute **Creamy Homemade Ricotta**, **Lemon-Cinnamon Stone Fruit Compote**, and **Maple-Vanilla Ricotta Parfait** take home recipes to each camper. Review recipe ingredients and procedure, highlighting any steps that campers were not involved in. Congratulate campers for completing today's cooking case.

Eat Local: Getting Ready

These are all the ingredients and supplies you need to make all the recipes and complete all cooking demonstrations and activities for 20 campers.

Shopping list

- 3 lbs. of assorted and ripe stone fruits from the farmers market (~ 6 cups coarsely chopped)
- 4 Tbsp. local honey
- Kosher salt
- 5 lemons
- 2 cinnamon sticks
- 2 half gallon containers of organic whole milk (not UHT*)
- 1 16-oz. container of heavy cream
- 1/2 cup maple syrup
- Pure vanilla extract
- 2 fresh vanilla beans
- 2 pints fresh blueberries
- 2 pints fresh raspberries
- 4 pints fresh strawberries
- 2 oranges
- Table salt
- 4 large eggs
- White vinegar

* UHT = Ultra-high-temperature processing, on the label the milk might say “ultra-pasteurized.” Milk treated at a high temperature (212° F. vs. 172° F. for regular pasteurization) will not properly form into curds because of how the high temperature changed the milk protein

Cooking Equipment

- 2 medium saucepans
- 1 cutting board per camper
- 1 knife per campers
- 6 sets of measuring cups
- 6 sets of measuring spoons
- 2 microplanes
- 2 silicon spatulas
- 13 small bowls
- 1 paring knife
- 6 large bowls
- 4 colanders
- 2 juicers
- 4 large mixing spoons
- 3 liquid measuring cups
- 24 clear plastic cups
- 1 package of cheesecloth (9 sq. ft.)
- 12 wooden clothes pins
- 2 stock pots
- 1 pair of kitchen scissors
- 1 large slotted spoon
- Tongs
- 2 burners
- 1 beaker
- 3 forks

Advanced Prep

- Set up stations using the *Eat Local: Set Up* lesson resource.
- Cut cheesecloth for each cooking group.

Eat Local: Set Up

Use this sheet to prepare the classroom for cooking. Campers prepare each recipe in small cooking groups. Set up a cooking station for each small group with all food and equipment listed, separated by recipe. Prepare the shared ingredient station with the food and equipment that are shared by all groups in a communal location. Prepare the Hot Zone with the listed food and equipment.

Station: Cooking Group 1

A. Ricotta

Foods:

- 1 half gallon container of organic whole milk

Equipment:

- 1 cutting board per camper*
- 1 knife per camper*
- 1 large colander
- 6 wooden clothes pins
- 1 large bowl
- 1 stock pot
- Cheesecloth
- 1 small bowl
- 1 citrus juicer
- 1 set of measuring cups*
- 1 set of measuring spoons*

Preparation:

1. Cut cheesecloth so that when folded in half it will fit the colander.

B. Compote

Foods:

- 1.5 pounds of assorted, ripe stone fruits from the farmers market
- 1 lemon
- 1 cinnamon stick

Equipment:

- 1 medium sauce pan
- 1 microplane
- 1 cutting board per camper*
- 1 knife per camper*
- 1 citrus juicer
- 1 liquid measuring cup
- 1 set of measuring spoons*

* Cutting boards, knives, measuring cups and measuring spoon sets can be shared between the recipes

Eat Local: Set Up (continued)

C. Parfait

Foods:

- Seeds from one vanilla pod (from vanilla bean demonstration)
- 1 pint fresh blueberries
- 1 pint fresh strawberries
- 1 pint fresh raspberries
- 1 orange

Equipment:

- 1 large mixing spoon
- 1 cutting board per camper*
- 1 knife per camper*
- 1 large bowl
- 12 clear plastics cups
- 2 small bowls
- 1 set of measuring spoons*

Station: Cooking Group 2

A. Ricotta

Foods:

- 1 half gallon container of organic whole milk

Equipment:

- 1 cutting board per camper*
- 1 knife per camper*
- 1 large colander
- 6 wooden clothes pins
- 1 large bowl
- 1 stock pot
- Cheesecloth
- 1 small bowl
- 1 citrus juicer
- 1 set of measuring cups*
- 1 set of measuring spoons*

Preparation:

1. Cut cheesecloth so that when folded in half it will fit the colander.

B. Compote

Foods:

- 1.5 pounds of assorted, ripe stone fruits from the farmers market
- 1 lemon
- 1 cinnamon stick

Equipment:

- 1 medium sauce pan
- 1 microplane
- 1 cutting board per camper*
- 1 knife per camper*
- 1 citrus juicer
- 1 liquid measuring cup
- 1 set of measuring spoons*

* Cutting boards, knives, measuring cups and measuring spoon sets can be shared between the recipes

Eat Local: Set Up (continued)**C. Parfait****Foods:**

- Seeds from one vanilla pod (from vanilla bean demonstration)
- 1 pint fresh blueberries
- 1 pint fresh strawberries
- 1 pint fresh raspberries
- 1 orange

Equipment:

- 1 large mixing spoon
- 1 cutting board per camper*
- 1 knife per camper*
- 1 large bowl
- 12 clear plastics cups
- 2 small bowls
- 1 set of measuring spoons*

Station: Shared Ingredients and Equipment**Foods:**

- Honey
- Maple syrup
- Pure vanilla extract
- Toasted sunflower seeds
- Table salt
- Heavy cream

Station: Hot Zone**Foods and Equipment:**

- 2 Burners
- 1 large mixing spoon
- 2 pot holders

* Cutting boards, knives, measuring cups and measuring spoon sets can be shared between the recipes

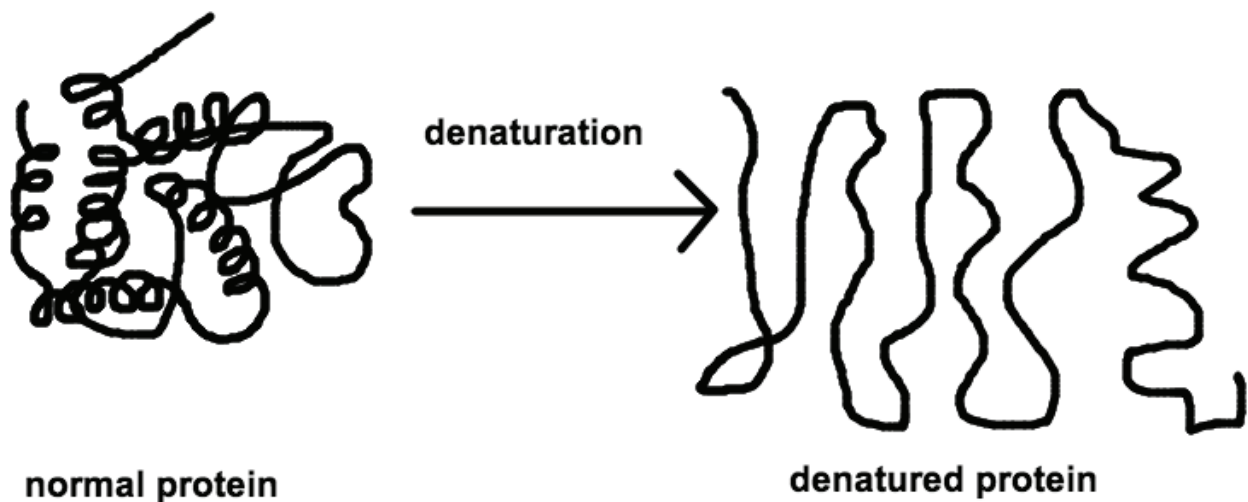
Exploring Protein Changes

Protein molecules are wound-up in coils, which are formed and held together by bonds. Changes to the structure of protein molecules can effect their form and function. Denaturation and coagulation are two examples of proteins changes and they are very much related.

Denaturation is the alteration of the three dimensional structure of the protein. This can be the result of mainly:

- Heat
- Change in pH (acid or base)
- Mechanical forces (such as shaking)
- Addition of detergents, certain salts, enzymes, or alcohol

When proteins denature they tend to bond together or coagulate into solid clumps.



Coagulation refers to the irreversible transformation of proteins from a liquid or semi-liquid state to a solid state, mostly because of denaturation. As proteins coagulate, they lose some of their capacity to hold water, shrink and become firm.

Examples of Protein Changes in Food

Meat: Cooking meat provides an excellent example of the different changes that occur in proteins. When meat is heated, the bonds that keep the protein coils in place break and the protein molecule unwinds (denaturation). Heat also shrinks the muscle fibers both in diameter and in length as water is squeezed out and the protein molecules recombine, or “coagulate”. Coagulation makes the meat more tender and easier to digest. If too much heat is applied, excessive coagulation occurs, pushing out moisture and leading to dry, leathery meat. However, if meat is cooked slowly the some of the proteins becomes soft gelatin and the meat

Exploring Protein Changes (continued)

becomes tender as in stews. Some heat-induced denaturation is reversible through cooling. This is why it is recommended to allow roasted foods to rest before carving; as the temperature falls, some of the water (“juice”) that was forced into spaces between the proteins is reabsorbed and the food becomes moister. Denatured proteins are easier to digest.

Milk and Cheese: Milk is a liquid that contains about 3 to 3.5% protein. When cheese is made, certain proteins coagulate separating from other proteins and components. Ricotta cheese is made from heat-acid denaturing and coagulation of proteins. During heating, the proteins begin to coagulate at about 70° C. The addition of acid (to about pH 5.9) will further coagulate the proteins. This will occur with a very visible transformation of milk to cheese.

Eggs: Egg whites contain many proteins. Egg white protein can be denatured and coagulated by the same factors that denature other proteins (heat, change in pH, mechanical forces, etc.) A common example of egg white denaturation and coagulation is the cooking of an egg. When heat is applied the egg white proteins are agitated and they bounce against other proteins and water molecules. All that bouncing and crashing denatures the protein. New chemical bonds form that connect one protein to another causing coagulation.

Some other examples of denaturation and coagulation of proteins when cooking are:

- Meringue - the egg white protein is denatured during beating; heat causes coagulation.
- Cheese making - an enzyme called rennin causes milk proteins to coagulate.

Eggsperiment Demonstrations

The purpose of these two demonstrations is for campers to observe the physical changes that happen when proteins are denatured and coagulated. These are carried out as demonstrations led by the teacher.

IMPORTANT: Be careful with campers handling the raw and the two-minute egg whites. Make sure they wash hands right afterwards. Also make sure to find out beforehand if anyone has egg allergies.

Coagulation of Egg White

Materials

- 1 burner
- 1 stock pot
- 3 large eggs
- 3 small bowls
- Tongs
- 3 forks
- Large slotted spoon

Exploring Protein Changes (continued)

Set-up

1. Carefully crack an egg and separate the white from the yolks. Place the whites in a bowl. Repeat for two more eggs so that you have three small bowls of egg whites. Discard egg yolks.
2. Set aside one bowl of egg whites, raw.
3. Fill a pot half way with water and bring to a boil. Once boiling, drop one small bowl of egg white into the hot water. Let it cook for exactly two minutes. Carefully remove it from the boiling water with a large slotted spoon and place it into a small bowl.
4. Add the third bowl of egg white to the boiling water. Let it cook for exactly five minutes. Carefully remove it from the boiling water with a large slotted and place it into a small bowl.

Procedure

1. Discuss the different changes that occur to proteins with the application of heat, varying pH, mechanical agitation etc.
2. Show campers the three “egg-specimens” and explain how each was prepared. Have them observe and compare the three different states and record observations into their i2 journals.
3. Allow them to use a fork to poke each egg sample to compare their textures and record their observations into their i2 journals.

Questions

1. *How did the visual properties of the egg white change with cooking?*
2. *How is the texture different among the three egg whites?*
3. *What do you think would happen if the egg white cooked 4 minutes? What about 7 minutes?*
4. *If bacteria are made up of proteins, what do you think would happen to harmful bacteria in the egg if you cook it for 2 minutes? What about 5 minutes? Which one do you think would be safer to eat?*

Denaturation of Egg Whites

Materials

- 1 beaker with
- 1 small bowl
- White Vinegar
- 1 large egg

Exploring Protein Changes (continued)

Set up

1. Separate egg white from the yolk into a small bowl. Discard egg yolk. Remove half of the egg white from the small bowl and add it to a beaker. Add 1/3 cup of white vinegar to the beaker and stir to combine.
2. Set out the raw egg white and the beaker with egg and vinegar mixture.

Procedure

1. Have campers take turns observing and comparing the raw egg white with the vinegar egg white.
2. Allow time for campers to record their observations.

Questions

1. *How did the visual properties of the egg white change when we added the acid?*
2. *How is the texture different between the raw and the acid egg whites?*
3. *How is denaturation with acid similar or different from cooking the egg whites?*

Eat Local: Cooking Skills

Stone Fruits and Zesting

Materials:

- 1 cutting board
- 1 knife
- 1 stone fruit
- 1 lemon
- 1 microplane

How to Safely Cut Stone Fruits:

Stone fruits, aptly named for the hard pit in the center, are easy to prepare. Examples are peaches, apricots, plums, and nectarines. The fruit should be washed thoroughly before being cut. The easiest way to cut a ripe stone fruit is to cut it in half. Insert the knife into the flesh of the fruit and cut all the way around the pit in a circular fashion. Gently twist the halves to pry the fruit apart exposing the flesh and the pit. The pit can be removed by hand. Sometimes the pit stubbornly remains and can not be easily removed. If this is the case, simply cut around the pit. Often after a few cuts the pit can be removed with a little wiggling.

How to zest:

The addition of lemon zest is a great way to add lemon flavor to a recipe.

1. Hold the microplane by its handle. Set the end of the microplane against a cutting board.
2. Holding the lemon firmly in one hand grate the lemon against the microplane. Applying gentle pressure, move the lemon from the handle of the microplane to its bottom edge. The goal is to remove only the surface of the peel. Be careful not to remove the bitter, white pith layer underneath the rind.
3. Rotate the lemon after every stroke. Refrain from using any section of the lemon more than once.
4. Continue grating and rotating until you have removed all of the zest from the lemon.

Ricotta*Serves 10 campers***Ingredients at station:**

Whole organic milk

Lemons

Ingredients at shared station:

Heavy cream

Table salt

Directions:

1. Add **2 quarts of milk** to the stock pot.
2. Take a piece of cheesecloth and fold it in half. Make sure that when folded it is large enough to cover the inside of a colander.
3. Take clothes pins and secure the cheesecloth to the rim of the colander. Place the colander into a large bowl. Set aside for later.
4. Juice **2 whole lemons** with a citrus juicer and measure out **3 tablespoons of lemon juice** into a small bowl. Set aside.
5. Take a medium bowl to the shared ingredients station. Measure out **1 cup of heavy cream**, and **½ teaspoon of table salt** into the bowl.
6. Add **heavy cream** and **salt** to the stock pot of milk.
7. Carefully bring the **pot** to the teacher in the Hot Zone, along with the **small bowl of lemon juice** and the **large bowl with the colander**.
8. The teacher will call you up to gently stir the pot in small groups and to watch the cheese coagulate.
9. Retrieve the colander of **ricotta** and large bowl from the teacher.
10. After it sits for a while, remove the **ricotta** from the cheese cloth and place it into the large bowl.

Compote

Serves 10 campers

Ingredients at station:

- Stone fruits
- Cinnamon stick
- Lemon
- Water

Ingredients at shared station:

- Salt
- Honey

Directions:

1. Wash **all stone fruits** carefully.
2. Cut **all stone fruits** into **large chunks** and place directly into the medium saucepan.
3. Using a liquid measuring cup, measure **1/4 cup water** and add to the medium saucepan.
4. Add **1 cinnamon stick** to the saucepan.
5. Collect the bottle of honey from the shared ingredient station. Over the saucepan carefully measure **2 tablespoons honey**. Return the honey to the shared ingredient station.
6. Use a microplane and remove the **zest** from **1/2 a lemon** and add it to the saucepan.
7. Use the juicer to juice the **1/2 lemon** and add the juice to the saucepan.
8. Bring the saucepan to the teacher in the Hot Zone.
9. Once it has been cooked, retrieve the cooked and cooled compote from the teacher in order to prepare parfaits.

Eat Local: Feature Food

Vanilla Beans

Materials:

- 2 vanilla bean pods
- 1 cutting board
- 1 paring knife
- 2 small bowls
- Pure vanilla extract

What is Vanilla?

Vanilla is a diminutive of the Spanish word “vaina” which means sheath or pod. In English it translates to “little pod.” Vanilla is primarily grown in regions along the Indian Ocean, like Madagascar, which is where the most common form, Madagascan Vanilla, is grown. However, it is also grown throughout the South Pacific, West Indies, and Central and South America.

Vanilla flavor is as ubiquitous as chocolate. In baked goods it is added as a flavor agent, often in the form of vanilla extract. However, fresh vanilla comes in pods. Vanilla is the fruit of the vanilla orchid plant. The pods are picked green and then subjected to a lengthy and involved process of drying, curing, and aging that takes several months. Due to the time and care required to prepare them for consumption, vanilla beans are one of the most expensive spices in the world, second to saffron (which also comes from an orchid plant).

When selecting vanilla beans at your specialty grocery store, be sure to look for fresh, plump, and moist pods for immediate use. If you need to store them, keep them in an airtight container. If your pods dry out, you can grind them and use the resulting powder to flavor desserts and various dishes.

Vanilla beans consist of a pod which houses the vanilla seeds. Both the seeds and the pods can be utilized in recipes. The pods can be used to make vanilla sugar, vanilla extract, and vanilla powder. The pods can also be tossed into stewing fruit as seen in the *Lemon- Cinnamon Stone Fruit Compote* take home recipe. The seeds can simply be added to any recipe that calls for them as seen in the *Maple-Vanilla Ricotta Parfait* take home recipe.

Handling and Using Fresh Vanilla:

Vanilla beans are very delicate and should be handled with care. The following steps outline the proper technique to both harvest the seeds and keep the pod intact for use in further recipes.

1. Split the Pod:

Place the bean on a flat surface. Using the paring knife, press the knife firmly down the length of the pod. This will split the pod into two halves. This step may need to be repeated if the pod does not completely

Eat Local: Feature Food (continued)

split on the first attempt. When the pod splits be careful not to loose any of the seeds. It may help to wet your fingers so no seeds stick to your skin.

2. Scrape the Pod Halves:

Run the unsharpened side of the paring knife down the length of the pod to scrape out the seeds. Often the sharpened part of the knife can tear the pod and or remove soft fibers in the pod.

3. Use the Seeds (and Save the Pod)!

Once the seeds are removed from the pod they are ready for use. The pod can be used to add extra flavor to recipes that are liquid-based. This works especially well when the liquid is heated. Both the seeds and the pod will be used in today's recipe.

Parfait

Serves 10 campers

Ingredients at station:

Homemade ricotta
Seeds scraped from 1 vanilla bean
Toasted sunflower seeds
Fresh blueberries
Fresh raspberries
Fresh strawberries
Orange

Ingredients at shared station:

Farmers market maple syrup
Pure vanilla extract

Directions:

1. Take a small bowl to the shared ingredients station and measure **4 tablespoons maple syrup**, and **1 teaspoon of vanilla extract**. Bring small bowl back to your cooking station.
2. Add **maple syrup** and **vanilla** to the large bowl of **homemade ricotta**. Gently mix until all are combined.
3. Add the **vanilla bean seeds** to the ricotta mixture. Gently mix until all are combined. Set aside.
4. Wash **1 pint blueberries, 1 pint raspberries, and 1 pint strawberries** carefully.
5. Remove stems from strawberries and cut them in half. Add them to a large bowl. Add the rest of the berries to the bowl with the strawberries.
6. Wash the orange and cut it in half. Using a citrus juicer, juice the orange and add the juice to the bowl of berries. Stir carefully to combine.
7. Take a small bowl to the shared ingredient station and measure out **1 cup toasted sunflower seeds**.
8. Retrieve **stone fruit compote** from teacher in the Hot Zone.
9. Make individual parfait by: spooning **¼ cup of berry mixture** into a glass. Add **3 tablespoons of the ricotta mixture**. Add **2 spoonfuls of compote**. Add **1 more tablespoon of the ricotta mixture**. Top with **one spoonful of the berry mixture** and sprinkle **toasted sunflower seeds** on top to layer all the ingredients.

Creamy Homemade Ricotta

Whoever knew that making your own cheese could be this simple? You can wow your friends and family with this creamy and delicious recipe for homemade ricotta.



Makes 3 cups

Ingredients:

- 2 quarts of organic whole milk
- 1 cup of heavy cream
- ½ teaspoon of table salt
- 3 tablespoons of lemon juice

You will also need:

- 1 package of cheesecloth
- 4 wooden clothes pins

* UHT = Ultra-high-temperature processing, on the label the milk might say “ultra-pasteurized.” Milk treated at a high temperature (212° F. vs., 172° F. for regular pasteurization) will not properly form into curds because of how the high temperature changed the milk protein

Directions:

1. Take a piece of cheesecloth and fold it in half. Make sure that when folded it is large enough to cover the inside of a colander.
2. Take clothes pins and secure the cheesecloth to the rim of the colander. Place the colander into a large bowl. Set aside for later use.
3. Juice 2 whole lemons with a citrus juicer and measure out 3 tablespoons of lemon juice into a small bowl. Set aside.
4. In a large stock pot, add 2 quarts of organic whole milk. It is important NOT to use Ultra-high Temperature (UHT*) treated milk.
4. Add 1 cup of heavy cream and ½ teaspoon of table salt.
5. Heat the milk, cream, and salt mixture on medium-low heat. Gently stir frequently to prevent the milk at the bottom of the pot from burning, giving the ricotta a burnt taste. It may take about 30 minutes for the mixture to heat to a rolling boil. Be patient. Don't raise the temperature and continue to stir frequently.
6. When the milk mixture has reach slow rolling boil, add the 3 tablespoons of lemon juice. Continue stirring constantly and reduce the heat to low until the milk curdles which should occur within 30 seconds to 2 minutes. The milk curds (solids) will separate from the whey (liquid) and the liquid will turn a yellowish color. If this does not happen, add 1 more tablespoon of lemon juice and stir to combine. Stir for 1-2 minutes.
7. Carefully pour the hot mixture into the lined colander and allow the curd to collect in the cheesecloth and the whey to drain into the large bowl placed under the colander.
8. Discard the liquid from the bowl. Let the mixture drain for 20-30 minutes. Again, remove any liquid that has collected in the large bowl. You will be left with creamy ricotta.
9. Remove the ricotta from the cheese cloth and place it into the large bowl.

Lemon-Cinnamon Stone Fruit Compote

You can use a collection of stone fruits choosing whatever is in season and at the farmers market: peaches, apricots, plums, etc. Try and choose soft and ripe fruits if you plan to make the compote that day.



Serves 10 -12 people

Ingredients:

- 1.5 pounds stone fruits (yields 3 cups of coarsely chopped)
- 2 tablespoons honey
- Table salt
- ½ lemon, zest and juice
- 1 cinnamon stick
- 1/4 cup water
- De-seeded vanilla pod shell

Directions:

1. In a medium saucepan combine chopped stone fruit, honey, pinch of salt, zest and juice of half a lemon, water, and a cinnamon stick.
2. Cook over medium-high heat, stirring occasionally for 10 minutes.
3. Add vanilla pod shell and let cook for an additional 5-6 minutes or until fruit is soft.
4. Transfer to a glass bowl and let cool.

Maple-Vanilla Ricotta Parfait

This parfait is a great healthy minimally processed dessert that looks, tastes, and smells delicious. It can be easily adapted to include your favorite fruits, or whatever is in season. The compote is chunky and fragrant, the berries are fresh, the maple-vanilla ricotta is smooth and creamy.



Serves 10 -12 people

Ingredients:

- 1 batch of homemade ricotta (3 cups)
- 4 tablespoons of farmers market maple syrup
- 1 teaspoon pure vanilla extract
- Seeds scraped from 1 vanilla bean
- 1 pint fresh blueberries
- 1 pint fresh raspberries
- 2 pints fresh strawberries, halved
- 1 orange, juiced
- 1 batch of Lemon-Cinnamon Stone Fruit Compote
- 1 cup toasted sunflower seeds

Directions:

1. Combine ricotta, maple syrup, vanilla extract and vanilla bean seeds in a bowl and set aside.
2. Combine orange juice and berries and gently mix fruit together.
3. Spoon $\frac{1}{4}$ cup of the berry mixture into a clear glass. Add about 3 tablespoons of maple-vanilla ricotta, then 2 spoonfuls of the compote, and one more spoonful of the maple-vanilla ricotta
4. Top with a spoonful more of the berry mixture and toasted sunflower seeds.

.....

Food Chemistry

Day 5



Making Change



Advertising Healthy Habits

.....

Materials

In Guide:

- *Food Marketing Techniques* activity sheet (from **Case 10 Processed Food Overload** case) p. 262
- *Advertising Techniques that Target Youth* lesson resource (from **Case 10 Processed Food Overload**) p. 263

Other Materials:

- Poster board
- Construction paper
- Markers
- Colored Pencils
- Stencils
- Scissors
- Glue
- Chart paper
- Camera with video capabilities (optional)
- i2 journal and pencil

Overview

Campers draw on marketing techniques learned in the **Processed Food Overload** case to create their own advertisements promoting healthy foods and behaviors. Campers select one food or recipe that they have prepared this week at i2 and design an advertisement that promotes this item. The group participates in a large brainstorming activity using guiding questions to review major concepts learned throughout the week. Campers then break into small groups with each group creating their own healthy advertisements. Campers share their advertisements with the group and discuss which marketing techniques were most effective.

Objectives

Campers will be able to:

- reflect on what they have learned this week; and
- utilize marketing techniques to promote a healthy product.

Before You Begin:

- Review lesson plan and all in guide materials.
- Gather art supplies.
- Charge camera. Locate video feature on the camera in case you choose to film any advertisements.

Clues collected:

- Healthy advertisement
- Video footage of completed jingles or commercial advertisements (optional)

1. Introduce the Case

Welcome campers to their final day at the i2 *Food Chemistry* course. Explain that today they will synthesize everything they have learned thus far in order to solve the last food detective cases. Introduce campers to the **Advertising Healthy Habits** case. Explain that today campers will use these marketing techniques to create a healthy advertisement for a food or recipe they have made at i2.

2. Brainstorm Concepts Learned

Ask campers to think back to what they learned about advertising in the **Processed Food Overload** case. Ask campers to take out their *Food Marketing Techniques* activity sheets and together, review the various marketing techniques: promotions, looks good, ads everywhere, celebrities, and claims. You may also want to use the *Advertising Techniques that Target Youth* lesson resource to review. Make notes on the board as needed.

As a large group, brainstorm concepts that the campers have learned throughout the week to generate ideas that could be incorporated into their healthy advertisements. As ideas are shared, write themes and other notes on the board. Use the following guiding questions:

What type of food system do you think we should support? Why? How?

Should we encourage our families, friends, and neighbors to eat:

- foods from the industrial or community food system?

- foods that are highly processed or minimally processed and whole foods?

- foods that are locally produced or grown and processed in other countries? Why?

What are the advantages and challenges of growing your own food in a backyard or community garden?

What's problematic about increased portion sizes? What is good about increased portion size?

What are some benefits and drawbacks to shopping at a farmers market? Eating seasonally?

How can we encourage people to eat more real, whole, healthy, fresh food?

What are some of the barriers people face to eating healthy? To getting enough exercise?

What changes can we make to our environments to increase access to good food?

3. Pick Topics

Have campers break into groups of 2 to 4 campers. Give each group a piece of chart paper to brainstorm. Each group should decide on one food or recipe that was made during i2. Explain that groups can make a poster or flier, create a jingle, or make a live commercial to perform (or any combination of these). Remind campers to use some of the concepts and ideas from the brainstorm session to strengthen their advertisements. For example, if promoting pickled green beans, campers can include the benefits of shopping at a local farmers market in their advertisement. Give campers time to pick a food or recipe and to decide on how they want to advertise and promote that product.

As campers are brainstorming, walk around the class and speak with each group. Ask campers to think about who their audience is. *Are they creating an advertisement for kids like them? Adults? Younger kids?* Have each group share their idea with an instructor for approval before proceeding.

4. Create a Healthy Ad

Give campers 20-30 minutes to create and practice presenting their advertisements. As you walk around monitoring campers work, remind them that their main goal is to convince people to want to eat their food and to keep their audience and advertising techniques in mind.

5. Promote the Product

Campers will now present their advertisements. Before they begin, remind campers about being respectful when their peers are presenting. Explain that campers should really try to sell their product! Allow each group 5 minutes to present their advertisements. Feel free to video record some or all of the presentations if desired. After each group presents, ask campers to share why they chose the food or recipe they did. Have campers talk briefly about why they chose the specific format (commercial, poster, etc.), audience, and advertising techniques they used.

6. Make Change

Throughout the week, campers have learned how many aspects of the industrial food system are damaging to our environment, communities, and families. Explain to campers that with all these new experiences, skills, and knowledge, they have the tools to envision a more just and healthy reality for our food systems. Have campers pick one problem with the current industrial food system that really resonated with them over the course of the week. Ask campers, *what could you do in your family or community to help solve this problem?* Encourage them to think of this as

Go Deeper

Campers have been exposed to a lot of information this week. Sometimes it can be overwhelming to learn about large social issues.

Share with campers the following video, www.youtube.com/watch?v=IGMW6YWjMxw

Ask campers how they feel about the video. What do they think it's about? Challenge campers to be more like the hummingbird in the film.

a long term project that can lead to improving their own lives as well as others in their communities. Give campers time to reflect and write or draw their thoughts and ideas in their i2 journals. Allow campers who are interested time to share with the larger group.

7. Close to the Case

Remind campers that change is hard and it doesn't happen over night. It's hard to make healthy choices when everywhere you look heavily processed foods and inactive lifestyles are promoted. Ask campers:

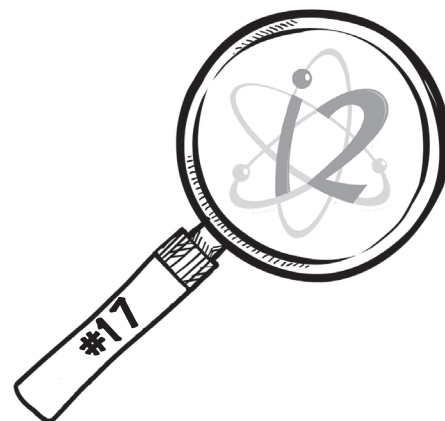
What techniques or advertisements did you think were effective?

Do you think there should be commercials and advertisements like the one's you made that promote "real foods"?

How could we share these messages with others?

How could we use similar marketing techniques to promote behaviors, activities, and lifestyles that are healthy for us, our communities, and the planet?

Congratulate campers on completing the case.



Cooking for Change

.....

Materials

In Guide:

- **Cook for Change: Visual Overview** cooking resource p. 400
- **Cook for Change: Getting Ready** cooking resource p. 402
- **Cook for Change: Set Up** cooking resource p. 402
- **Cook for Change: Cooking Skills** cooking resource p. 405
- **Cooking Processes** food science resource p. 408
- **Cook for Change: Feature Food** cooking resource p. 410
- **Pesto Mix-in** camper's recipe sheet p. 412
- **Tomato and Pea Shoot Mix-in** camper's recipe sheet p. 413
- **Bean Salad** camper's recipe sheet p. 414
- **Foam** food science resource p. 415
- **Whip Cream Dessert** camper's recipe sheet p. 416
- **Fresh Homemade Pasta** take home recipe p. 417
- **Perfect Pesto** take home recipe p. 419
- **Tomato Pea Shoot Delight** take home recipe p. 420
- **Mixed Bean and Corn Medley** take home recipe p. 421
- **Fresh Cream and Berries** take home recipe p. 422

Other materials

- All ingredients and equipment listed on the **Cook for Change: Getting Ready** cooking resource
- i2 journal and pencils
1 per camper

Overview

This is the final food detective case! Campers integrate major themes, food science principles, cooking skills, cooking methods and sensory skills learned throughout the week to make an entire meal from scratch using whole, minimally processed plant foods. Campers eat communally and share their opinions about the recipes and their food experiences through the week.

Objectives

Campers will be able to:

- describe how to make dough for fresh pasta and demonstrate how to roll out and cut pasta dough;
- recognize how various cooking methods impact the sensory properties of foods and how to use their senses to inform ingredient selection; and
- demonstrate increased confidence in their ability to prepare an all-plant based meal.

Before You Begin:

- Review lesson plan and all in guide materials.
- Gather ingredients and equipment and complete food preparation and cooking station set up using **Cook for Change: Getting Ready** and **Cook for Change: Set Up** cooking resources.
- Review **Cook for Change: Cooking Skills** and **Cook for Change: Feature Food** cooking resources and **Foam** and **Cooking Processes** food science resources.
- Make copies of **Pesto Mix-in**, **Tomato Mix-in**, **Bean Salad**, **Whipped Cream Dessert** camper's recipe sheets and **Fresh Homemade Pasta**, **Perfect Pesto**, **Tomato Pea Shoot Delight**, **Mixed Bean and Corn Medley**, and **Fresh Cream and Berries** take home recipes for campers.

There is a lot of cooking in this case! You may want to extend an invitations for parents or other adult family members to cook and eat with you!

Clues collected:

- *Fresh Homemade Pasta* take home recipe
- *Perfect Pesto* take home recipe
- *Tomato Pea Shoot Delight* take home recipe
- *Mixed Bean and Corn Medley* take home recipe
- *Fresh Cream and Berries* take home recipe

1. Introduce the Case

Introduce campers to their final food detective case, **Cooking for Change**. When we advocate for change, we are advocating for an environment that makes real, whole and plant-based foods accessible and normal to eat. Cooking more of our own meals allows us to select our own ingredients and advocate for change with our purchasing power for real ingredients. Explain that today we are making pasta from scratch using minimally-processed, mostly local, plant-based ingredients. By selecting to eat real over processed, local over imported, and plant-based foods more of the time, we are advocating for change with our forks.

2. Practice Cooking Skills: Making Pasta Dough

Have campers wash their hands. Lead a demonstration on making fresh pasta using the *Cook for Change: Cooking Skills* cooking resource.

(Note: since the making the pasta is lead by the teacher, there is not a “camper’s recipe sheet” all instructions for making the dough, rolling the pasta, and cooking the pasta (see procedure #5) are on the *Cook for Change: Cooking Skills* cooking resource.)

Have campers participate by measuring out the flours, cracking and adding the eggs, and kneading the dough. Working the ingredients into dough can be messy. Allow campers to practice kneading only after the ingredients have been incorporated so as not to lose too much of the dough to sticky hands. After the dough has been fully combined and sufficiently kneaded, set it aside for 30 minutes under a clean kitchen towel at room temperature.

3. Explore Cooking Processes

This week campers have used various cooking processes: pan frying bean burgers, blanching broccoli for their plant-part salad, roasting their peppers for dips, and simmering milk for ricotta. Use the *Cooking Processes* food science resource to guide campers in a discussion about the various cooking processes they’ve learned this week. Ask campers to recall some of these cooking processes and discuss some of their features. *What made roasting different from blanching or pan frying from simmering?* Encourage campers to recognize the different sources and movement of heat (conduction vs. convection), whether it involves moisture or not (blanching vs. pan frying), and what kind of changes these processes made in appearance, flavor, texture, and taste.

4. Highlight Feature Food

Today's feature food is sweet farmers market corn, which is so fresh and delicious that it can be enjoyed raw. Use *Cook for Change: Feature Food* cooking resource to guide the discussion on corn. Working in one large group, prepare the sweet corn three ways (roasted, boiled, and raw) by first removing the kernels off the cobs for the roasted corn in a kernel removal demonstration so that it can get put into the toaster oven while the campers practice removing kernels for the other two preparations. Once the corn is prepared, conduct a corn tasting to allow the campers to compare the differences in appearance, texture, taste, and smell of all three cooked varieties. Allow campers to decide, in their cooking groups, which preparation of corn they would like to use in their bean salads, and reserve those portions at the shared ingredients station for them to pick up later.

4. Review the Recipe and Assign Tasks

Today's cooking case has many different components: a bean salad, fresh pasta, a pesto, a tomato and pea shoot mixture to mix into the pasta, and market fruit with fresh whipped cream. The campers will help an instructor make the fresh pasta, taking turns throughout the cooking case to come up in small groups to roll and cut the pasta. Divide the campers into their cooking groups; give each group three copies of *Bean Salad*, *Pesto Mix-in*, and *Tomato and Pea Shoot Mix-in* camper's recipe sheets to share. Assign one group to start on the pesto recipe first, while the other group starts on the bean salad or the tomato and pea shoot mix-in to coordinate the timing and use of the food processor. The bean salad recipe provided can be used as a guide for campers to follow, however if there are veggies leftover from the week's recipes, allow camper to also choose from them to formulate their bean salad. Ensure that campers fully understand the timing and order in which things should be prepared.

5. Roll Fresh Pasta into Fettuccine

After the dough has rested for 30 minutes it is ready to be rolled. Cut the dough ball into 8 uniform pieces. Roll out one piece and let it rest for 10 minutes according to the *Cook for Change: Cooking Skills* cooking resource. Call campers to the demonstration station. Using the *Cook for Change: Cooking Skills* cooking resource, demonstrate how to roll out one piece of dough and cut the rested rolled out piece. Allow campers to return to their respective cooking groups to continue cooking, but call up small groups of three campers at time to roll a piece of dough and cut it into fettuccine through out the cooking session. Cook the pasta close to the time that you will be eating.

6. Whip it Up!

Once all the meal components have been prepared (bean salad, pesto, tomato mix-in), and the pasta has been cut and is ready to boil, bring the cooking groups together to discuss aeration and foams. Using the *Foams* food science resource, guide campers through a discussion of the food chemistry of foams. Allow campers to determine how this process compares to what they observed with emulsions. Lead a demonstration on how to make fresh whipped cream. Distribute *Whipped Cream Dessert* camper's recipe sheet and review the recipe. Finally, allow campers to apply the food science of foams and make their own whipped cream dessert.

7. Eat!

Once all the meal components have been completed, have campers and instructors sit down together as a group. Explain that campers have come a long way to become 'real eaters.' Remind campers that today's cooking theme is Cooking for Change. Ask campers, *What do you think this means? How can we use the way we cook and eat to make change in our homes and communities?* Help campers to understand that the way they eat and influence those around them and that they show support for different types of food systems depending on the food they buy.

8. Clean Up

Once everyone is finished it is time to clean up. Everyone should be involved in the cleaning process. Make sure that all cooking and eating surfaces are wiped down and floors are swept. If possible, have campers wash their own dishes. Cleaning will go faster if some washing has already been done throughout the activity.

9. Close the Case

Ask the campers the following questions:

Has anybody had raw sweet corn before? If not, how do you typically eat it?

Had anybody made or eaten homemade pasta before?

How does the pasta you buy generally come? Packaged? Can? Box? Frozen?

What do you like most about the meal?

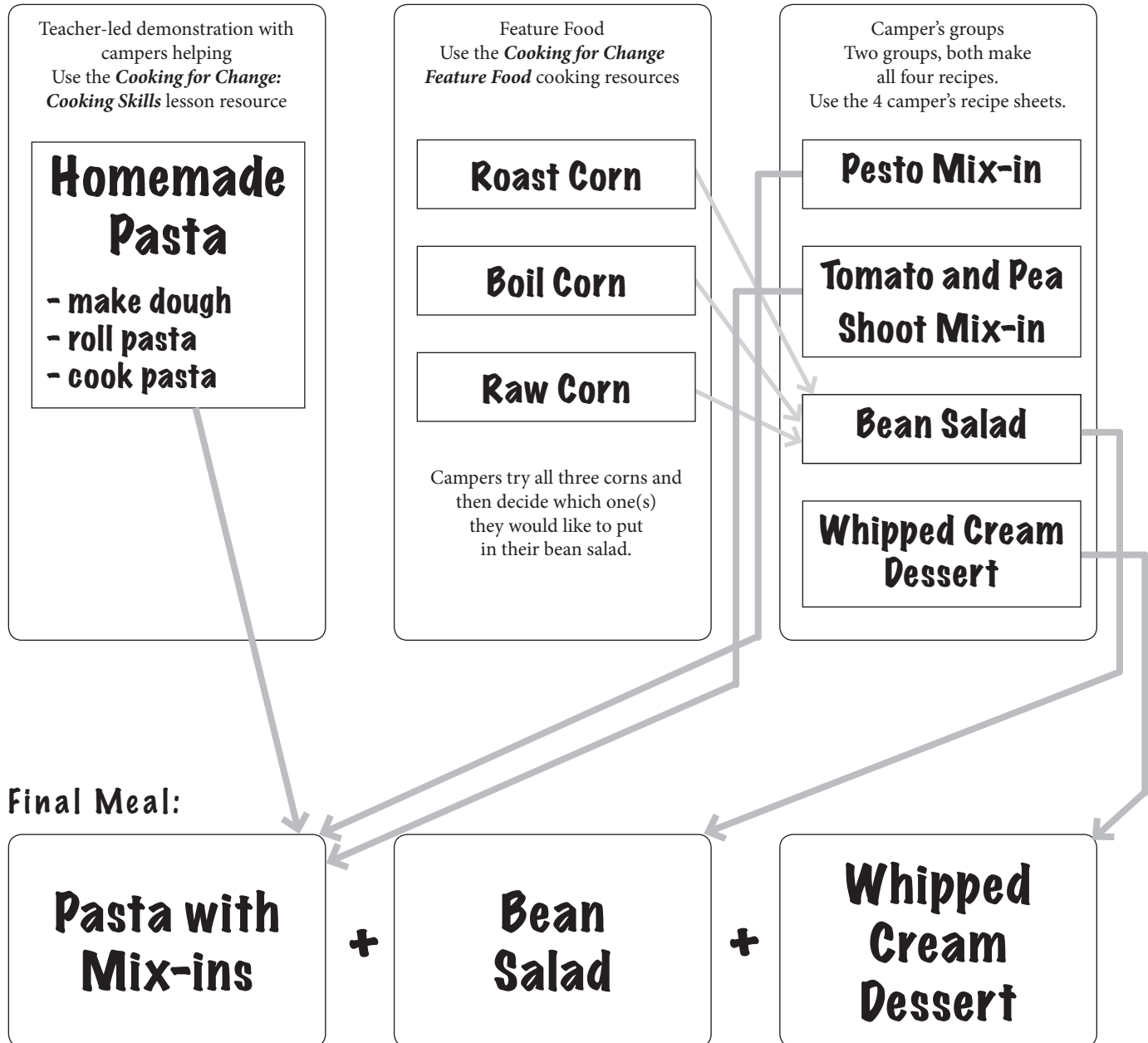
Briefly recap some of the week's cooking themes of eating real, more plants, less processed, more local, and making change. The campers have learned a lot of new skills, been introduced to many new foods and flavors, and also know how to describe the foods that they eat. Hold a brief discussion to allow campers to recap what they have learned, enjoyed and disliked within the themes of each day; start with Day 1 and move along to Day 5. End with a discussion on the importance of cooking more at home. *Why might cooking more at home help to achieve these daily goals?* Through more scratch cooking, campers have a better understanding and control over the real ingredients that they put into their bodies.

Have campers record their impressions in their i2 journals. Distribute all the take home recipes to each camper at the end of the day. Review recipe ingredients and procedure, highlighting any steps that campers were not involved in. Congratulate campers for completing today's cooking case.

Cook for Change: Visual Overview

This is the exciting last day of cooking! Since there is a lot going on, this visual provides an overview of what you will be cooking and how the different cooking components interact with each other.

Cooking:



Cook for Change: Getting Ready

These are all the ingredients and supplies you need to make all the recipes and complete all cooking demonstrations and activities for 20 campers.

Shopping list

- 1 2-lb. bag of 100% whole wheat flour
- 1 2-lb. bag of all-purpose flour
- 6 large eggs
- 6 bunches of basil
- 2 heads of garlic (10 cloves)
- 2 lemons
- 4 pints of cherry tomatoes
- 6 cups sprouts and microgreens from Case 7 or farmers market
- 10 pints of fresh berries
- 1 ½ quart of whipping cream (1 liter)
- 4 Tbsp. granulated sugar
- 2 tsp. vanilla extract
- 2 cups olive oil
- Table salt
- Kosher salt
- Ground pepper
- 4 15-oz. cans of mixed beans
- 1 bunch Celery (4 ribs)
- 4 scallions
- 2 red bell peppers
- 12 ears of corn
- 1 bunch of parsley
- 2 tsp. of ground cumin
- 4 limes

Cooking Equipment

- 1 cutting board per campers
- 1 Knife per campers
- 9 large mixing bowls
- 12 small bowls
- 2 mixing spoons
- Imperia pasta maker with fettuccine attachment
- Pastry scrapper
- 2 citrus juicers
- 4 medium bowls
- 2 whisks
- 2 large pots
- Pasta fork
- 3 colanders
- 2 rubber spatulas
- 6 clean dish towels
- 4 baking sheets
- 1 pastry scraper
- 10 corn kernel removers
- 2 can openers

Advanced Prep

- Set up stations using the *Cook for Change: Set Up* lesson resource.

Cook for Change: Set Up

Use this sheet to prepare the classroom for cooking. Campers work in 2 groups with both groups making bean salad, pesto mix-in, tomato pea shoot mix-in, and whipped cream dessert. Set up a cooking station for each small group with all food and equipment listed, separated by recipe. Prepare the shared ingredient station with the food and equipment that are shared by all groups in a communal location. Prepare the Hot Zone with the listed food and equipment.

Station: Cooking Group 1 and Group 2 (both make all 4 recipes)

A. Bean Salad

Foods:

- 2 15 oz. cans of mixed beans
- Celery (2 ribs)
- 2 scallions
- 1 red bell pepper
- 1/2 bunch of parsley
- 2 limes

Equipment:

- 10 knives*
- 10 cutting boards*
- 1 large mixing bowl
- 1 mixing spoon
- Citrus juicer*
- 1 set of measuring spoons*
- 1 set of measuring cups*
- 1 dish towel
- 1 small bowl
- 1 medium bowl

Preparation:

1. Open, drain, and wash cans of mixed beans and place in a small bowl.
2. Wash parsley and pat dry with a dish towel.

B. Pesto Mix-in

Foods:

- 8 cups of basil leaves
- 2 cloves of garlic
- 1 lemon

Equipment:

- 10 knives*
- 10 cutting boards
- 1 set of measuring cups*
- 1 set of measuring spoons*
- Citrus juicer*
- 2 small bowls
- 1 medium bowl
- Food processor
- Rubber spatula

Preparation:

1. Strip basil leaves from thick stems. Wash and pat dry.

* Knives, cutting boards, colander, citrus juicer, measuring cups and measuring spoon are used in more than one recipe and can be shared across recipes.

Cook for Change: Set Up (continued)

C. Tomato Pea Shoot Mix-in

Foods:

- 2 pints cherry tomatoes
- 18 large basil leaves
- 3 cups of garden microgreens/sprouts
- 1 clove of garlic, pre-chopped by instructor

Equipment:

- 1 knife per camper*
- 1 cutting board per camper*
- 1 colander*
- 1 large mixing bowl
- 1 small bowl
- 1 dish towel
- 1 set measuring cups*

Preparation:

1. Finely chop 1 clove garlic for each cooking group and set out with other ingredients.
2. Strip and count out basil leaves from thick stems. Wash and pat dry.

D. Whipped Cream Dessert

Foods:

- 2 cups heavy cream
- 5 pints of fresh berries

Equipment:

- 10 knives*
- 10 cutting boards*
- 1 colander*
- 2 large mixing bowls
- 1 medium bowl
- 2 small bowls
- 1 whisk
- 2 sets of measuring cups*
- 2 sets of measuring spoons*

Preparation:

1. Keep heavy cream refrigerated until right before campers start this recipe.

* Knives, cutting boards, colander, citrus juicer, measuring cups and measuring spoon are used in more than one recipe and can be shared across recipes.

Cook for Change: Set Up (continued)**Station: Shared Ingredients****Foods:**

- Cumin
- All leftover ingredients from the week's cooking
- 1 small bowl of boiled corn (~ 1 cup)
- 1 small bowl of raw corn (~1 cup)
- 1 small bowl of roasted corn (~1 cup)
- 6 bunches of basil
- Olive oil
- Table salt
- Ground pepper

Station: Hot Zone**Foods and Equipment:**

- Burners
- 2 large pots of salted water, for boiling corn, and pasta
- Pasta fork
- Colander, for draining
- 1 cup measuring cup, to reserve pasta water

Cook for Change: Cooking Skills

Homemade Fresh Pasta

Materials:

- 2 ½ cups of 100% whole wheat flour
- 2 ½ cups of all-purpose flour
- 6 large eggs
- Small bowl of warm water
- 1 large mixing bowl
- 4 baking sheets
- Imperia hand-crank pasta maker and all attachments
- 1 pastry scraper

Preparation:

1. Set up the pasta maker according to the manufacturer's instructions. Make sure you properly secure it to a counter top.
2. Dust all 4 baking sheets with cornmeal and set aside.
3. Clean and sterilize the counter space that you'll be using to form the pasta dough.

Making Homemade Pasta Dough

Pasta dough is really easy to make and there is nothing like the taste of fresh pasta. Unlike pastry and bread dough, pasta dough isn't very fussy.

It's basically only three ingredients, eggs, flour, and salt. However, because of variations in eggs, flour and other factors, you may need to tinker with the exact recipe a bit by adding a little more flour or small amounts of water to the mixture or to your hands. Therefore, it is impossible to give exact instructions on how to make the perfect pasta dough. However, some tips to look for are: the dough should be uniformly combined and smooth and dry enough so that your hands come away clean when handling it.

Procedure

1. **Clean your Work Space:** Clean the counter space that you'll be using ahead of time.
2. **Combine the Flour and Salt:** In a large mixing bowl combine flours and salt.
3. **Make a Well:** Pour flour mixture onto the counter top. Form a mound with a deep crater in the center.
4. **Add the Eggs:** Crack the eggs into the crater in the flour mound.
5. **Begin Combining the Flour and Eggs:** Use your fingers to gradually draw the dry ingredients into the center, mixing the flour mixture with the eggs. The dough will be hard and separated at first, use a pastry

Cook for Change: Cooking Skills (continued)

scraper to help incorporate the wet and dry ingredients and scrape excess ingredients off the counter space.

- Knead to Incorporate:** Knead the mixture until it is relatively smooth. Adjust the dough as necessary. Add a very small amount (1/2 to 1 teaspoon) of warm water if it is not coming together smoothly, or a small amount of all-purpose flour if it is too wet.
- Knead to Make Smooth:** Knead the dough with the heel of your hand for at least three minutes until the dough is smooth. The dough should not feel sticky, but if it does, knead in a small amount of flour, just enough so that your fingers come away clean when you pull away.
- Rest the Dough:** Place the dough into the large bowl used to combine the dry ingredients. Place a clean dish towel over the bowl to cover and let it sit at room temperature for 30 minutes.

Rolling Fresh Pasta

One of life's greatest pleasures is pulling those final cuts of pasta strands from the pasta machine. Instead of a hand-crank machine you can hand roll the pasta with a rolling pin, however it is challenging to roll the dough out thin enough to make uniform and properly textured pasta unless you are experienced. These instructions are based on the Imperia Hand-crank Pasta Maker. Follow factory instructions for rolling and cutting fettuccine accordingly when using other machines.

Procedure:

- Divide the Dough:** Remove the rested dough from the bowl and stretch it out slightly. Cut it into 8 equal pieces. Allow campers to come up in small groups of three to work the dough through the pasta maker.
- Getting Ready to Roll:** Dust your hands, the machine, and the dough with a small amount of all-purpose flour.
- Begin Rolling out the Dough:** Set the pasta machine to the thickest setting (typically marked '6'). Flatten one piece of dough into a thick disk between your hands and feed it through the pasta roller. Fold the flattened dough in half and run it through the roller again, on the same setting. Take the flattened piece and run it through the roller one more time.
- Thinning the Dough:** Starting at the second to widest setting (#5) pass the dough repeatedly through the rollers setting the rollers one notch narrower each time until you have reached notch #2. When the dough becomes too long, cut it roughly into 12" lengths. Each piece of divided dough should make at least two 12" lengths of flattened dough.
- Resting the Flattened Dough:** Place flattened dough onto a dusted baking sheet and dust with cornmeal. Cover completed trays with a dish towel to prevent from drying out and let rest for at least 10

Cook for Change: Cooking Skills (continued)

minutes and no more than 2 hours.

- Getting Ready to Make Fettuccine:** The 12” flattened dough pieces are now ready to be put through the fettuccine roller. As one group rolls out a piece, allow them to use the previous groups rolled and rested dough for cutting. Adjust the pasta maker by removing the handle from the pasta machine and inserting it into the side of the pasta-cutting attachment. Before cutting the pasta, ensure that the baking sheets are dusted with flour.
- Making Fettuccine:** Run the 12” rolled out pasta sheet through the fettuccine setting at notch #2 and arrange the pasta on the baking sheet. Dust the fettuccine lightly with cornmeal to keep them from sticking. Each 12” rolled out pasta sheet will make enough pasta for one to two campers. Gently gather one portion of fettuccine together lengthwise in a bundle, and carefully twist it into a small mound. It should look like a bird’s nest. Cover the mounds with a clean kitchen towel while you finish cutting the rest of the pasta. Repeat with the remaining pasta sheets.

Cooking Fresh Pasta

To cook the pasta, bring a large pot of salted water to a boil. Drop in the pasta quickly, mound by mound, and cook the pasta until al dente, 3-4 minutes. Make sure to separate fettuccine strands by gently stirring the water when the pasta is dropped into the boiling water to ensure consistent cooking and no sticky pasta. Fresh pasta cooks much quicker than dry pasta and is more likely to stick together. Carefully monitor by tasting a single strand after about 3 minutes. Once cooked, reserve ½ cup of pasta water, and drain the pasta into a colander. Quickly transfer the pasta into a large mixing bowl and drizzle with olive oil, tossing to prevent the pasta from sticking. Add the mix-ins and enjoy warm!

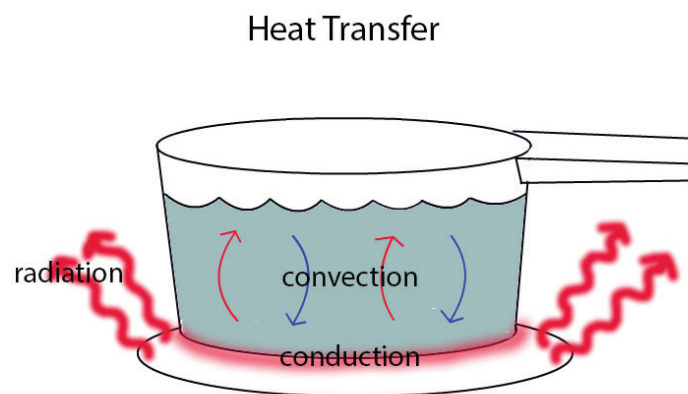
Cooking Processes

Heat is transferred to foods by three basic methods: conduction, convection and radiation.

In conduction, the heat is transferred by direct contact between two materials with different temperatures. For example, in sautéing, the food is in direct contact with the pan that also is in direct contact with the source of heat. When we put our pan on the heat element to cook the bean burgers, the heat generated by the element (hot plate, gas stove) was transferred between the material in the heat element and the metal in the pan.

Convection happens in fluids or gases when there are differences in temperature. This difference in temperature causes the movement of the fluid (or gas) because of the tendency of hotter (and subsequently, less dense) material to rise, while the cooler (and more dense) material sinks. This movement essentially creates a current. An example of convection heat is boiling water. The flame heats the pot and the pot heats the water by conduction, then the hot water travels upward in a current while cold water travels downward by convection. We used convection heating to blanch the broccoli for our plant-part salad, and will use it to boil the pasta noodles.

Lastly, radiation involves the movement of heat waves. Radiation does not require the physical contact between the heat source and the food being cooked rather, energy is transferred through waves of heat. For example, radiation heat is used to heat up foods that we put into a microwave.



However, cooking is more than just heating food, it changes food in different ways. These changes are largely determined by the composition of the food (the fat, sugar, and protein content), but also by whether moisture is used to cook the food. Cooking methods that involve dry heat, are those methods without moisture and include cooking with oils or fat. Those using moist heat, involve water.

Cook Processes (continued)

Among the methods that campers used this week, two employed dry heat and three moist heat:

Dry heat cooking methods:

Pan frying - used to cook the veggie burgers on day 1

Pan Frying uses only a moderate amount of fat and oil. It is considered a dry heat cooking method that will caramelize carbohydrates and uses conduction and then some convection within the oil to heat the food. To make pan frying a healthy cooking method, minimize the fat or oil used.

Roasting - used with peppers on day 3 and corn on day 5

Roasting uses dry heat in a closed environment, like an oven, cooks the foods by convection (air currents) and conduction (from the baking sheet or pan to the food, then from the outside layers of the food to the inside).

Moist heat cooking methods:

Boiling - used when cooking quinoa on day 1, wheat berries on day 2, pasta, and corn on day 5

Boiling uses a liquid (e.g. water or broth) to cook food. First, heat travels by conduction from the heat source (i.e. the flame) to the pot, then it is transferred by convection within the liquid in the pot. The high heat makes the liquid vaporize rapidly once it reaches its boiling point. Nutrients that are soluble in water may get lost in the boiling liquid.

Blanching - used for broccoli on day 2

Like boiling, blanching uses a liquid, usually water, and heat is transferred first by conduction and then by convection. The food, usually a vegetable or fruit, is submerged briefly into boiling water to soften it, to partially or fully cook it, to remove unwanted substances, or to inactivate the enzymes that may affect the food quality later on. Immediately afterwards, the food is plunged into iced water or placed under cold running water to stop the cooking process.

Simmering - used for pickle brine, simmering the compote, and the milk for the ricotta (day 4)

Similar to boiling and blanching, simmering involves a liquid and heat transfer by conduction and convection. In simmering, the liquid is kept at just or below its boiling point, usually for long periods of time. To keep a liquid simmering, you can bring it to a boil and then reduce the heat to a gentle roll.

Cook for Change: Feature Food

Corn

Materials

- 12 ears of corn
- 2 Tbsp. olive oil
- Kosher salt
- 1 6-quart pot of water
- 1 burner
- 1 baking sheet for the toaster oven
- Toaster oven
- 10 kernel removers
- 6 small bowls
- Tasting spoons

What is corn?

Corn is a large grain plant that has been eaten around the world for thousands of years. It can be boiled, baked, roasted, steamed, grilled, and eaten raw (to name a few preparations). It grows as ears of corn on stalks (which usually grow as high as 8 feet above the ground).

Selecting the Best Corn:

Enjoying sweet and delicious corn always starts with selecting the freshest and just ripe ears of corn, which tastes the absolute best when it comes from a local farm and is in season. When selecting corn, the husks (outer green covering) should be a bright green color. It should be snugly wrapped around the ear of corn. The kernels under the husk should be in tight rows right to the tip of the ear of corn, and be plump.

Shucking the Corn:

It is best to remove the husk of the corn just before cooking; this will maximize the freshness. When you are ready, pull off the husks of the corn and save for your compost bin. Remove the silk (the white threads found just under the husk).

Removing the Kernels:

To remove the kernels from the ear without them scattering everywhere, use a corn kernel remover. These are often safe for kids to use as well. Cut each ear of corn in half so that you can rest it upright on a flat surface. Use the kernel remover as package instructions indicate.

Cook for Change: Feature Foods (continued)

How to Prepare the Corn for Tasting:

We are using the feature food to demonstrate how cooking processes have different affects on foods. For this tasting, work with the campers to prepare the corn three ways: roasted, boiled, and raw. For timing, it will be best to get the corn kernels roasting as soon as possible. Demonstrate and allow campers to use the kernel removers to remove the kernels off the ears of corn and into small bowls.

Roast Corn (4 ears):

The process for roasting corn is the same as what was conducted for the peppers except that the corn kernels will not take as long. Remove the kernels from four ears of corn. Toss them in about 2 tablespoons of olive oil and kosher salt until all kernels are coated. Place in a pre-heated toaster oven at 425 degrees for 20 minutes or until golden brown. Put 1 cup of roasted corn into a small bowl and put at the Shared Ingredients Station for later use in bean salad recipe. Use the remaining corn for tasting.

Boil Corn (4 ears):

Place a pot of water on high heat to boil. Remove the kernels from four ears of corn and place them into the boiling water. Let them cook for 3-5 minutes or until tender. Use a colander and drain the kernels. Sprinkle with salt. Put 1 cup of boiled corn into a small bowl and put at the Shared Ingredients Station for later use in bean salad recipe. Use the remaining corn for tasting.

Raw Corn (4 ears):

Fresh farmers market corn that is plump and milky is a wonderful raw treat. After the kernels have been removed, simply sprinkle with a little salt. Put 1 cup of raw corn into a small bowl and put at the Shared Ingredients Station for later use in bean salad recipe. Use the remaining corn for tasting.

Tasting:

Distribute one spoonful at a time of each corn preparation. Allow campers to observe, smell, taste, and record their observations of each item into their i2 journals.

Pesto Mix-In

Serves 10 campers

Ingredients at station:

Basil leaves

Lemon

Garlic

Ingredients at shared station:

Olive oil

Salt

Ground pepper

Directions:

1. Peel skin off **2 cloves of garlic** and place them in the food processor.
2. Juice **lemon** and measure out two **1 tablespoon portions**. Add **1 tablespoon of lemon juice** to the food processor.
3. Add **8 cups of basil leaves** to the food processor.
4. Take 2 small bowls to the shared ingredient station. Measure out **3 tablespoons of olive oil** into each bowl. Add **one bowl of olive oil** to the food processor and pulse until coarsely chopped.
5. Then, add the other **bowl of olive oil** and mix until smooth.
6. Add $\frac{1}{4}$ **teaspoon of salt** and $\frac{1}{4}$ **teaspoon of pepper**.
7. Allow an instructor to taste the mixture and determine if more **lemon juice, salt, or pepper** are needed.
8. Use the rubber spatula to carefully remove all the pesto from the food processor into a medium bowl.
9. Mix into homemade pasta.

Tomato and Pea Shoot Mix-in

Serves 10 campers

Ingredients at station:

Cherry tomatoes

Basil leaves

Garlic

Garden pea shoots

Ingredients at shared station:

Olive oil

Directions:

- 1. Wash **2 pints cherry tomatoes**, cut them in half and add to a large mixing bowl.
- 2. Add **chopped garlic** to bowl.
- 3. Tear **18 large basil leaves** and place them in the large bowl. Stir to combine all the ingredients.
- 4. Take a small bowl to shared ingredient station. Measure out **1/4 cup of olive oil**. Add to the large bowl and stir to combine.
- 5. Cover the bowl with a clean dish towel and let rest for 30 minutes do flavors can combine.
- 6. Just before serving add **3 cups garden pea shoots** and stir to combine.
- 7. Mix into pasta-pesto mixture and stir to combine.

Bean Salad*Serves 10 campers***Ingredients at station:**

Mixed beans

Celery

Scallions

Red bell pepper

Parsley

Limes

Ingredients at shared station:

Roasted corn

Boiled corn

Raw corn

Ground cumin

Olive oil

Cayenne pepper

Salt

Black pepper

Directions:

1. Finely chop **celery** and **scallions** and place them into a large bowl.
2. De-seed and finely chop the **bell pepper**.
3. Tear **parsley** leaving to small pieces and measure out $\frac{3}{4}$ **of a cup** and place it in the large bowl.
4. Add **beans** to the large bowl and stir mixture to combine all the ingredients.
5. Juice **2 limes** and measure out **2 tablespoons** into a small bowl.
6. Take a medium bowl to the shared ingredients station. Measure out **3 tablespoons of olive oil, 1 teaspoon of ground cumin, 1 pinch of cayenne pepper, $\frac{1}{2}$ teaspoon of salt, and $\frac{1}{2}$ a teaspoon of pepper**. Bring bowl back to cooking station.
7. Add **lime juice** to **oil and spice mixture** and whisk to blend. Pour over the **bean mixture**. Stir to combine.
8. Go to the shared ingredients station and select the **corn** that you would like to add to your salad: **roasted, boiled, or raw**. Generally **$\frac{1}{2}$ -1 cup of corn** is recommended. You may choose to add a little more or a little less. You may decide to use only one type of corn or all three. Use your developed sensory skills to decide. Add it to the salad and stir to combine.
9. Sample to see if it is balanced. As a group, decide on any other ingredients that could be used for flavor, texture, and aroma.

Foams

Materials:

- 1 cup whipping cream
- 1 medium bowl
- 1 whisk
- 1 set of measuring cups

How to whip fresh cream:

Use cold whipping cream; it will whip faster. When whipping, begin by using wide strokes to incorporate air into the cream. Switch directions every so often. Continue whisking until soft peaks form. You can also make the whip cream a little stiffer if desired.

Food Science:

Aeration in foods refers to trapping air or CO₂ in a food. Aeration works by mechanically agitating a food, for example beating, pulling, kneading, or flaking it, which creates air pockets in the food. Normally these air pockets would just dissipate, but some ingredients, like wheat proteins, egg white proteins, or milk fat globules found in foods, have the ability to stabilise these air pockets so that the air stays trapped inside the food. This process is similar to the stabilizing properties of emulsifiers that we observed in emulsions. While in emulsions we try to create small pockets of one liquid in another (liquids that don't mix), aeration involves creating pockets of air or CO₂ in either a liquid or a solid. Even though there are clear differences, some of the same principles apply. Adding energy (like shaking) is a way to create these pockets and, in some cases, steps can be taken or ingredients can be added to stabilize the pockets.

Here are some examples of how aeration is used in everyday foods that you eat:

- Whipping or shaking some liquids can entrap air (e.g. whipped cream, beaten egg whites, cake batter, milkshakes, frappés).
- Steam can be generated when certain foods are cooked slowly to create air pockets (e.g. doughnuts, waffles, most unleavened baked goods).
- Air can become entrapped between sheeted layers, as in pastries and croissants, or between pulled strands, as in pulled taffy and candies.

Aeration results in: a less dense or “lighter” product; a change in the texture, giving a different mouthfeel and appearance; enhanced ability to take up space, due to increased surface area; modification of digestibility; and a decrease in the intensity of flavors.

The benefits of aerated food products have to do with texture. Fluid products such as whipped cream and mousses become smoother, while solid products such as breakfast cereals and snacks become light and crisp. Carbonation of soft drinks produces the tingling mouthfeel central to the appeal of these beverages, as well as contributing acidic preservative action and giving a “fizzy” appealing sparkling effervescence.

Whipped Cream Dessert

*Serves 10 campers***Ingredients at station:**

Heavy cream

Fresh berries

Ingredients at shared station:

Granulated sugar

Vanilla extract

Directions:

1. Wash **berries** and place **5 cups fresh berries** into a large bowl.
2. Measure out **2 cups of cooled heavy cream** into a second large bowl.
3. Using a whisk, begin whipping the cream with wide strokes to incorporate air into the cream. Switch directions every so often.
4. Take **2 small bowls** to the shared ingredients station. Fill one with **4 tablespoons granulated sugar** and the other with **1 teaspoon vanilla extract**.
5. When the mixture starts to get stiffer add **4 tablespoons granulated sugar** and **1 teaspoon vanilla extract** and continue to whip the mixture.
6. Continue whipping the mixture until soft peaks form.
7. Use your **fresh whipped cream** to top the **berries**.

Fresh Homemade Pasta

Fresh pasta dough is really easy to make and there is nothing like the taste of fresh pasta. This recipe can show you that simple ingredients and scratch cooking are rewarding and worth the added effort.



Makes 15 ½ cup servings

Ingredients:

- 1 cup 100% whole wheat flour
- 1 cup all-purpose flour
- 4 large farm eggs

Directions: Making the dough

1. In a large mixing bowl combine flours and salt.
2. Pour flour mixture onto a clean, dry counter top forming a mound and make a crater in the center.
3. Crack the eggs into the formed crater and use your fingers to gradually draw the dry ingredients into the center, mixing the flour mixture with the eggs.
4. The dough will be hard and separated at first. Use a pasty scraper to help incorporate the wet and dry ingredients and scrape excess ingredients off the counter space.
5. Knead the mixture until it is relatively smooth. Adjust the dough as necessary by adding a very small amount (1 teaspoon) of warm water if it is not coming together smoothly, or a small amount of all-purpose flour if it is too wet. Continue kneading the dough with the heel of your hand for at least three minutes until the dough is smooth, so that your fingers come away clean when you pull away.
6. Place the dough into the large bowl. Place a clean dish towel over the bowl to cover and let it sit at room temperature for 30 minutes.

Directions: Rolling the dough

7. Remove the rested dough from the bowl and stretch it out slightly. Cut it into 8 equal pieces.
8. Dust your hands, the machine, and the dough with a small amount of all-purpose flour.

Fresh Homemade Pasta (continued)

9. Set the pasta machine to the thickest setting (generally marked '6'). Flatten one piece of the dough into a thick disk between your hands and feed it through the pasta roller. Fold the flattened dough and run it through the roller again on the same setting. Take the flattened piece and run it through the roller one more time.
10. Now you are ready to thin the dough. Start at the second-to-widest setting (generally marked '5'), pass the dough repeatedly through the rollers, setting the rollers one notch narrower each time until you have reached the second-to-last notch (generally marked '2'). When the dough becomes too long, cut it roughly into 12" lengths. Each piece of divided dough should make at least two 12" lengths of flattened dough.
11. Place flattened dough onto a flour dusted baking sheet and dust with cornmeal. Cover completed trays with a dish towel to prevent from drying out and let rest for at least 10 minutes and no more than 2 hours.
12. The 12" flattened dough pieces are now ready to be put through the fettuccine roller. Adjust the pasta maker accordingly by removing the handle from the pasta machine and inserting it into the side of the pasta-cutting attachment. Before cutting the pasta, ensure that the baking sheets are still adequately dusted with flour.
13. Run the 12" rolled out pasta sheet through the fettuccine setting at notch #2 and arrange the pasta on the baking sheet. Dust the fettuccine lightly with cornmeal. Gently gather one portion of fettuccine together lengthwise in a bundle, and carefully twist it into a small loose nested mound and cover with a clean kitchen towel while you finish rolling the rest. Repeat with the remaining pasta sheets.

Directions: Boiling Fresh Pasta

14. Bring a large pot of salted water to a boil. Drop in the pasta quickly, mound by mound, and cook the pasta until al dente, 3-4 minutes. Ensure that when the pasta is dropped in, it separates into strands by gently stirring the water. Fresh pasta cooks much quicker than dry pasta and is more likely to stick together.
15. Carefully monitor and pull the pasta out once it is cooked. Once cooked drain the pasta into a colander and quickly transfer the pasta into a large mixing bowl and drizzle with olive oil, tossing to prevent the pasta from sticking.
16. Add any sauces, toppings, mix-ins, or cheese as desired and enjoy warm!

Perfect Pesto

Although pesto traditionally contains nuts and dairy (Parmesan cheese), this nut and dairy-free version is brighter and just as delicious. The touch of citrus and garlic with the floral flavors of summer basil make this pesto a great mix-in for fresh pasta.



Makes 1 cup

Ingredients:

- 8 cups packed fresh basil leaves
- 2 cloves of garlic
- 6 tablespoons olive oil, divided in two
- 2 tablespoons of fresh lemon juice, divided in two

Directions:

1. In a food processor, combine the basil leaves, garlic, $\frac{1}{2}$ the lemon juice, and $\frac{1}{2}$ of the olive oil and pulse until coarsely chopped.
2. Add the other $\frac{1}{2}$ of the olive oil and process until fully incorporated and smooth.
3. Add more lemon juice to taste.
4. Season with salt and pepper to taste.
5. Enjoy as a sauce for pasta or pizza, as a dip, or on a sandwich or salad.

Tomato Pea Shoot Delight

This versatile, fresh, and flavorful recipe can be eaten simply as a side salad, mixed into pasta, stuffed into a pita sandwich or topped on plain pizza. It is a wonderful addition to any meal and a great way to take advantage of summer farmers market fare.



Makes 5 cups

Ingredients:

- 2 pints cherry tomatoes, halved
- 18 large basil leaves, julienned
- 1 clove of garlic, minced
- 3 cups of garden pea shoots
- ¼ cup olive oil
- Salt to taste
- Pepper to taste

Directions:

1. In a large bowl, combine tomatoes, garlic, basil with olive oil.
2. Stir to combine and let rest for 30 minutes covered.
3. Just before serving add pea shoots and stir to combine.
4. Add to your favorite pasta recipe, as we've done in the photo above and during i2 Food Chemistry camp, for an extra hit of fresh.

Mixed Bean and Corn Medley

Mixed beans, with sweet seasonal corn, peppers, and celery make a colorful, and flavorful, summer salad. This salad tastes good when it is first made, but often tastes even better after a day, when all the juices combine and marinate the beans.



Makes 5 cups

Ingredients:

- 2 cobs of sweet summer corn
- 2 15-oz. cans of mixed beans, well drained and rinsed
- Celery (2 ribs), chopped
- 2 scallions, sliced finely
- 1 red bell pepper, chopped
- 1/2 bunch of parsley
- 2 tablespoons of lime juice
- 1 teaspoon ground cumin
- 3 tablespoons of olive oil
- 1 pinch of cayenne pepper
- 1/2 teaspoon of salt
- 1/2 teaspoon of black pepper
- Any other chopped vegetables

Directions:

1. Remove kernels of corn from cob and place them into a large bowl. Corn can be used raw, roasted, or boiled.
2. Add all other ingredients and stir to combine.

Fresh Cream and Berries

Nothing beats fresh whipped cream made from scratch, and you don't have to live on a farm to have access to it. With only three ingredients and a few easy steps, you'll never have to settle for the processed version again. Add a dollop to a heaping serving of fresh fruit or any other dessert.



Makes 2 cups

Ingredients:

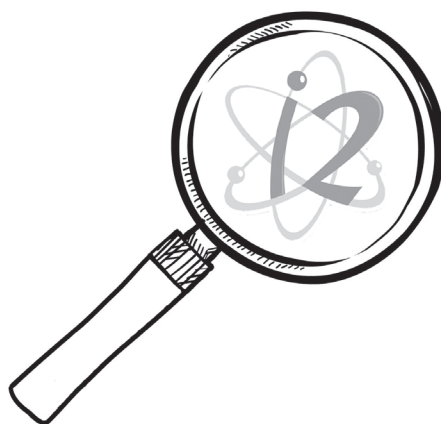
- 1 cup heavy cream
- 2 tablespoons granulated sugar
- 1 teaspoon vanilla extract
- 5 cups of fresh berries

Directions:

1. Keep heavy cream in the refrigerator until just before whipping. The colder it is, the easier and faster it will whip.
2. Pour heavy cream into a bowl. You may want to put the bowl in the refrigerator so it starts cold.
3. Using a whisk, begin whipping the cream with wide strokes to incorporate air into the cream. Switch directions every so often.
4. When the mixture starts to stiffen, just before the soft peaks form, add sugar and vanilla extract and continue to whip the mixture.
5. Continue beating the mixture until soft peaks form. You can also make the whipped cream a little stiffer if desired.
6. Top over fresh berries.

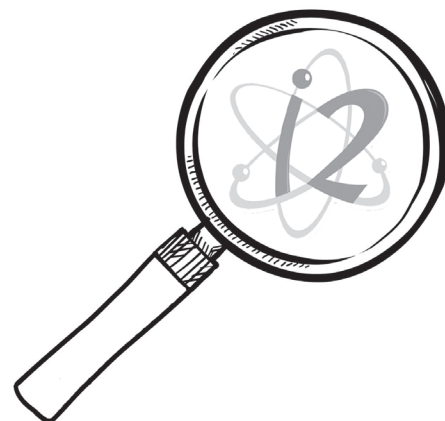
.....

Food Chemistry



Optional Cases

Food Miles



Materials

In Guide:

- *Food Miles: It came from Where?* activity sheet
p. 427

Other Materials:

- World map poster
- Sticky Notes
- Online resource, The Global Grocer: <http://www.foodandwaterwatch.org/food/global-grocer/> and <https://maps.google.com/>
- Online resource, Distance From To: <http://www.distancefromto.net/>
- iPads or laptops
- i2 journals and pencils
1 per camper

Overview

To accompany learning about food systems, campers use online resources to discover how far food travels to reach our supermarkets.

Objectives

Campers will be able to:

- explain the concept of “food miles” and calculate how far food travels using online resources.

Before You Begin:

- Review lesson plan and in guide materials.
- Prepare *Food Miles: It came from Where?* activity sheet for each camper.

Clues collected:

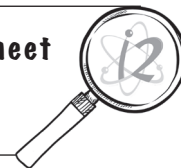
- *Food miles: It came from Where?* activity sheet

1. Calculate Food Miles

Campers have learned that in the industrial food system, food travels around the globe in order to reach our supermarket shelves. Campers now explore just how far food travels in the industrial system by using the Global Grocer website: <http://www.foodandwaterwatch.org/food/global-grocer/>.

Distribute and review the *Food Miles: It Came from Where?* activity sheet. Show campers the Global Grocer website. Review what an ‘import’ and ‘export’ is. Then explain how to use the ‘Distance From To’ website to calculate the distance between their city and the country an industrial food item came from. Divide campers into groups of two. Give them a few minutes to explore the website in their pairs. Allow campers to complete the activity sheet.

Allow campers to share their discoveries with the group. Have them write the country, food item, and distance traveled of one item from their activity sheet onto a sticky note and attach it to the world map poster.

**Camper:**

Food Miles: It Came from Where?

As a food detective, it is your job to discover where exactly our food comes from! Using the 'Global Grocer' website and the 'Distance From To' website you will discover just how far our food travels to make it onto our plates.

Global Grocer: <http://www.foodandwaterwatch.org/food/global-grocer/>

Distance From To: <http://www.distancefromto.net/>

Using the 'Global Grocer' website choose one food item from each category to fill in the following information. Use 'Distance From To' to discover the distance traveled from the top exporter country to your state. For example, frozen spinach most likely is imported from China. In the "from" box, put in your location, for example, New York City. In the "to" box put China. Click measure distance. The distance to travel from the US and China is about 7,000 miles.

1. Fresh vegetable: _____

Top exporter to the United States: _____

Odds that it was imported: _____

Interesting fact: _____

Distance travelled from top exporter country to your state: _____

Do you think this item can be grown locally? _____

2. Fresh fruit: _____

Top exporter to the United States: _____

Odds that it was imported: _____

Interesting fact: _____



Food Miles: It Came from Where? (continued)

Distance traveled from top exporter country to your state: _____

Do you think this item can be grown locally? _____

3. Shelved goods: _____

Top exporter to the United States: _____

Odds that it was imported: _____

Interesting fact: _____

Distance traveled from top exporter country to your state: _____

Do you think this item can be grown locally? _____

4. Frozen foods: _____

Top exporter to the United States: _____

Odds that it was imported: _____

Interesting fact: _____

Distance traveled from top exporter country to your state: _____

Do you think this item can be grown locally? _____



The Lost Steps

Materials

In Guide:

- *The Lost Steps Interview* activity sheet p. 431

Other Materials:

- Pedometers
- Chart paper
- Markers
- i2 journals and pencils
for each camper

Overview

As detectives, campers learn about their friends and classmates physical activity habits. Campers learn interview skills and brainstorm with one another to find ways to be more physically active.

Objectives

Campers will be able to:

- investigate environmental factors that influence physical activity choices;
- create a plan for increasing physical activity in their daily lives;

Before You Begin:

- Prepare one copy of the activity sheets for each camper.
- Put on your pedometer.

Clues collected:

- *The Lost Steps* activity sheet
- Photo of physical activity list and pledge

Get Up and Move

To help your campers understand the benefits of physical activity have them write down how they feel in their i2 journals, they put in a song and let them dance! Have them write down how they feel right after dancing. They should feel like their head is clearer, they can concentrate better etc after getting up and dancing.

1. Introduce the Case

We know it's hard for many people to get enough physical activity each day. Explain to campers that in this activity they will become interviewers. Campers will learn about the physical activity habits of their friends and classmates and what barriers to physical activity they may experience.

2. Conduct Interviews

Discuss with campers what it means to interview someone. Review how to ask questions clearly, listen properly, and how to be respectful when someone else is talking. Distribute *The Lost Steps Interview* activity sheet to each camper. Review the instructions and how to use the activity sheet. Divide campers into pairs and begin interviews. Remind campers that they are collecting clues in order to determine what barriers their friends may face when it comes to being physically active. After a few minutes have campers switch so everyone gets an opportunity to be the interviewer and the interviewee. If you have not already completed **Case # 11 Finding Balance**, please discuss reasons why physical activity is important. See procedure # 4 on page 270.

3. Analyze the Data

Once everyone has had a chance to be the interviewer and the interviewee gather the class for a group discussion. Have campers share some of their findings. *How many kids walk to school? How many bike? Is it considered cool to walk to school/camp? Why or why not? What were some of the barriers that emerged? Do campers live too far away from school/camp to walk? Are there parks nearby to play and run in?*

4. Brainstorm Solutions and Pledge to Act

As a class come up with ways that campers can be more physically active. Brainstorm a list on a piece of chart paper. Write down all ideas and encourage campers to be creative. Once a robust list has been formed challenge campers to set a goal of doing at least one of the things on the list. If campers pledge to do at least one of the activities on the list, have them sign the piece of paper as a reminder of their pledge. Take a photo of the list and the signatures so each camper who signed can have a copy.

5. Close the Case

Remind campers about the importance of being physical active every day. Tell campers that as a class you will be checking in with each to see if people are meeting their physical activity pledge. Congratulate campers for completing another case.

**Camper:****The Lost Steps Interview**

Interview your partner to find out about how your partner gets to school.

Date _____

1. How far away do you live from your school? _____

In an average school week, how many days do you use the following kinds of transportation to get to and from school? [Example: If you always ride a bus to and from school, you would circle 5 next to “go by car or bus” in both columns.]

2. Days Per Week to School

a. walk 0 1 2 3 4 5

b. bicycle 0 1 2 3 4 5

c. go by car or bus 0 1 2 3 4 5

d. other _____ 0 1 2 3 4 5

3. Days Per Week from School

a. walk 0 1 2 3 4 5

b. bicycle 0 1 2 3 4 5

c. go by car or bus 0 1 2 3 4 5

d. other _____ 0 1 2 3 4 5

Please tell us how much you agree or disagree with the following statements. Put a check in the appropriate box.

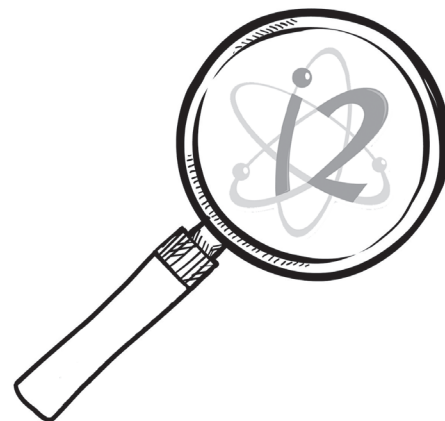
	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
4. Other kids my age walk or bike to school by themselves.				
5. Other kids my age walk or bike to school with a parent or other adult.				
6. I enjoy (or would enjoy) walking or biking to school.				



The Lost Steps Interview (continued)

	Strongly Disagree	Disagree	Agree	Strongly Agree
6. I enjoy (or would enjoy) walking or biking to school with my friends.				
7. I enjoy (or would enjoy) walking or biking to school with my friends.				
8. I like biking even when there are hills.				
9. There are sidewalks or bike lanes on my route from home and school.				
10. The route from home to my school has good lighting.				
11. There is not too much traffic on my route from home to school.				
12. There are not any dangerous streets to cross between home and school.				
13. Others kids that I know walk or bike to school.				
14. It is considered cool to walk or bike to school.				
15. My bookbag and other school stuff is light enough that I can carry it while I walk or bike.				
16. I would rather walk or bike to school than to be driven or take a train or bus.				
17. There is a place to safely park my bike or leave my scooter by school.				
18. My family helps me to make a plan for how I can walk or bike to school.				

Everything that you answered “strongly agree” or “agree” helps you walk or bike to school. Everything that you checked “strongly disagree” or “disagree” makes it harder for you to walk or bike to school.



Seasonality Wheel

.....

Materials

In Guide:

- *Seasonality Wheel* activity sheet
- *What's in Season* lesson resource
- *Farmers Market Case Book* activity sheets (from **Case 13 Farmers Market Exploration**)

Other Materials:

- Online resource, *Field to Plate*: <http://www.fieldtoplate.com/guide.php>
- Online resource, *Simple Steps*: <http://www.simplesteps.org/eat-local>.
- Brass fasteners
- Scissors
- Markers
- i2 journals and pencils

Overview

To accompany learning about farmers markets, campers create a seasonal wheel for their region to learn what is locally available in the various seasons.

Objectives

Campers will be able to:

- describe different growing seasons and the produce available during each season.

Before You Begin:

- Review lesson plan and in guide materials.
- Review *Field to Plate* and *Simple Steps* online resources.
- Prepare *Seasonal Wheel* activity sheet for each camper.

Clues collected:

- *Seasonality Wheel* activity sheet

1. Explore Seasonality

Explain to campers they will now discover the different growing seasons in your region. Campers will make a seasonal food wheel using the food clues found at the farmers market and online resources.

Distribute the *Seasonal Wheel* activity sheet and explain how to construct them using the *What's in Season* lesson resource. Using the information collected in their *Farmers Market Case Book* activity sheet from Case 13, campers will be able to write or draw the foods available in “summer” on the bottom sheet of the Seasonal Wheel. Distribute laptops/ipads and allow campers to discover what is in season throughout the rest of the seasons using the online resources provided by *Field to Plate* and *Simple Steps*. When campers finish, have them share their discovers.

2. Discussion

Have campers reflect on the following questions:

Were you surprised to learn that something grew in your state that you didn't know?

What are some fruits and vegetables that are not grown in your region?

Would it be possible to just eat a “seasonal diet”?

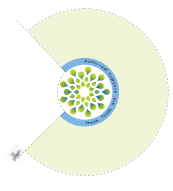
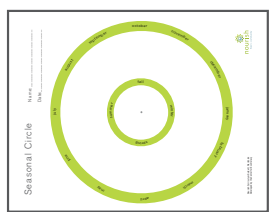
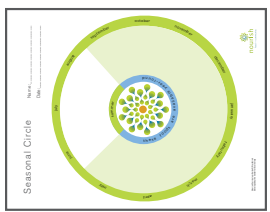
What are some of the changes that have happened throughout history that have removed seasonal eating from our diet? (E.g. technological advancements, transportation, preservation, etc.)



Camper:

Seasonal Wheel

TO ASSEMBLE

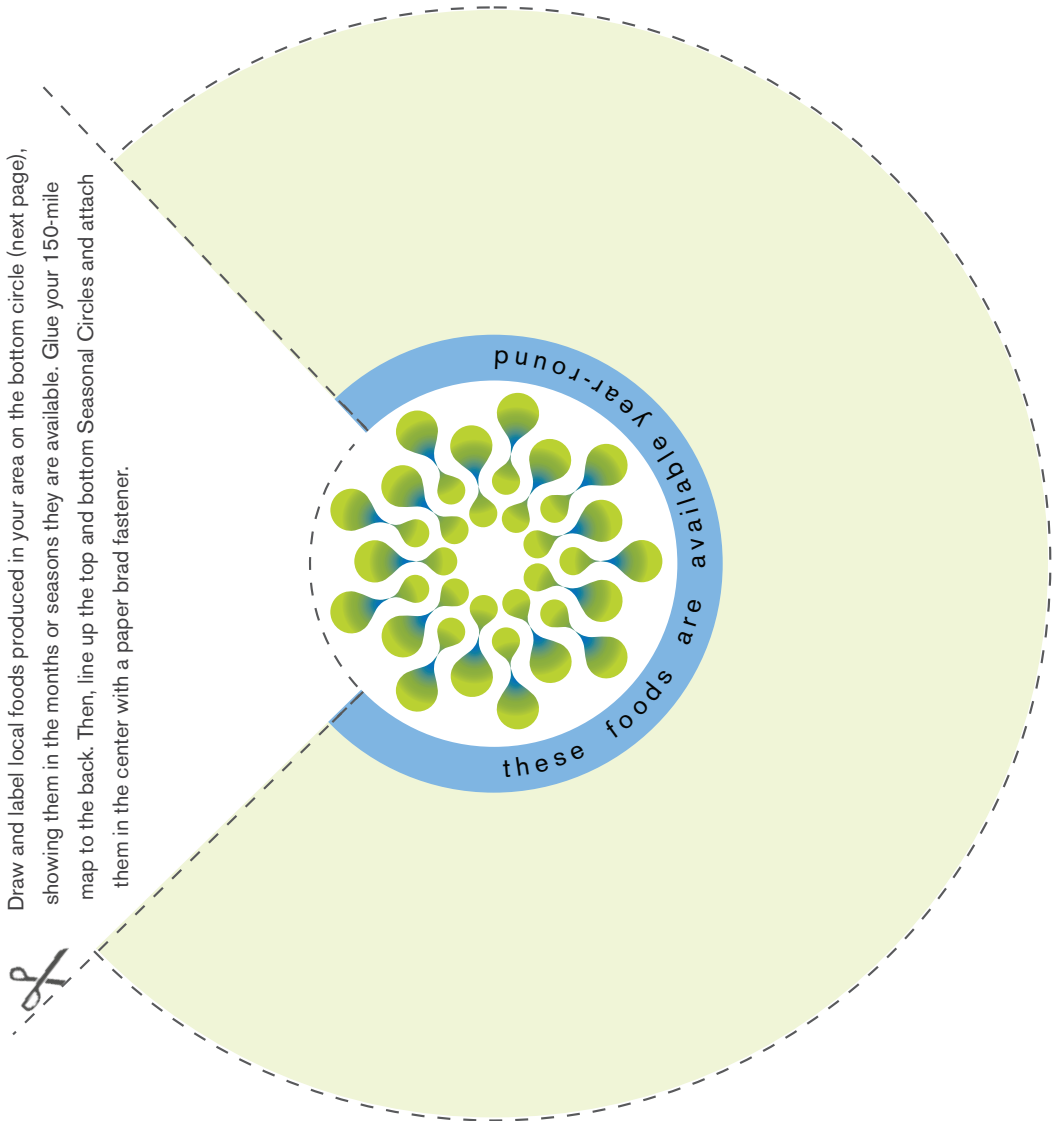
1. Cut out this circle. 
2. Place it on top of this circle and line it up. 
3. Fasten the two circles together with a brad fastener to make this: 

Nourish Curriculum Guide © WorldLink
Developed by the Center for Ecoliteracy

SEASONAL CIRCLE

On the shaded space indicated, draw and label local foods that are available year-round in your area. Then, cut out the circle and wedge on this page as marked.

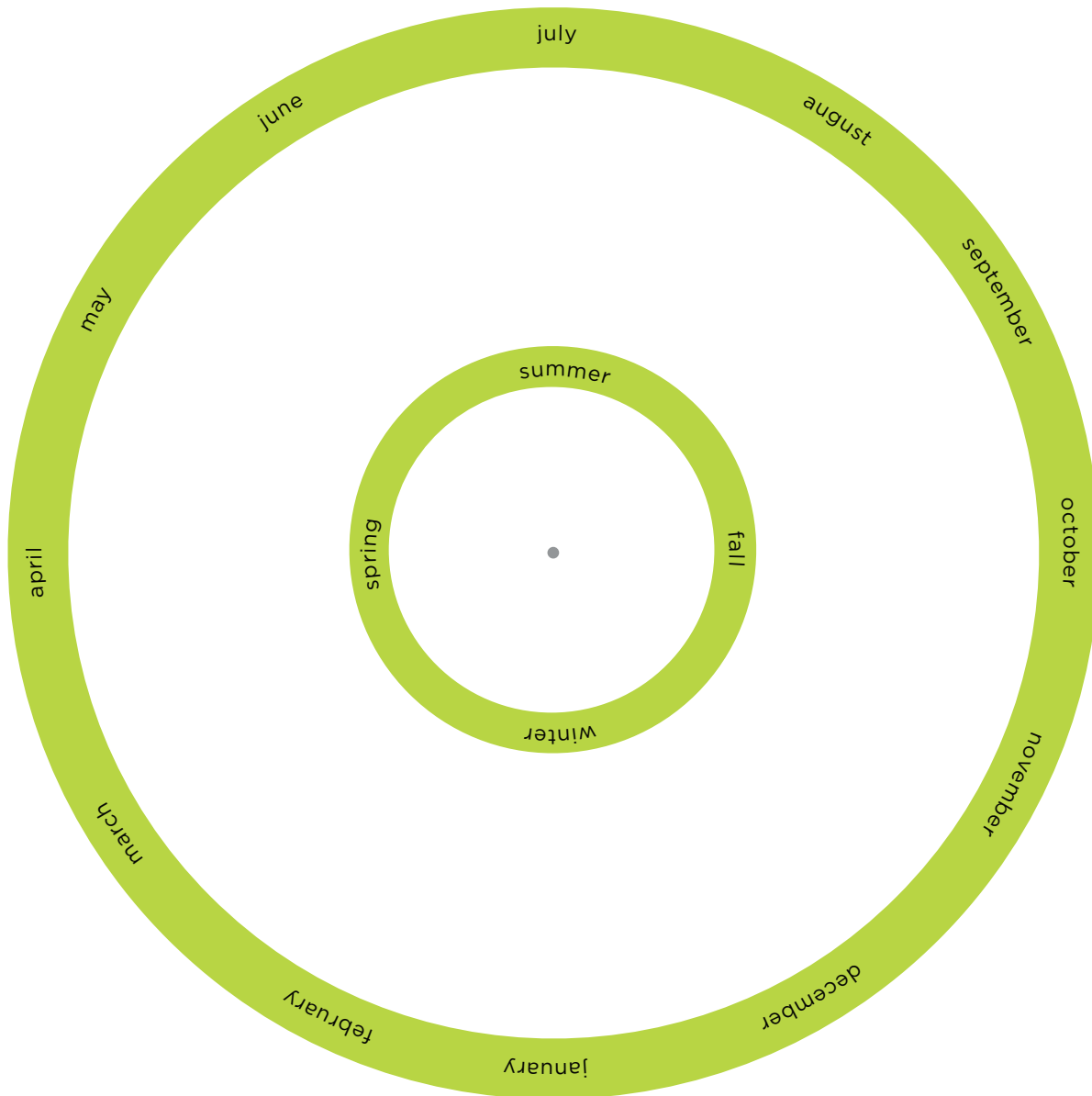
Draw and label local foods produced in your area on the bottom circle (next page), showing them in the months or seasons they are available. Glue your 150-mile map to the back. Then, line up the top and bottom Seasonal Circles and attach them in the center with a paper brad fastener.





Seasonal Wheel (continued)

Seasonal Circle



What's In Season?

What's In Season in Your Region?

Because of differing climates, different regions have different growing seasons. Some crops can be grown all year round in Southern California whereas in the Northeast Region the snow and cold temperatures in the Winter season limit what can be cultivated. Do some research to familiarize yourself with what the growing season in your region is and what products are grown locally at various times of the year. A trip to your local farmers market will help you to find what is currently available in your region. Your local Cooperative Extension Service may be a good resource. Use this website to search for your local Cooperative Extension Service: <http://www.csrees.usda.gov/Extension/>.

Seasonality Wheel Instructions

Provide campers with some resources indicating what is available in your region during the different months and seasons of the year. Have campers think about what they saw at the farmers market. They can include some of those products in the current season. On the second (white) sheet of the Seasonal Wheel have campers write or draw fruits, vegetables, and other products available during the different months of the year. On the top (green) sheet have campers write or draw the names of products available all year round. Have campers cut out the top sheet on the dotted lines and fasten it to the bottom sheet using a brass fastener.

References

Case 1: From Farm to Plate

Think Globally and Eat Locally teacher note text adapted from Teachers College Columbia University *Growing Food* book of the *Linking Food and the Environment* LIFE curriculum series.

Apple Game Production card used with permission from Teachers College Columbia University *Growing Food* book of the *Linking Food and the Environment* LIFE curriculum series.

Case 2: Hidden Ingredients

Uses of Corn image from: Iowa State University, Center for Crops Utilization Research. <http://www.ccur.iastate.edu/education/posters.html>. Accessed on March 2, 2014.

Case 3: All About Worms

All worm and compost images used with permission from Teachers College Columbia University *Growing Food* book of the *Linking Food and the Environment* LIFE curriculum series.

All About Worms activity adapted from Teachers College Columbia University *Growing Food* book of the *Linking Food and the Environment* LIFE curriculum series.

Case 4: Cooking 101

no references

Case 5: Cooking to Eat Real

Binder information from: Brown, Amy. *Understanding food: Principles and preparation*. Cengage Learning. 2010.

Binder information from: Vaclavik, Vickie A, Christian, Elizabeth W, & Christian, Elizabeth W. *Essentials of food science*. Vol. 42: Springer. 2008.

Case 6: Learning in the Garden

Sun image from: <http://free.clipartof.com/details/5-Free-Summer-Clipart-Illustration-Of-A-Happy-Smiling-Sun>. Accessed on March 2, 2014.

Watering can image from: Bret-Mar Landscape, Inc. <http://bretmarlandscape.com/proper-watering-techniques/>. Accessed on March 2, 2014.

CO2 image from: Anne of Carversville. <http://www.anneofcarversville.com/fp/global-carbon-emissions-drop-far-less-than-predicted-in-econ.html>. Accessed on March 2, 2014.

Case 7: Gardening in the Classroom

Soil Test Demonstration adapted from Garden Lessons: Soil Exploration of Growing Minds which is a program of Appalachian Sustainable Agriculture Project (ASAP). <http://growing-minds.org/lesson-plans/soil-exploration/>. Accessed on March 2, 2014.

Seed image from: Colorado State University Extension, Plant Structures Seeds. <http://www.ext.colostate.edu/mg/Gardennotes/137.html>. Accessed on March 2, 2014.

References (continued)

Bean cartoon image from: A little Corner for Memories, Crafts, and Other Random Projects. http://thegreysheep.blogspot.com/2010_03_01_archive.html. Accessed on March 2, 2014.

Case 8: Cooking to Eat More Plants

Wheat Berry Salad adapted from The Food TV Network's Healthy Appetite with Ellie Krieger. <http://www.foodnetwork.com/recipes/ellie-krieger/wheat-berry-salad-recipe2.html>. Accessed March 2, 2014

Senses information from: Delwiche, Jeannine. "The impact of perceptual interactions on perceived flavor." *Food Quality and Preference* Vol. 15 (2004): 137-146.

Senses information from: "Human Physiology/Senses." Wikibooks, The Free Textbook Project. http://en.wikibooks.org/w/index.php?title=Human_Physiology/Senses&oldid=2612844. Accessed on March 2, 2014.

Emulsions information from: Crosby, G., Newhouse, M., & Burgoyne, J. *The Science of Good Cooking: Master 50 Simple Concepts to Enjoy a Lifetime of Success in the Kitchen*. America's Test Kitchen. 2012.

Emulsions information from: Dornenburg, A., & Page, K. "Emulsions." Food information. <http://www.ugcs.caltech.edu/~sayyid/culinary/dlist.cgi?food=emulsions>. Accessed on March 2, 2014.

Case 9: Portion Distortion

Used to develop Portion Distortion teacher note: Portion Distortion! Do You Know How Food Has Changed for the Past 20 Years. National Institute of Health. <http://www.nhlbi.nih.gov/health/public/heart/obesity/wecan/portion/index.htm>. Accessed on March 2012.

Used to develop Portion Distortion teacher note: Overweight and Obesity Statistics. (Updated 2012). National Institute of Health. <http://www.pdfdownload.org/pdf2html/pdf2html.php?url=http%3A%2F%2Fwin.niddk.nih.gov%2Fpublications%2FFPDFs%2Fstat904z.pdf&images=yes>. Accessed on March 2, 2014.

Used to develop Portion Distortion teacher note: Flegal KM, Carroll MD, Kit BK, Ogden CL. "Prevalence of obesity and trends in the distribution of body mass index among US adults." *Journal of the American Medical Association*. 2012; 307(5):491–97. <http://jama.ama-assn.org/content/307/5/491>. Accessed on March 2, 2014.

Used to develop Portion Distortion teacher note: Rolls BJ, Morris EL, Roe LS. "Portion size of food affects energy intake in normal-weight and overweight men and women." *American Journal of Clinical Nutrition* Vol. 76 (2002): 1207-1213.

Used to develop Portion Distortion teacher note: Wansink B, Junyong, K. "Bad Popcorn in Big Buckets: Portion Size Can Influence Intake as Much as Taste." *Journal of Nutrition Education and Behavior* Vol. 37(5). (2005): 242-245.

Super Size Me. Dir. Morgan Spurlock. Kathbur Pictures, The Con, 2004. Film.

Case 10: Processed Food Overload

Increased Soda Size image from: When Did Sodas Get So Big? It started during the Great Depression. http://www.slate.com/articles/news_and_politics/explainer/2012/09/new_york_city_soda_ban_when_did_soft_drinks_get_so_big_in_the_first_place_.html. Accessed on March 2, 2014.

Nose Knows Best adapted from Cornell University Food and Brand Lab 'Nose Knows Best' activity. <http://foodpsychology.cornell.edu/>. Accessed on March 2, 2014.

References (continued)

Hey Good Lookin! adapted from Cornell University Food and Brand Lab 'Hey Good Lookin' activity. <http://foodpsychology.cornell.edu/>. Accessed on March 2, 2014.

Food Marketing Techniques adapted from Nourish Curriculum 'Analyzing Food Ads' activity. <http://www.nourishlife.org/teach/curriculum/>. Accessed on March 2, 2014.

Used to develop Advertising Techniques That Target Youth: Chandon, P., Wansink, B. "Does food marketing need to make us fat? A review and solutions." *Nutrition Reviews*. Vol. 70(10). (2012): 571-593.

Used to develop Advertising Techniques That Target Youth: Lebowitz, J., Rosch, J.T., Ramirez, E., Brill, J., Ohlhausen, M. "A Review of Marketing to Children and Adolescents." The Federal Trade Commission. (2012). <http://www.ftc.gov/sites/default/files/documents/reports/review-food-marketing-children-and-adolescents-follow-report/121221foodmarketingreport.pdf>. Accessed on March 2, 2014.

Used to develop Advertising Techniques That Target Youth: Food Marketing to Children. Center for Science in the Public Interest. http://www.cspinet.org/new/pdf/food_marketing_to_children.pdf. Accessed on March 2, 2014.

Case 11: Finding Balance

Finding Balance activity adapted from Teachers College Columbia University Choice, Control & Change book of the Linking Food and the Environment LIFE curriculum series.

Used to develop Finding Balance activity: Environmental Barriers to Physical Activity. Harvard School of Public Health. <http://www.hsph.harvard.edu/obesity-prevention-source/obesity-causes/physical-activity-environment>. Accessed on March 2, 2014.

Used to develop Finding Balance activity: Youth Physical Activity Guidelines Toolkit. Center for Disease Control. (2013). <http://www.cdc.gov/HealthyYouth/physicalactivity/guidelines.htm>. Accessed in March 2, 2014.

Case 12: Cooking to Eat Whole Foods

Preservation information from: Rahman, S. *Handbook of Food Preservation, Second Edition*. Taylor & Francis. 2007.

Aromatics information from: Delwiche, Jeannine. "The impact of perceptual interactions on perceived flavor." *Food Quality and Preference*, Vol. 15(2). (2004):137-146.

Aromatics information from: "Human Physiology/Senses." Wikibooks, The Free Textbook Project. http://en.wikibooks.org/w/index.php?title=Human_Physiology/Senses&oldid=2612844. Accessed on March 2, 2014.

Aromatics information from: Barrett, Mel. "How to Create Flavour Part 2: Aroma." Wholesome Food Association. 21 July 2011. <http://www.wholesome-food.org/2011/07/21/how-to-create-flavour-part-2-aroma/>. Accessed on March 2, 2014.

Case 13: Farmers Market Exploration

Farm Graph from: Small Farm Fresh. <http://www.smallfarmfresh.com/news/small-farm-fresh-launches>, accessed on March 3, 2014.

Case 14: Marketville

Marketville activity adapted from Umoja Community Builders Program 'Marketville' activity. <http://www.umojablogspot.com/>, <http://www.teachersforjustice.org/2009/01/curriculum-food-access-food-justice.html>. Accessed on March 2, 2014.

References (continued)

All Marketville photos from various online sources.

Case 15: Cooking to Eat Local

Protein information from: Ophardt, Charles E. "Denaturation Protein." Virtual ChemBook. Elmhurst College. 2003
<http://www.elmhurst.edu/~chm/vchembook/568denaturation.html>. Accessed on March 2, 2014.

Protein information from: "Eggsemplary Coagulation." American Egg Board. <http://www.aeb.org/food-manufacturers/egg-product-functionality/coagulation>. Accessed on March 2, 2014.

Protein information from: Pots, Janine. "Coagulation and Denaturation." Functional Foods Unit. Wikispaces. 28 May 2010. <http://functionalfoodsunit.wikispaces.com/Coagulation+and+Denaturation>. Accessed on March 2, 2014.

Case 16: Advertising Healthy Habits

no references

Case 17: Cooking for Change

Cooking methods information from: Wong, Peter, Ioannis Miaoulis, and Haruna Tada. "Gourmet Engineering Lecture Notes Chapters 1 & 2." EN43ME Fall 2002. 2002. Tufts University. 28 Feb. 2014. http://www.tufts.edu/as/tampl/en43/lecture_notes/notes.html. Accessed on March 2, 2014.

Cooking methods information from: Emulsions information from: Crosby, G., Newhouse, M., & Burgoyne, J. *The Science of Good Cooking: Master 50 Simple Concepts to Enjoy a Lifetime of Success in the Kitchen*. America's Test Kitchen. 2012.

Foams information from: "Eggstraordinary Aeration" American Egg Board. <http://www.aeb.org/food-manufacturers/egg-product-functionality/aeration>. Accessed on March 2, 2014.

Foams information from: Campbell, Grant M., & Mougeot, Estelle. "Creation and characterisation of aerated food products." *Trends in Food Science & Technology*. Vol. 10(9). (1999): 283-296. [http://dx.doi.org/10.1016/S0924-2244\(00\)00008-X](http://dx.doi.org/10.1016/S0924-2244(00)00008-X). Accessed on March 2, 2014.

Optional Cases

Seasonality Wheel activity adapted from Nourish Curriculum 'Activity 2: Seasonal, Local Foods' activity. <http://www.nourishlife.org/teach/curriculum/activity-2-seasonal-local-foods/>. Accessed on March 2, 2014.

Additional

All photos that are not referenced above were purchased from 123rf.com.

