

# *Seed to Table*



a secondary experiential education  
agriculture and culinary arts curriculum

## The Seed to Table Curriculum was developed by



Goodman Community Center is located in Madison, WI. GCC strengthens the lives of the people in its community by offering a diverse array of programs and resources for people of all ages. The center includes a teen run café, a fitness center and gym, art rooms, a large food pantry, community meals, preschool, and teen center.

[goodmancenter.org](http://goodmancenter.org)



Community GroundWorks is an educational organization in Madison, WI. A 5-acre CSA farm, award winning youth gardening programs, a community garden and a natural areas restoration program connect people to nature and growing food.

[communitygroundworks.org](http://communitygroundworks.org)



**Madison East High School**

East High School is a public school with a diverse student body serving Madison, WI. Students and teachers strive for excellence while engaging in innovative curriculum.

[eastweb.madison.k12.wi.us](http://eastweb.madison.k12.wi.us)



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# Seed to Table

## Table of Contents

Introduction.....	6
<b>Part One: In the Field</b>	
<b>Unit 1: History of Agriculture</b>	
Local Foods of Wisconsin .....	9
Geographic Origins of What You Eat .....	17
Historical Overview of Agriculture .....	20
Organic vs. Conventional Farming .....	23
Grow Your Own Food.....	29
Who Grows Our Food? .....	31
So You Want to Be a Farmer? .....	35
<b>Unit 2: Food Systems</b>	
From Farm To Table: Understanding Food Systems.....	39
Ecosystems & Agroecosystems .....	43
Organic Farming Business Structures – Case Study: Organic Valley.....	47
<b>Unit 3: Local Foods</b>	
Eating with the Seasons.....	51
A Locavore Foodshed.....	56
Exploring Local Farms in WI.....	60
Edible Plant Parts.....	62
Exploring Your Local Grocery Store.....	67
<b>Unit 4: Farm Planning</b>	
Designing Your Garden.....	73
How Are These Crops Planted? .....	76
Creating a Planting Schedule.....	78
What is a Seed? .....	81
How to Start Seeds.....	84
Temperature Readings in Greenhouse.....	88
Tracking Germination.....	91
<b>Unit 5: Planting and Harvesting</b>	
Spring Cultural Celebrations.....	98
Fall Harvest Cultural Celebrations.....	102
Spring Gardening Topics .....	107

Direct Seeding and Transplanting.....	110
Harvesting Techniques.....	114
Water Needs of Crops.....	120
Nutrient Cycle: What Plants Need.....	123
Compost MacroInvertebrates.....	129
Compost, Recycling and Trash.....	132

### **Unit 6: Saving Food**

Food Preservation.....	146
Growing Garlic.....	155

### **Unit 7: Veggie of the Month**

Veggie of the Month: Beet.....	159
Veggie of the Month: Carrot.....	161
Veggie of the Month: Potato.....	163
Veggie of the Month: Rhubarb.....	165
Veggie of the Month: Pepper.....	167
Veggie of the Month: Winter Squash.....	169
Veggie of the Month: Template.....	171

## **Part Two: In the Kitchen**

### **Unit 1: Introduction to “In the Kitchen”**

Food Rules.....	181
Where to Find Food.....	187
Omnivore's Dilemma.....	193
Food Security.....	198
Fair Trade.....	202
Cultural Cooking.....	207
Food Entertainment.....	210
Food Allergies.....	214
Vegetarianism.....	221
Restaurant Review.....	227

### **Unit 2: The Ins and Outs of Preparing Meals**

Balanced Meal (protein, carbohydrate, vegetable).....	233
Recipe (Read, Adapt, Create).....	239
Recipe Conversion.....	253
Reading Ingredient Labels.....	261
Safe Knife Handling Skills.....	267
Salads.....	271
Soups.....	279

Entrées.....	290
Side Dishes.....	294
Rice.....	297
Pasta.....	301
Desserts.....	306
Iron Works Chef: Cooking Competition.....	310

**Unit 3: Learning to Work as a Culinary Arts Professional**

Meet a Chef .....	317
Dress for Success.....	322
On Time to Work.....	327
Customer Service.....	332
Working with the Boss.....	336
Tips.....	342
Dishwashing.....	347
Catering.....	352

**Unit 4: Science of Cooking**

Got Milk.....	362
Eggs.....	372
Edible Parts of an Animal.....	386
Salt.....	390
Fruits.....	397
Yeast and Other Leaveners.....	401
Sprouts.....	406

<b>Acknowledgements.....</b>	<b>412</b>
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# Introduction



## The Seed to Table Curriculum

The Seed to Table curriculum is a collaborative project between three organizations in Madison, WI - Community GroundWorks, East High School and Goodman Community Center. This experiential curriculum teaches youth valuable employment skills while they learn the life cycle of plants, from seed to table.

By cultivating the natural connection between agriculture education and culinary arts classes, this curriculum makes a clear link between growing, cooking, and eating food. The lessons are multidisciplinary, focusing on science concepts while incorporating English, social studies, mathematics, and art. The lessons included in this curriculum feature a range of hands-on activities, many of which take place in the field and the kitchen. The classroom-based activities serve as

introductions, extensions, and reviews of material learned by working in the agricultural or culinary settings.

Seed to Table can be used as a whole curriculum or as individual lessons. Even though this was created for a class with a farm site and a commercial kitchen, many of the lessons can be adapted for use in smaller gardens or kitchens with less specialized equipment. In addition, while the lessons are written for high school-aged youth, the background information and activities can be easily modified for use with younger students. We invite you to use and adapt the curriculum to best fit your needs.

## In The Field



The East High Youth Farm serves as our Seed to Table field site. The Youth Farm is an inclusive, collaborative project that engages a diverse population of students in a hands-on science and a vocational program focused on sustainable agriculture and service learning. Youth are actively involved in the entire process of running a small-scale organic urban farm - from raising seedlings in the East High School greenhouse to harvesting produce at the ¼ acre East High Youth Farm and packing the food for delivery to the Goodman Community Center's Food Pantry. Youth farmers strengthen food security in the community

by providing fresh vegetables and volunteer hours to the food pantry, thereby building relationships with pantry consumers directly. During the school year, students work at the farm, in the greenhouse, and in the classroom to explore a variety of topics focusing on small scale urban agriculture. In the summer, youth farmers work three days a week planting, tending, harvesting, washing and packing the produce for delivery. At the end of their experience at the farm, students have acquired the skills to move into urban agriculture, landscaping, plant nursery, and environmental education jobs.

## In the Kitchen



At the Goodman Community Center, youth workers prepare food for community meals, as well as for the Iron Works Café and Working Class Catering. Students involved with these programs learn valuable life and employment skills.

Students prepare over 200 meals each day for senior citizens and preschoolers. Youth staff the Iron Works Café—a coffee shop, bakery and lunch café that is open to the public. The students also run the Working Class Catering operation which provides meals to conferences and weddings that are hosted at the community center. These vocational opportunities

teach students safe sanitation skills, meal planning, culinary arts, and customer service.

In addition to on the job training, students are instructed in issues surrounding food. These include food security, local and seasonal eating, and exploring different cultures' food choices. The students are also able to earn credit towards a high school diploma while discovering the science involved with cooking.

After six months of working in the culinary track at Goodman, students are prepared to move on to other employers in the food service industry or to pursue further education in a culinary arts program.

## **Unit 1: History of Agriculture**

In this section students discover where food comes from and how it is grown in a general sense. Lessons compare different types of farming and enable students to meet different farmers.

Local Foods of Wisconsin

Geographic Origins of What You Eat

Historical Overview of Agriculture

Organic vs. Conventional Farming

Grow Your Own Food

Who Grows Our Food?

So You Want to Be a Farmer?

**Lesson Plan:** Local Foods of Wisconsin

**Unit:** History of Agriculture

**Objectives:**

- Students will learn the definition of local foods
- Students will learn the health and environmental benefits of local food
- Students will learn how to find and purchase local foods.
- Students will compare locally grown food with foods produced in other parts of the country/world.
- Students will prepare a meal with locally based foods.

**Modified Curriculum Objectives:**

**Materials:** Map with scale, compass, internet access

**Time:** 45 minutes overview, 2 hours creation of local foods map, 45 minutes comparing eggs

**Vocabulary:** local, community supported agriculture, food processor

**Background Information:**

One hundred years ago almost all food was local. Much of the food people ate was grown on their own property, that of the neighbors, or within 50 miles of their house. Local food includes vegetables grown in a garden or nearby farm, animals raised for meat or dairy, animals hunted for meat, and foods collected from native areas including berries, nuts, and mushrooms. Often the definition of local food is food that is grown within a certain distance measured in concentric circles from the location where the food will be eaten. The distance is often 50, 100 or 150 miles depending on how strict you want your definition and the availability of food grown near your home. Another definition that is sometimes used states if the food is grown in the same state as it is eaten, it is considered local.

There are certain foods/ingredients that cannot be grown in certain climates. While some local food advocates encourage going without these foods, others recommend finding a local food processor that purchases fair trade ingredients. These types of food include coffee, tea, chocolate, certain spices, nuts, and fruits.

While it was originally less expensive to buy local produce, improvements in transportation, subsidies of certain food crops and ignoring environmental costs associated with large scale farming operations have created a price advantage for some non-local food producers. While locally grown food often commands a higher price, it provides farmers who grow the food with additional income. When selling processed foods the farmer only receives 20 percent of the revenue. However, when food is purchased directly from farmers, they receive all of the profit.

There are several ways to find locally produced foods. The first is to grow it yourself in a backyard garden or community garden plot. Another is to participate in a Community Supported Agriculture farm where individuals pay for a share of a farm's produce. The customer pays for the food ahead of time allowing the farmer access to money for seeds and other expenses. Then, depending on the harvest the customer receives vegetables throughout the summer. Local farms also sell produce at farmer's markets, roadside stands, or directly to grocery stores and restaurants.

In addition to vegetables there are also local food options for meat, eggs, milk, and cheese. There is also local production of bread, beer, or liquor that may or may not use local ingredients. In addition, local processors of products like chocolate and coffee, which cannot be grown in Wisconsin, allows more revenue to stay in the community. In addition these processors have deeper background knowledge in their products and are available to share that information with consumers.

**Teacher Instruction:**

1. Read "High Cost of Cheap Food" by Institute for Agriculture and Trade Policy
2. Read "Why Eat Locally and Sustainably Grown Food?" By REAP Food Group

**Student Instruction:**

1. Draw circles on a map that show what is included in 50 miles, 100 miles and 150 miles from Madison or other city. Use a compass and different color pencil for each circle.
2. Place farms or other sources of food on this map.
3. Identify what ingredients from a favorite meal can be found locally.
4. Create a chart that compares and contrasts locally produced food with non-local food.
5. Go to this website to find local foods around Madison  
<http://www.chickmappers.com/100miledietmap/>
6. Create a menu using foods found locally.
7. For other areas of the country try <http://www.localharvest.org/>.
8. Purchase, prepare and eat a meal made with all locally grown foods
9. Compare eggs. Conventional, Organic and Local. Determine the costs per egg. Make observations about the color, size, and weight of each egg both inside and out. Using the same method for each type of egg cook the egg and compare the taste. This can be done as a blind taste test.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What environmental costs are associated with non-local agriculture?
2. Local is not always organic, and what are the implications of local, nonorganic foods compared to global organic foods?
3. What is the majority of corn/soybeans produced in Wisconsin used for?

4. Determine if conventional farmers are making enough money to continue farming? How much does it cost to run a farm and a house? How much profit do they make? What is a subsidy? Why do farmers not a lot of money by growing corn?
5. How can consumers find local foods?
6. What types of food can you not find produced locally?
7. What types of food are surprising to find produced locally?
8. Identify the benefits associated with local foods.
9. Should restaurants that use local foods market that to customers? Why and How?

### **Extensions:**

Lesson Plan: Local Foodshed. Visit a Farmer's Market. Compare prices and taste of food purchased locally versus commercially. Visit farms that produce a variety of food products. Compare duck eggs and/or Ostrich eggs to chicken. Visit a cheese producer. Read *Animal, Vegetable, Miracle* by Barbara Kingsolver, *The Omnivore's Dilemma* by Michael Pollan, or *The 100-Mile Diet: A Year of Local Eating* (Canada & Australia Edition), *Plenty: Eating Locally on the 100-Mile Diet* (US Edition) by Smith and MacKinnon. Watch films "King Corn" or "Food, Inc."

### **Resources:**

<http://wisconsinlocalfood.com/> Wisconsin local food resources.

<http://www.localharvest.org/> Nationwide listing enter you zip code to find local food choices.

<http://www.reapfoodgroup.org/> Research, Education, Action, and Policy on Food located in Madison Wisconsin

<http://www.chickmappers.com/100miledietmap/> GIS Map-Interactive with local food options listed for Madison, Wisconsin.

## Eggs Comparison

Type	Conventional	Organic	Local
Cost per Dozen			
Cost per Egg			
Color of Shell			
Weight of Egg			
Height of Egg			
Color of Yolk			
Size of Yolk			
Nutritional Content			
Taste			
Other			

## **HIGH COST OF CHEAP FOOD (By: Institute for Agriculture and Trade Policy)**

This year American consumers will spend 10% of their household disposable income on food – a lower percentage than any country in the world. As Americans, we are told that cheap and abundant food is the backbone of a thriving economy. The fact is that cheap food often comes at a cost that is often not reflected in the supermarket price tag. Farming communities struggle. The environment suffers. And our overall public health gets compromised when price takes precedent over quality and safety.

### **Why is U.S. food so cheap?**

We can attribute much of our cheap food to the large expansion of industrial agriculture over the last 50 years – a system that substitutes fossil fuel energy, chemicals and capital for labor and management. Larger farms operate on lower labor costs and are able to take advantage of large-scale economies that produce more for less. The U.S. government offers many incentives, such as tax breaks and subsidies, which favor large farms with little diversity. As large-scale agriculture has expanded, so has concentration and consolidation within the food industry. In the Midwest, four firms now control the processing of a variety of farm products (corn, soybeans, beef, etc) that thousands of farmers produce.<sup>1</sup> Because agribusiness and food retailers encourage farmers to produce a limited range of crops to simplify their marketing and distribution operations, different regions of the U.S. specialize in a limited number of crops and livestock. As a result, the majority of food sold in the typical grocery, convenience and super-store must be shipped to reach market. A 2001 study found that the average Midwestern meal travels 1,518 miles to get from producer to consumer.<sup>2</sup>

### **The Social/Economic Costs**

Every year the U.S. loses thousands of farmer jobs in a food system in which they are not paid an adequate price for what they produce. Between 1993 and 1997 the number of mid-sized family farms dropped by 74,440. Farmers have been urged to “get big or get out.” Now just 2% of U.S. farms produce 50% of agricultural product sales.<sup>3</sup> Although commodity prices (price paid to farmers) for corn and soybeans, adjusting for inflation, are considerably lower than in the 1970s, the price of food has continued to rise with inflation. From 1989 to 1999 consumer expenditures for farm foods rose by \$199 billion, 92% of which can be attributed to the marketing costs of agribusiness and food companies. These expenses include transportation, packaging, labor and inputs used to sell food products. Meanwhile, the farmer only gets 20 cents of each dollar spent on food, down from 41 cents back in 1950.<sup>4</sup> Unable to capture more of the food dollar, farmers are stuck in a vicious cycle to produce high volumes of cheap commodities with a low profit margin. When we lose farmers and farm families we also lose farmland. Encroaching urban areas drive up the real estate value of farms located on the fringe. More than 6 million acres of rural land, an area the size of Maryland, were developed between 1992 and 1997, often on the nation’s best farmland.<sup>5</sup> With the loss of food/fiber producing capabilities the country also loses wildlife habitat and the aesthetic qualities of America’s rural countryside – all costs that are unquantifiable and irreplaceable.

## **Environmental Costs**

The corn and soybean crops that dominate the Midwest often cause soil loss and impair water quality through the leaching and runoff of fertilizers and pesticides. The ecosystem in the Gulf of Mexico is ailing from a growing zone of low oxygen caused by excessive nitrogen from fertilizers on cropland upstream. This phenomenon, a hypoxic zone the size of New Jersey, affects the communities and fishermen that live by and work on the Gulf of Mexico.<sup>6</sup> Eighty percent of all the corn grown in the U. S. goes to feed livestock, poultry and fish. Access to inexpensive corn and soybeans has facilitated the rapid growth of large-scale confined animal feeding operations (CAFOs) that feed a domestic and international appetite for cheap meat. The U.S. protein industry (swine, poultry, beef and dairy) generates an estimated 2 trillion pounds of manure a year<sup>7</sup> and can have significant impacts on the environment; threatening neighboring waterways and air quality with potentially noxious fumes.<sup>8</sup>

## **INSTITUTE FOR AGRICULTURE & TRADE POLICY**

Billions of gallons of petroleum fuel are required annually for the trucks that transport food across the United States.<sup>9</sup> This does not include fuel used by trains, barges or planes that also transport food products. U.S. taxpayers pay the price through subsidies to our roads and highways, more dependence on imported oil and increased fossil fuel emissions that contribute to environmental problems like smog and climate change.

## **Public Health Costs**

A number of emerging public health concerns have resulted from the production and processing of food that is increasingly concentrated and automated. Many of the country's CAFOs add antibiotics to livestock feed. An estimated 70% of all antibiotics in the U.S. go into healthy pigs, poultry and cattle to increase animal weight and to minimize disease risks associated with the large numbers of animals within one complex.<sup>10</sup> A growing number of studies show that routine use of antibiotics can encourage the growth of antibiotic resistant bacteria which can make treating human bacterial diseases more difficult and potentially life threatening. Today's centralized systems for meat production and processing are more susceptible to large-scale contamination by food borne pathogens. Food recalls are increasing. The largest food recall in U.S. history took place in October 2002, when the country's second largest poultry producer recalled 27.4 million pounds of fresh and frozen poultry products after an outbreak of listeriosis killed 20 people and sickened 120 others.<sup>11</sup> While cheap food is plentiful, it is not necessarily healthy – over half of U.S. citizens are considered overweight.<sup>12</sup> Currently, the United States is plagued with an epidemic of chronic diseases associated with over-consumption (obesity, diabetes, cardiovascular disease, and certain cancers) that health professionals attribute to both a decline in physical activity and an abundance of products high in animal fat and refined carbohydrates and low in fiber. Additionally, cheap food has not eliminated hunger. Using U.S. Department of Agriculture's conservative definitions, 5.6 million adults and 2.7 million children in the US are hungry.<sup>13</sup>

## Winners and Losers in the Cheap Food Game

Cheap food, rather than fostering a food system that benefits the general American public, has promoted an increasingly industrialized agriculture. Expanding national and multinational food companies that purchase cheap commodities continue to increase their profits. Meanwhile, farmers and rural communities in the United States do not benefit. A health care system, taxed with an epidemic of diet related diseases, does not benefit. And the environment certainly does not benefit. But there are other ways to fill America's dinner plate. Regional food systems that support the local production and processing of farm products grown in environmentally sensible ways are emerging throughout the country. These systems take out the "middle men" and put the profits back into the pockets of the farmers and communities they support. Farmers markets, Community Supported Agriculture farms, restaurants featuring locally produced foods, and "Buy Local" campaigns give consumers the choice to buy food that is not only affordable, but benefit farmers, the natural environment and local economies.

1 Hendrickson, M. and W. Heffernon (2002). "Concentration of Agricultural Markets," Department of Rural Sociology - University of Missouri. February.

2 R. Pirog et al (2001).

3 USDA (1997). Census of Agriculture

4 USDA Economic Research Service

5 American Farmland Trust (2002). "Farming on the Edge." Online at:

[http://www.farmland.org/farmingontheedge/major\\_pr\\_natl.htm](http://www.farmland.org/farmingontheedge/major_pr_natl.htm)

6 D.A. Goolsby and W.A. Battaglin (2000). "Nitrogen in the Mississippi Basin-Estimating Sources and Predicting Flux to the Gulf of Mexico," USGS Fact Sheet, 135-00. December. Online at:

<http://ks.water.usgs.gov/Kansas/pubs/fact-sheets/fs.135-00.html>

7 Environmental Defense (2002). "Scorecard - Animal Waste from Factory Farms." Online at:

<http://www.scorecard.org/>

8 USEPA (2001). "Environmental Assessment of Proposed Revisions to the National Pollutant Discharge Elimination System Regulation and the Effluent Guidelines for Concentrated Animal Feeding Operations," EPA-81-B-01-001. January.

9 Ibid.

10 Mellon M. et al. (2001). "Hogging It: Estimates of Antimicrobial Abuse in Livestock," Union of Concerned Scientists. Cambridge, MA.

11 Abboud, L. (2002). "Fatal Strain of Bacteria Traced To Pilgrim's Pride Meat Plant," Wall Street Journal, October 16.

12 Center for Disease Control (2002). "U.S. Obesity Trends from 1985 to 2000." Online at:

[www.cdc.gov/](http://www.cdc.gov/)

13 <http://www.ers.usda.gov/briefing/foodsecurity/>

**For more information on IATP's work on cheap food and related topics, go to  
[www.agobservatory.org](http://www.agobservatory.org)**

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870-0453**

## **Why Eat Locally and Sustainably Grown Food?**

### **By REAP Food Group**

Because What We Eat Matters. How our food is grown, processed, and packaged really does matter. Our food choices influence our health, the quality of our environment, jobs in our community, and the culture and diversity of our society.

### **Buying locally & sustainably grown food is good for YOU.**

Food tastes better and is more nutritious when it's fresh. Foods grown using organic farming practices come to your table with no harmful pesticides. And in these times, when obesity and diet related illnesses are on the rise, replacing heavily processed foods with whole fresh produce will improve your health.

### **Buying locally & sustainably grown food is good for our COMMUNITY.**

Keeping our local farmers and producers in business supports our local economy. Dollars spent close to home tend to stay close to home. Our local producers understand our community and work to provide nutritious affordable food for all our citizens. The more we feel connected to the people who produce what we eat, the better we preserve our regional food heritage. Rural and urban-- we're all connected.

### **Buying locally & sustainably food is good for FARMERS**

The current national food system is dominated by very few large corporations which are forcing farmers to accept lower prices, grow only "travel-tolerant" varieties, grow bigger, use more chemical inputs, or leave the farm altogether. When farmers sell directly to their neighbors, fewer middlemen cut into their profits. Farmers can afford to stay on their land producing an abundance and variety of food while being good stewards of the land.

### **Buying locally & sustainably food is good for the ENVIRONMENT.**

Most of the food we eat travels an average of 1,500 miles from the farm to our table. By reducing the travel distance our food takes, we save energy and reduce carbon dioxide emissions that likely contribute to global warming. By buying whole local foods, we also reduce packaging, further saving energy and resources. And sustainable farming practices protect the quality of our water and soil, while preserving green space for healthy native habitats.

<http://www.reapfoodgroup.org/Why-Buy-Local/why-buy-local.html>

## **Lesson Plan:** Geographic Origins of What You Eat

### **Unit:** History of Agriculture

#### **Objectives:**

- Students will create a map of the world and label the countries and climate zones
- Students will research the origins of fruits and vegetables then place them in specific countries based on their research findings
- Students will learn about the different climate zones and seasons around the world
- Students will learn how food is transported over long distances

**Materials:** Map of world, overhead projector, large piece of white paper, magazines and catalogs, colored paper, encyclopedia, Internet access

**Time:** 45min/day 3 days

**Vocabulary:** Origin, Fruit, Vegetable, Northern and Southern Hemisphere, fair trade, equator, temperate, tropical

#### **Background Information:**

In our global economy food is grown everywhere. It is then transported to where it is sold and then eaten. While 100 years ago a person would only eat food that was grown 50 miles from his/her house we now have a far wider range of food available. However, there are costs associated with this global food market.

One such cost is in transporting the food. Food can be shipped in boats, trains, trucks, planes or a combination of these methods. Some foods need refrigeration during transit which requires extra energy to keep the food cool during transport. Often food is picked before it is ripe so that it will not spoil in transport. In many cases the food has had chemicals applied to it either to slow the aging process or at a later point to speed the ripening process when it arrives at the grocery store.

In addition, labor laws in other parts of the world are often less strict than in the United States and Western Europe. In some countries the minimum wage is very low and workers safety is not protected by adequate regulations. Some other countries also have less stringent environmental laws allowing for the use of more chemicals and more erosion of the soil in agricultural settings. There are organizations fighting against these issues by labeling items as fair trade. Fair Trade brings more money to the producer and insures that certain worker safety and environmental regulations are followed.

There are certain foods that can only be grown in more temperate or tropical climates so if you want to eat those in Wisconsin you will need to import them. There are other foods that, while they will grow in Wisconsin, they do not grow in Wisconsin year round. If you have not made preparations to save these foods for the off season you will need to import them from other producers.

Because of the tilt of the Earth, the rotation of Earth, the Earth's orbit around the Sun and the thickness of the atmosphere there are differing seasons on the Earth. The season will vary depending on whether

you are in the Northern or Southern Hemisphere. The closer a location is to the equator the less variability in the seasonal temperatures there is. Simply put, the seasons are reversed in the Northern and Southern Hemispheres: when it is winter in one, it is summer in the other.

**Teacher Instruction:**

1. Project the map of the world onto a large piece of paper. Group or pair students and assign them a continent to trace. Have students trace the continents and countries.
2. Discuss with students where different foods come from and how those foods come to the local grocery store.

**Student Instruction:**

1. On the map label the equator, tropics of cancer and Capricorn, hemispheres, countries, and climate divides. Create a key for the map. See below.

	<b>Spring (green)</b>	<b>Summer (red)</b>	<b>Fall (yellow)</b>	<b>Winter (blue)</b>	<b>Native Origin (brown)</b>
<b>Northern Hemisphere</b>	March- June	June-August	September- November	December- February	
<b>Southern Hemisphere</b>	September- November	December- February	March-May	June-August	

2. Find and cut out pictures of vegetables and fruits in catalogs and magazines.
3. Determine where these foods are grown and what time of year (resources listed below):
  - Based on the time of year the vegetable or fruit will be placed on a background color (green, red, yellow, or blue)
  - Students will identify the native place for the fruit or vegetable to be grown and it will need a brown backing and placed in that area of the world.
4. Tape the picture of these foods onto the map.
5. Continue to add to the map throughout the course of the class.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What causes the different seasons?
2. Are there any foods grown in winter?
3. Why is there a difference in the months for each season based on hemispheres?
4. Why can some types of produce not grow in Wisconsin?
5. List several foods that cannot be grown in Wisconsin.
6. How does travel time/distance change harvest practices? If the food travels 16 hours to arrive in Wisconsin is it harvested the same time or way if it were delivered one hour away?
7. How far does food travel to come to Wisconsin? What is a food that travels the longest distance?

8. How does the food stay fresh during transport?
9. What are some environmental costs of having food travel such a long distance?

**Extensions:**

- Have a local meal. Create a meal in class using only local (100 miles) ingredients.
- Compare the difference in taste between a local food and the same food that has traveled across the world/country.
- Take a field trip to a local grocery store and give each student a list of 5 vegetables or fruits to identify. They will find the vegetable/fruit in the store, look at the tag, sticker, or container to identify where it is from and write the location down. After the field trip the students discuss what they found and pictures based on their findings can be created for the map of their findings.

**Resources:**

<http://www.foodtimeline.org/>

[http://en.wikipedia.org/wiki/List\\_of\\_food\\_origins](http://en.wikipedia.org/wiki/List_of_food_origins)

<http://www.nrdc.org/health/foodmiles/default.asp>

<http://online.sfsu.edu/~patters/culinary/pages/croporigins.html>

<http://marketnews.usda.gov/portal/fv> USDA website listing where fresh fruits and vegetables are produced. search able by food item.

<http://www.leopold.iastate.edu/resources/fruitveg/fruitveg.php> USDA site that allows students to search specific fruits or vegetables and see the country, amount produced, and time of year.

**Lesson Plan:** Historical Overview of Agriculture

**Unit:** History of Agriculture

**Objectives:**

- Students will understand the role geography played in the establishment of agricultural regions
- Students will understand what geographic and climatological factors create a favorable environment for agriculture
- Students will understand the regions in the United States devoted to farming and what they produce

**Modified Curriculum Objectives:**

- Students will understand that some regions are better than others for farming

**Materials:**

- Picture books: *By the Light of the Harvest Moon*, by Harriet Ziefert

**Time:** 75 minutes

**Vocabulary:** Shaded relief map, topographic map, USDA, arable, citrus

**Background Information on the Central Valley:**

The world is not equal when it comes to arable agricultural land. How have cultures decided where to farm? What climatological and geographic conditions made some areas better than others? This lesson looks specifically at the United States, but certainly could be expanded globally. Conversely, the lesson could zero in the conditions within a particular state or locality. The Central Valley in California is used here due to its significance in US agricultural production.

*General Background*

<http://geography.howstuffworks.com/united-states/geography-of-california2.htm>

The Central Valley is a 400-mile stretch of fertile land bordered by California's coastal range in the west and the Sierra Nevada Mountains to the east. It is home to many different regions each with its own issues and needs. It takes approximately 8 hours to drive the entire stretch of the valley.

Fruits are grown in many parts of California. Hardy fruits, including apples, pears, plums, apricots, cherries, and peaches, grow in the Central Valley and in the valleys of the coastal mountains. Most widely grown are peaches, of which California is the country's leading producer. In grape production as well, California is far ahead of the other states. By value, grapes are California's chief crop.

Near Los Angeles and in the southern part of the Central Valley, citrus orchards cover large areas. California produces about 80 per cent of all the lemons grown in the United States and ranks high in the production of oranges, grapefruit, and tangerines. Other semitropical fruits of southern California include figs, olives, dates, and avocados. Great quantities of nuts, particularly almonds and English walnuts, are grown in the Central Valley.

Many different kinds of winter and summer vegetables thrive in California. By tonnage the state normally accounts for more than half of the commercial vegetables grown in the United States; by value the state accounts for nearly half of the United States total. Among the chief vegetables are broccoli, carrots, cauliflower, celery, lettuce, onions, and tomatoes. The Central Valley, the Imperial Valley, and the Salinas Valley are major centers of production.

California was the first state to grow sugar beets successfully, and it remains a leading producer. Cotton is grown mainly in the San Joaquin Valley; normally, production is second only to that of Texas.

Wheat and barley are important California crops. Both are produced largely by dry-land methods, although some irrigation is practiced. Rice, grown entirely by irrigation, comes largely from the Sacramento Valley.

*A Statistical Tour of California's Great Central Valley*

<http://library.ca.gov/CRB/97/09/index.html>

### **Teacher/Student Instruction:**

Ask students:

1. Where does 25% of our nation's food come from? (The Central Valley in California)
2. Distribute/show topographic map of the Central Valley.
3. Ask students to "read" the map explaining the geographic features included in and surrounding the region.
4. Ask students to interpret the map. What features make the region particularly desirable for agriculture?
5. Have students look at a shaded relief map of the United States. Ask which regions look like they'd be good agricultural regions. Have students explain why. Ask students to predict which crops might grow well where and why? (Assess what they know about conditions for specific crops.)
6. Distribute Farm Resource Regions handout. What is grown where in the United States?
7. (Optional) Google Earth (<http://earth.google.com/>) is a powerful (and free) software/web tool that lets users see the earth's surface. Students are able to search for specific places and see its physical characteristics (i.e. urban or rural, agricultural etc.)

### **Questions:** (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)

1. Where is California's Central Valley? What is grown there? (Knowledge)
2. What conditions are necessary for specific crops to grow? (i.e. blueberries need acidic soil) (Comprehension)
3. What conditions make a region favorable for crop productions and where are those regions located in the United States? (Application and Synthesis)

## **Extensions:**

Correlating topography with the world's climate zones adds the climatological basis for selecting prime agriculture land.

1. Worldwide Climate Zones

[http://www.esrl.noaa.gov/gmd/education/lesson\\_plans/index.html](http://www.esrl.noaa.gov/gmd/education/lesson_plans/index.html) (Look for Module #9:

**Earth's Climate System** , in particular the lesson on World Climate Zones)

2. For more detailed zones, *Worldwide Climate Classification Zones*

<http://en.wikipedia.org/wiki/Climate>

Looking at the broader issues surrounding California's Central valley gives students an understanding of the pressures farmers and farm workers are facing in the region. NPR's report delves into development issues, pesticide use, and immigration in a 3-part radio series.

California's Central Valley: NPR Series Profiles the State's 'Backstage' Rural Breadbasket

[http://www.npr.org/programs/atc/features/2002/nov/central\\_valley/](http://www.npr.org/programs/atc/features/2002/nov/central_valley/)

## **Resources:**

1. Central Valley (CA) production data sheet. (<http://www.library.ca.gov/CRB/97/09/index.html>)
2. California Relief Map  
(<http://www.hort.purdue.edu/newcrop/cropmap/california/maps/CAgeo.jpg>)  
(<http://education.usgs.gov/california/resources.html>)
3. US Relief Map  
(<http://www.shadedrelief.com/physical/index.html>)
4. US Farming Regions Map: Economic Research Service  
([www.ers.usda.gov/Publications/aib760/aib-760.pdf](http://www.ers.usda.gov/Publications/aib760/aib-760.pdf))

**Lesson Plan:** Organic vs. Conventional Farming

**Unit:** History of Agriculture

**Objectives:**

- Students will learn the difference between organic and conventional foods.
- Students will compare organic and conventional foods in terms of cost, taste, environmental impacts, and social impacts.

**Materials:** Conventional and Organic foods to compare, prices of the foods, character cards.

**Time:** 45 minutes taste comparison, 30 minutes price comparison, 45-90 minutes character card debate.

**Vocabulary:** Conventional, Sustainable, Organic, Industrial, Fertilizer, Pesticide, Herbicide

**Background Information:**

Food is classified in two main categories based on how it is grown. These categories are referred to as conventional and organic. These terms are often misunderstood. Conventional farming methods refer to most large scale farming operations that rely heavily on chemical fertilizers and pesticides. While it is true that all food is “organic,” in terms of chemical makeup, the organic food movement focuses on using natural forms of fertilizers and pest controls.

Conventional farming is also referred to as industrial agriculture or factory farming. This is how most of the food is currently produced in the world. Food on conventional farms is typically one crop or species of animal put into a small space to maximize output. Money is spent on expensive manufactured equipment and costly chemical pesticides and fertilizers to increase yields. Conventional farming is somewhat of a misnomer because this type of farming has only been around for the last 100 years and has only been prevalent since World War II.

Organic farming, also known as natural farming, or sustainable agriculture has been around since the dawn of agriculture. It is typically, though not always, accomplished on smaller farms with more diversity of crops. Organic farms put more resources into labor and strategies regarding about how best to improve crops without using chemicals.

The main benefits of conventional farming include reduced cost, increased yield and a reduction in workforce. However, conventional farming often is a monoculture or one group of plants grown over a large area. This type of farming requires the use of fertilizers and pesticides to grow healthy crops. In addition the end product typically has to be transported long distances before it reaches the end consumer.

The main benefits of organic farming include less environmental degradation, higher pay for farmers, better land use, more diversity, less erosion, healthier animals, lower cost for fertilizers and pesticides, and cleaner water. While many organic farms are small farms that sell locally, there are also several large global organic producers that use only organic fertilizers and pesticides. These farms take advantage of economies of scale but typically do not have diverse crops, highly paid workers, or the ability to market all of their products locally.

The laws regarding what makes an organic farm in the United States are set by the US Department of Agriculture. These rules limit the use of certain pesticides and fertilizers, and require animals to have some access to grazing. However, there is a fee for certification which is the same for both small and large farms. This is one reason many small farmers selling at farmer's markets do not use the term "organic" and instead substitute "natural," "no chemicals used," or "herbicide free."

In addition to fruits and vegetables, meat can also be produced in either a conventional or an organic manner. Animals in the conventional setting are typically confined to feedlots or buildings where they are fed a diet consisting of corn. This setting usually causes more diseases than their organic counterparts and these animals are often injected with hormones and antibiotics to fight the effects of those diseases. In organic meat production, the animals can graze on land and find their own food at least some of the time. This method is often more labor intensive but produces animals more likely to be free of disease.

**Teacher Instruction:**

1. The first part of this lesson focuses on comparing organic to conventional produce. This includes observing the look and feel of the foods as well as the taste. Give each student an example of a conventional and an organic food to compare. In addition, students should compare the cost of the two types of food.
2. The second part of the lesson has students play the roles of different producers or consumers.

**Student Instruction:**

1. Make observations of the two fruits/vegetables in front of you. Compare the outside look and feel. Cut open the items smell them, taste them and write down all of your observations.
2. Compare the price of organic and conventional produce. Be sure to compare like quantities and similar items.
3. Read the character card you have been given. You need to formulate your position based on the information found on this card.
4. In character, your class will have a debate discussing different viewpoints of the organic farming debate.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. Create a list of reasons to use organic products in your cooking.
2. Create a list of reasons to use conventional products in your cooking.

3. Are there some products where you see more value in using organic versus conventional?
4. Compare the costs associated with organic and conventional foods. Be sure to include environmental and social costs (not just monetary costs).
5. What marketing strategies would you use if you decided to serve organic foods in a restaurant?

**Extensions:** Visit both organic and conventional agriculture settings, visit different stores to compare the prices and appearances of different food choices.

**Resources:**

<http://www.ams.usda.gov/AMSV1.0/nop> USDA-- National Organic Program

Item	Conventional		Organic	
	Size	Cost	Size	Cost
Apple				
Banana				
Orange				
Avocado				
Tomato				
Potato				
Onion				
Garlic				
Broccoli				
Beef				
Chicken				

Which foods cost more?

Why do you think that these foods cost more?

Discuss whether this price differential is or is not worth the additional cost.

## **Character Cards** (*cut apart and give one to each student or group of students*)

### **Organic Farmer**

I am a farmer who grows vegetables on about ten acres of rolling hills just outside of Madison, WI. I grow a wide diversity of vegetables for sale at local farmers' markets. During the season I spend 12 hours a day tending the land, weeding, harvesting, and selling my produce. I do not use any non-organic pesticides or fertilizers on my crops; however the fee for organic certification is cost prohibitive. I prefer to communicate my growing practices directly with the people who buy my food. I love growing beautiful vegetables that taste great and are healthy for both the land and people who eat them. Come and visit my farm.

### **Apple Producer**

I run an apple orchard in the Baraboo Hills. I sell a wide variety of types of apples. A few years ago I tried to produce some of my apples without pesticides. But the apples had black spots on them and even though I spent more money on workers to care for the trees, very few people wanted to pay more for apples with spots. I try to save money by limiting the amount of fertilizer and pesticides I apply to my crops, but I want to sell nice looking apples to my customers.

### **Produce Buyer Small Store**

I buy produce for a cooperatively run grocery store in Madison, WI. My customers want to support local farms. I try to find producers who have the food for a reasonable price. However, I often find that while I need 200 pounds of carrots a week, the producer may only have 100 pounds. That means I have to find another producer. Other times the farmer thought that an item would be ready but her field was flooded. I am interested in supporting local agriculture but I also need to have good looking produce on my shelves at all times of the year. It would be easier to just go to one company selling produce from all over the world to provide all the produce but I know my customers want local foods.

### **Restaurant Chef**

I am the chef at an upscale restaurant in Sun Prairie, WI. I prepare dishes using the most natural and interesting ingredients I can find. I provide meals that are not found at a typical restaurant or that you would not make for yourself at home. Because I buy all of the ingredients I use locally from small producers. I often shop the farmers' market early in the morning; in addition I will drive directly to different farms to find the food I want to serve my customers.

### **School Food Service Provider**

I organize the preparation of over 20,000 meals a day. I am given very little money to prepare all these meals and need meals that students will eat and can eat quickly. I do not have the time or the money to run around in search of a specific ingredient. I buy all the food from one large food supplier. I receive a discount because our purchase is so large each week.

## **Single Parent**

I want to provide the best most nutritious food for my children. However, I do not have a lot of time for shopping or food preparation. I want to go to one store that has everything I need that is inexpensive and quick to prepare.

## **Produce Buyer Large Store**

I buy all the produce for a large grocery store in Madison, WI. My customers are most concerned about price and I buy 1000 pounds of carrots each week. The majority of these are from my food supplier from a conventional farm; I also buy 100 pounds of organic carrots from the same provider and am able to sell these for more money. The quantities I deal with prevent me from being able to deal with local producers that may or may not have the produce I need on a given week. My company also has an arrangement with the food supplier that provides the same food to similar stores all over the country.

## **Conventional Farmer**

I grow corn and soybeans. Just like my father before me. I am up early and late driving the large tractors and combines that are worth more than my house. I care for my land and love being a farmer but it is hard to make a living selling to the corn buyers. My corn is used for animal feed, producing corn syrup for soft drinks and even making ethanol to run cars on. Every season I buy the newest products that will produce the greatest yield but it always seems that the price changes so rapidly and I do not know if I will be able to continue to farm this land. A developer just offered me a lot of money to sell my farm. I am not ready to sell now but when I retire I think this land will become a housing development.

## **CSA Buyer**

I buy my vegetables from a Community Supported Agriculture (CSA) farm. I pay for a share of vegetables in February and every week from June through September I go to pick up a box of produce from the local farm. My family and I enjoy the fresh produce and get to try vegetables we would probably have never purchased at the store. We also get to visit the farm several times a year to pick extra vegetables and to see where our food comes from and how it is grown.

**Lesson Plan:** Grow Your Own Food

**Unit:** History of Agriculture

**Objectives:**

- Students will understand their options for growing their own food in a range of scenarios from containers to gardens to rooftops

**Modified Curriculum Objectives:**

- To understand individual options for growing food

**Materials:**

- Picture books: City Green, Dyanne DiSalvo-Ryan

**Time:** 75 minutes

**Background Information:**

Growing food can take place in a range of spaces from containers on a porch to rooftops to 100-acre farms. Combining what grows in your region with what spaces are available, you and your students can identify their options for growing food.

Simple web searches on Google Images or Flickr or your local Extension Office for “growing food in small spaces” or “container gardening” or “rooftop gardens” will yield a bounty of photographs to share with your students. Contrast these with photos of larger farms

Other space options to consider: backyard plots, greenhouses, community gardens, leasing agricultural land, hoop houses, urban farms, or traditional rural farms.

**Teacher/Student Instruction:**

Ask students:

1. Which plants do they like to eat? Encourage them to think about fruits, vegetables, nuts, herbs, etc. Using background knowledge and teacher assistance identify which of those crops are suitable for growing in your region.
2. Review the basics of what it takes for plants to grow: sun, air, soil, water
3. Ask students to brainstorm where could they grow food? At their home? In their neighborhood? At their school? Some students may already know where food is being grown nearby.
4. Review a slide show of photographs featuring different examples of where you can grow. Such a slide show can be generated with web search results described above.
5. Have students create a map identifying both vertical and horizontal spaces where food could be grown. Have them be zany. Have them color code it: 1. possible but not realistic;

2. doable with a little bit of work; or 3. ready to go right away (Or use a different coding scheme.)The important part of the lesson is for students to understand they can grow their own food in their own space with varying degrees of resources and effort.

**Questions:** (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)

1. What plants do students like to eat? (Knowledge)
2. What conditions are necessary for various crops to grow? (Comprehension)
3. What different environments and spaces can food be grown in? (Application)
4. Where can food be grown in their own neighborhood? (Synthesis)

**Extensions:**

1. Have students identify how they would go about saving the seeds from food they eat. How could other seeds be acquired?
2. Ask students to research where soil, compost, and containers could be gotten at low or no-cost in their neighborhood. For example, in Dane County (WI) compost is available at several sites throughout the county for a nominal fee:  
([http://www.countyofdane.com/pwht/recycle/compost\\_sites.aspx](http://www.countyofdane.com/pwht/recycle/compost_sites.aspx))

**Resources:**

1. Fresh Food from Small Spaces: The Square-Inch Gardener's Guide to Year-Round Growing, Fermenting, and Sprouting, by R. J. Ruppenthal
2. Square Foot Gardening, University of Wisconsin Extension:  
<http://www.uwex.edu/CES/cty/taylor/cnred/>

**Lesson Plan:** Who Grows Our Food?

**Unit:** History of Agriculture

**Objectives:**

- Students will learn about several farmers from their foodshed
- Students will identify several large and small scale production facilities in Wisconsin
- Students will understand there is no one type of person who is a farmer

**Modified Curriculum Objectives:**

- To learn who grows some of our food

**Materials:**

- Farm Fresh Atlas (<http://www.reapfoodgroup.org/atlas/index.htm>)
- Wisconsin Map (or other state)

**Time:** 75 minutes

**Vocabulary:** demographics

**Background Information on Farming in the United States:**

**1. Structure of US farms:**

**USDA Economic Research Service**

**Economic Information Bulletin No. (EIB-24) 58 pp, June 2007**

[http://www.ers.usda.gov/Publications/eib24/eib24\\_reportsummary.html](http://www.ers.usda.gov/Publications/eib24/eib24_reportsummary.html)

U.S. farms are diverse, ranging from very small retirement and residential farms to enterprises with annual sales in the millions of dollars. Farms are operated by individuals on a full- and part-time basis, by multiple generations of a family, by multiple families, and by managers of nonfamily corporations. Some specialize in a single product, while others produce a wide variety of products. Some have full control over their farming processes while others produce commodities under contract to strict specifications. But despite their diversity, most U.S. farms are family farms.

Most U.S. farms—98 percent in 2004—are family farms, defined as operations organized as proprietorships, partnerships, or family corporations that do not have hired managers. Nonfamily corporations make up a small and stable share of farm numbers and sales, accounting for less than 1 percent of farms and 6-7 percent of farm product sales in each agricultural census since 1978.

**Small family farms account for most U.S. farms and farm assets.** Small family farms (sales less than \$250,000) accounted for 90 percent of U.S. farms in 2004. They also held about 68

percent of all farm assets, including 61 percent of the land owned by farms. As custodians of the bulk of farm assets—including land—small farms have a large role in natural resource and environmental policy. Small farms accounted for 82 percent of the land enrolled by farmers in the Conservation Reserve and Wetlands Reserve Programs (CRP and WRP).

**Large-scale family farms and nonfamily farms produce the largest share of agricultural output.** Large-scale family farms, plus nonfamily farms, made up only 10 percent of U.S. farms in 2004, but accounted for 75 percent of the value of production. Nevertheless, small farms made significant contributions to the production of specific commodities, including hay, tobacco, wheat, corn, soybeans, and beef cattle.

**The number of larger farms is growing.** The number of farms with sales of \$250,000 or more grew steadily between the 1982 and 2002 Censuses of Agriculture, with sales measured in constant 2002 dollars. The growth in the number of these larger farms was accompanied by a shift in sales in the same direction. The most rapid growth was for farms with sales of \$1 million or more. By 2002, million-dollar farms alone accounted for 48 percent of sales, compared with 23 percent in 1982.

**For the most part, large-scale farms are more viable businesses than small family farms.** The average operating profit margin and rates of return on assets and equity for large and very large family farms were all positive in 2004, and most of these farms had a positive operating profit margin. Small farms were less viable as businesses. Their average operating profit margin and rates of return on assets and equity were negative. Nevertheless, some farms in each small farm group had an operating margin of at least 20 percent. In addition, a majority of each small farm type had a positive net farm income, although the average net income for each small-farm type was low compared with large-scale farms.

**Small farm households rely on off-farm income.** Small farm operator households typically receive substantial off-farm income and do not rely primarily on their farms for their livelihood. Most of their off-farm income is from wage-and-salary jobs or self-employment. Because of their off-farm work, small farm households are more affected by the nonfarm economy.

Households operating retirement or limited-resource farms, however, receive well over half of their income from such sources as Social Security, pensions, dividends, interest, and rent, reflecting the ages of operators on such farms.

**Payments from commodity-related programs and conservation programs go to different types of farms.** The distribution of commodity-related program payments is roughly proportional to the harvested acres of program commodities. As a result, medium-sales (\$100,000-\$249,999) and large-scale farms received 78 percent of commodity-related government payments in 2004. In contrast, CRP, which pays the bulk of environmental payments, targets environmentally sensitive land rather than commodity production. Retirement, residential/lifestyle, and low-sales small farms received 62 percent of conservation

program payments in 2004. However, most farms—61 percent in 2004—receive no government payments and are not directly affected by farm program payments.

**A growing number of farms operate under production and marketing contracts to guarantee an outlet for their production.** About two-fifths of U.S. agricultural production is produced or marketed under contract, although the share varies by commodity and type of farm. Relatively few small family farms use production and marketing contracts, while 64 percent of very large family farms use contracts and, as a group, produce 61 percent of the value of production grown under contract.

**2. Basic demographic data on farmers from USDA.** The USDA has a myriad of demographic data relating to US farmers, ranging from the amount of experience a principal farm operator has to the gender, age, or race of the farmer. Find updated information at the Economic Research Service site: <http://www.ers.usda.gov/Briefing/WellBeing/demographics.htm>

**3. Specific Local Farm Data.** Many states maintain a database or interactive map of operating farms. In Wisconsin, the Farm Fresh Atlas Project (<http://www.farmfreshatlas.org/>) created originally by REAP Food Group (<http://reapfoodgroup.org/>) maintains a publication and website called the Farm Fresh Atlas. The Atlas profiles different farms, identifying what they grow, who their operator is, and where they are located.

### **Teacher/Student Instruction:**

Ask students:

1. Who grows our food? Who is a typical farmer in our state? What type of farm do they own?  
Ask students if they know any farmers in their community. As students how types of farms and farmers might be different in different parts of the country.
2. Share with students some of the demographic data from ERS.  
<http://www.ers.usda.gov/Briefing/WellBeing/demographics.htm>  
In particular students may be interested in the “aging of farmers,” in other words the fact that there aren’t many young people going into farming.
3. For each of the graphs you share, ask students to both read and interpret the graph. First, ask students to read the graph, simply making factual statements from the data. Second, ask students to interpret the graphs. What are some of the implications of the data?
4. Next, give students access to a copy of the Farm Fresh Atlas, or access to it via the web site. Have them browse the atlas and keep track of the types of farms they see. How can they characterize the farms? Are there more of one type than the other? Have students make a list of the farms they would like to visit or learn more about.
5. Give students the opportunity to explore farm web sites to collect more information. In small groups, have students share the farms they’ve looked at. How are the farms they’ve looked at similar to one another? Different?

6. In the last part of the lesson, have students look at the structure of farms nationwide. Using the background information provided above, have students contrast their local farms with national trends.
7. If possible, invite a few farmers to class to have them talk about their experience as a farmer. Students can use the *Meet the Farmer* handout available in the Appendix to track their notes.

**Questions:** (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)

1. Who is a typical farmer in this country? (Knowledge)
2. Which farms do the students find interesting? Who are some of their local farmers? (Application)
3. How similar are the farms in Wisconsin (or another state) to those found nationwide? (Synthesis)

**Extensions:**

1. Interview a farmer one-on-one to discuss their background and current experience.
2. Do more in-depth analysis of farmer demographics and farm structures using the USDA ERS website. Identify some key research questions that need to be addressed given current trends.

**Resources:** *Meet the Farmer* handout

**Lesson Plan:** So You Want to Be A Farmer?

**Unit:** History of Agriculture

**Objectives:**

- Students will understand different options farmers have for selling their produce: farmer's markets, grower cooperative, farm market stand, CSA, grocery store, wholesaler, restaurants, institutions

**Modified Curriculum Objectives:**

- To understand farmers have a choice for how they will sell their produce

**Materials:**

- Internet Access
- Butcher block paper or other large group brainstorming space
- Children's Picture books (optional): Apple Farmer Annie, by Monica Wellington

**Time:** 75 minutes

**Vocabulary:** community supported agriculture, cooperative, corporation

**Background Information on Distribution Networks:**

Farmers have a range of options for selling their products. Each has its own advantages and disadvantages, and several of them can be used simultaneously. A farmer first needs to decide what his or her priorities are, have an accurate assessment of the farm's production capacity and schedule, and a good handle on the amount of time the farmer wishes to devote to sales. Here are some examples of the options a farmer might have:

Farmer's markets (producer only):

Dane County Farmers Market: <http://www.dcfm.org/>

Farm Fresh Markets (D.C. area): <http://www.freshfarmmarket.org/markets.html>

Grower Cooperatives:

Grower's Cooperative Grape Juice: <http://www.concordgrapejuice.com/>

Florida's Natural Orange Juice: <http://www.floridasnatural.com/>

Farm Market Stand/Sales from the Farm:

Massachusetts Roadside Stands: <http://www.massfarmstands.com/>

### Community Supported Agriculture:

Madison Area Community Supported Agriculture Coalition: <http://www.macsac.org/>

### Grocery Store:

Whole Foods: <http://www.wholefoodsmarket.com/>

Roundy's: <http://roundys.com/>

Wegman's: <http://www.wegmans.com/>

### Grocery Cooperative:

Willy Street Coop: <http://www.willstreet.coop>

The Wedge: <http://www.wedge.coop/>

### Farm to Institution:

Farm to School: <http://www.farmtoschool.org/>

Farm to Hospital: <http://departments.oxy.edu/uepi/cfj/f2h.htm>

### **Teacher/Student Instruction:**

1. Present students with a large bag of fruits and vegetables...the bigger the better. Tell them that as a farmer, you are trying to figure out what your options are for selling your surplus crop.
2. Ask students to brainstorm a range of possible venues for selling your surplus. If they get stuck, ask them to think about all the places they encounter fruits and vegetables for purchase. After students have struggled a bit with brainstorming, fill in the gaps with options not yet discussed.
3. With the list the whole group generates, break students up into small groups and have them discuss how the options differ. For groups needing more concrete direction, have them brainstorm a list of advantages and disadvantages for each option. Have students identify some examples of these structures within their own community. (Some examples are provided in the Background section above. If available, students can look through some of these sites to get a feel for the different options.)
4. Guide students into a discussion of variables that farmers need to consider in making these decisions: time, location, volume, political goals, ecological goals, etc. (Be sure students have an adequate understanding of the definition of each of these options.)
5. Ask students to write a reflection on which of the options they think would best fit their own vision of farming. As an alternative, have students rank order the options they created, based on their own personal criteria.

**Questions:** (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)

1. What options do farmers have to sell their surplus produce? (Knowledge)
2. What are the variables that go into deciding which option is the most appropriate? (Comprehension)
3. Which option does the student most see fitting themselves? (Application)
4. How do the different options influence society? (Synthesis)

**Extensions:**

1. Choosing a particular value (i.e. ecological, efficiency, price, etc.) rank order the options farmer have for distributing produce.

2. For an added challenge, create a grid that identifies both particular values and distribution options. Students can begin marking the boxes filling in the boxes with comments or a self-created ranking system. Something similar to this table would be a beginning.

	Ecological	Farmer Profit	Time Efficiency
CSA			
Farmer's Market			

3. Have students research the difference in business models these options represent: sole proprietorship, limited partnership, cooperative, or corporation. The structure each represents will help students better understand the legal implications of the options they choose.

**Resources:**

1. Farmer's Markets nationwide: <http://www.ams.usda.gov/AMSV1.0/FARMERSMARKETS>
2. Marketing your Produce, Tips from Cornell University Extension:  
<http://www.marketingschoolforgrowers.org/homepage.html>
3. National Cooperative Grocer's Association: <http://www.ncga.coop/>
4. Local Harvest: <http://www.localharvest.org/>

## **Unit 2: Food Systems**

In this section students explore the larger picture of how food moves from agriculture to the culinary arts. In addition, lessons allow students to see how agriculture affects natural ecosystems.

From Farm To Table: Understanding Food Systems

Ecosystems & Agroecosystems

Organic Farming Business Structures – Case Study: Organic Valley

**Lesson Plan:** From Farm to Table: Understanding Food Systems

**Unit:** Food Systems

**Objectives:**

- Students will define what a food system is.
- Students will identify different parts of a food system.
- Students will compare and contrast conventional and local food systems in the United States.
- Students will compare and contrast large scale organic and local organic food systems in the United States.
- Students will learn what energy inputs are necessary for food systems to function.

**Modified Curriculum Expectations:**

- Students will learn what a food system is.
- Students will understand parts of a food system by tracing how milk and other dairy products travel from farm to table.
- Students will compare the path traveled by dairy products produced locally (in Wisconsin) with those produced in California.
- Students will identify one part of a food system that needs energy to work.

**Materials Needed:** Copies of Food System Flashcard Sets\*, Scissors, Glue, Poster board or large construction paper, Computer Access, Samples of Food Products (optional)

*Illustrated cards to go along with terms below (excluding last two) are being completed and then digitalized – lesson will include these to be reproduced and cut out by students.*

**Time:** Minimum of 3 class periods.

**Vocabulary:**

**Food system:** the system that produces, processes, distributes, and consumes food from seed to table.

**Organic Agriculture:** a way of growing crops and raising animals that promotes and enhances biodiversity, biological cycles and biological activity using very little, if any, synthetic chemical fertilizers, herbicides, pesticides, and insecticides.

**Conventional Agriculture:** a way of growing crops and raising animals to maximize production by including new technologies, mechanization, increased use of chemicals, and specialization, often characterized by large scale production operations.

Vocabulary for Food System Flashcard Sets:

**Farm Supplier:** a company that produces farm inputs such as seeds, compost, fertilizer, pesticides, herbicides, farm machinery, and fuel.

**Producer:** a farm that raises plants or animals, including fisheries, for food.

**Processor:** a company that takes raw product from a producer and turns it into a food product.

**Distributor:** a company that acts as a “middle-man,” buying large amounts from producers and selling them to a variety of retailers/stores.

**Transporter:** someone who uses trucks or other vehicles to move products from farms to other parts of the food system.

**Retailer:** the grocery store or other food store that sells directly to the consumer.

**Consumer:** the person who buys and uses the food.

### **Background Information:**

In order to create a map of your local food system, it is helpful to know who the main players are. Identifying local grocery stores is easily done, but knowing who the local and regional distributors are is more challenging. Calling a few local grocery stores, especially those that are not chain stores (they often have their own distribution networks), and asking to talk with a Produce Purchaser is a great place to start. They can tell you where the fresh vegetables, roots and fruit the store carries come from, both in terms of local farm producers and local/regional distributors. Asking to talk with someone who does purchasing in the grocery area of the store may also be helpful to identify local food processors as well as grocery distributors.

### **Teacher Instruction:**

Day 1 – Lecture and Class Discussion

Begin by introducing the concept of a food system and identify the main components, writing out the definition of each for students to copy. Ask students to give examples of producers, processors, distributors, transporters, and retailers they can think of.

Discuss differences between conventional and local food systems by writing both on the board and asking students to come up with general characteristics of each. Here are some starting ideas:

#### Conventional Food Systems

Large scale production of food  
Can produce a lot of food efficiently  
Provides a cheap, abundant source of food  
Needs chemical inputs to function  
Encourages trade around the world

#### Local Food Systems

Small scale farmers/producers  
More biodiverse way of farming  
Provides high quality food  
Uses sustainable farming methods  
Keeps money in the local economy

## Day 1 - Student Activity: Create Local and Conventional Food System Maps

Split up into groups and have each group pick a food product to research and present on. Groups could be given a sample of the product to get started with, but could also use the internet to get further information. Each group will trace the product's path in both conventional and local food systems. Using the Food System Flashcards, students will construct food system maps, identifying components by name as much as possible, to present to the class.

*For example: Broccoli production*

Conventional Food System traces origin from California farm fields to consumer's table at home. Local Food System traces origin from local family farm to farmer's market where consumer purchases item to take home.

Students working on modified curriculum expectations can choose to focus on dairy industry (ideally two separate groups with one focusing on WI industry and another on California) and include several regular education students to create mixed ability grouping. Product produced can be turned into a poster showing food system parts, combining magazine/internet pictures or drawings with text explaining how milk come from the cow to the dining room table.

## Day 2 – Student Presentations

Each student group presents their Food System Maps to the class, tracing their product's path.

## Day 2 – Lecture and Class Discussion

After presentations are done, continue lesson by introducing conventional and organic agriculture terms to class. *Explaining that both methods of agriculture are used in both kinds of food systems currently.* Explain that many changes have happened in farming since the industrialization of agriculture after World War II. Most small family farms used organic methods of farming prior to that and many still do today. Larger farming operations have increasingly relied on conventional agricultural methods to maximize production, especially when they have to compete in a global food system.

The growth of the modern-day organic agriculture system has also resulted in some changes over time. Prior to the 1990s, many farms using organic agricultural methods wanted to distinguish themselves from large-scale conventional farming operations and therefore developed their own certification systems regionally. Independent certifying agencies were created to oversee farms to ensure that they met agreed-upon guidelines, allowing farms to claim to be certified organic to consumers looking for healthy alternative food sources. Most farms that were certified organic were small scale, but as the market grew and became increasingly profitable, large corporations became more involved. Interested in making profits, large companies involved in the conventional food system bought up small-scale organic producers or competed directly with them, putting some out of business. With the development of National Organic Standards in 1995, this trend has continued.

### Day 3 - Student Activity: Tracing the Use of Energy in Producing Food

Give students copies of the Fuel Flashcard (preferably on color copy paper so they stand out), scissor and glue. Ask them to put the Fuel icon next to any components on their Food System Maps where energy is used.

Have students hang their Local and Conventional Food System Maps around the room and ask students what they think as they compare the two.

Discuss:

*How much fuel does each system use? Are these systems sustainable – ecologically? Economically? What is the true cost of food production in each system? Are issues of scale as important as the method of production used?*

#### **Extensions:**

To further illustrate the changes in how food is produced in this country and issues of scale, have students watch the movie Food Inc. The DVD is widely available rated appropriate for school-aged audiences. However, it is helpful to forewarn students that some of the images they will see, and the information shared, may shock and surprise them, even being hard to watch at times. Take time to stop and discuss portions of the film with students as you view it.

#### **Accommodations:**

Provide copies of terms and definitions to students with disabilities as needed. Ensure mixed ability groupings for activities and that tasks are divided appropriately to include all learners.

#### **Resources:**

French Fries and the Food System

CIAS “Toward a Sustainable Agriculture” Curriculum

**Lesson Plan:** Ecosystems and Agro-Ecosystems

**Unit:** Food Systems

**Objectives:**

- Students will learn what an ecosystem is and identify different types of ecosystems found in the world.
- Students will identify two laws of energy critical to understanding how ecosystems function.
- Students will identify how nutrients cycle in different eco systems.
- Students will learn how agro-ecosystems function.

**Modified Curriculum Expectations:**

- Students will learn how different parts of an ecosystem work together.
- Students will learn how living organisms use energy and nutrients to survive.
- Students will identify parts of an agro-ecosystem.
- Students will learn how food systems work from farm to table.

**Materials Needed:** Access to computers for students, media projector to show website features to whole class, blackboard or overhead projector

**Time:** Minimum of 2 class periods.

**Vocabulary:**

**System:** an interdependent group of items forming a unified whole.

**Ecosystem:** a biological community in a physical environment

**Sustainable:** when all parts of a system are in balance and capable of reproduction

**Biodiversity:** a biological community that includes a variety of living organisms and species

**Biome:** a highly specialized ecosystem that only exists in a certain area or climate

**Agro-ecosystem:** an ecosystem that is managed to produce food or fiber

**Teacher Instruction:**

Begin by writing the word “System” on the board and asking students to define or give examples of systems. Emphasize key elements of systems, including that many parts make up a whole, that parts are interdependent on one another, and that parts have a functional relationship with each other.

Day 1 – Lecture Presentation: What is an ecosystem?

*(students take notes off board or overhead projector)*

An ecosystem is a complex set of *relationships* among living resources, habitats and residents in an area. The biological community includes plants, animals, microorganisms, water, soil and people.

Everything in an ecosystem depends on each other, making up a functioning community. When an ecosystem is healthy, we say that it is *sustainable* – that all the elements of the community live in balance and are capable of reproducing themselves.

Ecosystems are usually characterized by *biodiversity*, meaning the community includes a diverse variety of living organisms and species. When a very specialized ecosystem only exists in a certain area or climate, we call it a *biome*. Biomes are identified by factors like rainfall, soil type, temperature and altitude. Some examples of more specialized ecosystems include deserts and rainforests.

Day 1 - Student Activity:

Have students go to [www.geography4kids.com/extras/panoramas/index.html](http://www.geography4kids.com/extras/panoramas/index.html) to learn more about different ecosystems in North America. The site features 360-degree panoramas from around the country to explore – there are 16 in total, so assign students accordingly so that all ecosystems are explored. Have students answer the following questions about each ecosystem:

Name of Ecosystem Studied:

1. What plants live in this ecosystem? (Minimum of 2 examples)
2. What animals live in this ecosystem? (Minimum of 2 examples)
3. What kind of soil, rocks, and minerals are present in the ecosystem?
4. Where can you find sources of water in the ecosystem?
5. How do climate and weather conditions impact the ecosystem?

After students are done researching their system, ask each student or group to share about their system with the rest of the class. As students present, use a media projector to show the panorama from the website to everyone.

Day 2 – Lecture Presentation: Energy and Nutrient Flows in Ecosystems

An ecosystem's development depends on the energy and nutrients that move in and out of that system. Understanding how energy and nutrients move through ecosystems is important, especially for farmers who want to maximize the energy efficiency of their specially created ecosystems: farms.

All energy production in ecosystems starts with the sun and the process of *photosynthesis*. Use a diagram from the internet to review the process of photosynthesis briefly. Possible image resources include:

[milander.net/sarahAlexanderWeb//images/irrigation-photosynthesis.gif](http://milander.net/sarahAlexanderWeb//images/irrigation-photosynthesis.gif)

[s2.hubimg.com/u/701793\\_f520.jpg](http://s2.hubimg.com/u/701793_f520.jpg)

[farm4.static.flickr.com/3217/3081218761\\_d6d4aa2f72\\_o.gif](http://farm4.static.flickr.com/3217/3081218761_d6d4aa2f72_o.gif)

Have students take notes as you present the following information:

### Ecosystems capture and waste energy

Living organisms in ecosystems get and use energy all the time. There are two laws about energy. Number one: Energy can't be created or destroyed, only converted to a different form. Number two: Every time that energy is converted to a different form, some of it is lost, usually as waste heat. How does energy enter ecosystems? Through sunlight captured by plants. What do they do with it? They transform the sunlight energy (through photosynthesis) into sugar, which is the food they need to live. Plants are producers, they produce all their own food. They are the only things that can transform sunlight into food energy.

### Ecosystems cycle nutrients

Elements or nutrients are needed by plants and animals. Every time a plant or animal is eaten, the nutrients in it will be transformed by the eater. Some of the nutrients remain in the body of the eater and some go back to the soil and to the air. Then decomposers in the soil use some of those nutrients, and some go into the soil to be drawn back up and used to grow plants. It's a whole nutrient cycling system. Some nutrients do leave the system in what we call "leaks," for example in surface water runoff or in ground water leaching. In a sustainable ecosystem, these losses are small, and most of the nutrients can constantly be reused and recycled.

(Source: "Toward a Sustainable Agriculture", UW-Madison Center for Integrated Agricultural Systems)

### Day 2 – Student Activity

Have students go to [www.uwsp.edu/cnr/wcee/keep/Mod1/Flow/foodchains.htm](http://www.uwsp.edu/cnr/wcee/keep/Mod1/Flow/foodchains.htm) and read about food chains.

Ask students to define the following terms:

Producer

Consumer

Chemical Energy

Decomposers

Review and discuss the two diagrams included with the site: "Heat Loss in Food Chains" and "The Carbon Cycle." This can be done with handouts, an overhead projected on a screen or having students pull up the images on their computers.

Emphasize how energy is lost as one moves up the food chain, with approximately 10% making it from one level to the next. Also reiterate that while energy flows *through* an ecosystem, carbon cycles within a system.

Discussion: Are farms ecosystems? Have students give their opinions based what they have learned about ecosystems so far, then present the following definition:

*An agricultural ecosystem — or agro-ecosystem — is an ecosystem that is managed to produce food or fiber. Agricultural ecosystems follow the same energy and nutrient rules as natural ecosystems. Sustainable producers try to do two things: make the most of the sun's energy and recycle nutrients.*

(Source: “Toward a Sustainable Agriculture”, UW-Madison Center for Integrated Agricultural Systems)

Ask students to identify what components make up an agro-ecosystem and write items on board to diagram parts..

**Extensions:**

Have students set up a basic fish tank in class as an example of a closed, managed aquatic ecosystem. Students will identify what components make up the ecosystem and learn how to balance the inputs and outputs of the system to make it sustainable.

**Accommodations:**

Group students based on differing abilities when doing the internet activities, ensuring that those who struggle with reading or writing skills work with partners with strong literacy skills. Partners can read aloud website content and highlight key words or phrases to be copied by the other student to answer questions and define vocabulary. Ask partners to paraphrase more difficult concepts to ensure understanding, asking for assistance from staff as needed.

When lecturing on topics, teacher should provide written copies of notes to students with disabilities as needed and ask them to highlight key concepts during the presentation.

**Lesson Plan:** Organic Farming Business Structures – Case Study: Organic Valley

**Unit:** Food Systems

**Objectives:**

Students will:

- Learn about the organic dairy industry and what it takes to be successful in today's marketplace.
- Understand how Organic Valley Co-operative's business structure differs from conventional dairy industry businesses.
- Understand how prices for products are determined in a farmer-owned co-operative.
- Taste test organic and conventional dairy products to better understand how consumer taste influences economic decisions.

**Modified Curriculum Expectations:**

Students will

- Learn about the organic dairy industry.
- Understand that Co-operatives like Organic Valley have workers (farmers) decide together how to run the business.
- Understand why organic dairy products cost more.
- Taste test organic and conventional dairy products to compare flavor.

**Materials Needed:**

Copies of CIAS Research Brief #80 "Mid-scale Food Value Chains Case Study: Organic Valley"

Available for download at [www.cias.wisc.edu/economics/mid-scale-food-value-chains-case-study-organic-valley-research-brief-80/](http://www.cias.wisc.edu/economics/mid-scale-food-value-chains-case-study-organic-valley-research-brief-80/)

Copies of Organic Valley Case Study Activity Sheet (see below)

Computers with access to the Internet

Organic Valley Whole or 2% Milk for sampling

Non-organic Whole or 2% Milk for sampling

*(make sure fat content is the same for both kinds of milk)*

Small cups to use for samples

Paper bags to cover the milk containers during sampling

Other Organic Valley dairy products to sample if desired

**Time:** 1 to 2 class periods

**Key Vocabulary:**

**Cooperative** a business owned and controlled equally by the people who use its services or who work at it

**Supply Chain** a system of people, organizations, or resources who are involved in moving products or services from a business to customers

**Teacher Instruction:**

Set up a Taste Testing table in the classroom before students arrive (if possible), having small sample cups of milk ready to go. Put paper bags over each milk container to hide their brand name and label one Sample A and the other Sample B.

At the start of class, tell students that they will be sampling milk from two different dairy producers, both of whom are major brands in the industry. Explain to students that one of the samples will be from organic farms and the other from farms using conventional agriculture practices. Tell students that you would like them to think about which one is which as they sample the milk.

After each person has had a taste, take a count of which sample students liked better. Ask students to tell you why they thought it was better. Then ask students which sample they thought was the organic milk, again asking them what about the sample they tasted made them think it was organically produced. After discussing the results as a class, reveal the identify of each milk product and talk about how your sampling experience and expectations did or did not match up with reality.

Ask students – what are consumer’s perceptions of organic products and how do those affect how products are priced, packaged and marketed? Ask students if it matters to them as consumers how a business is run as well as how their farmers grow their crops or raise their animals?

Explain that today you will be taking a closer look at the Organic Valley name brand and what kind of business is behind the products we see on the grocery store shelves. Pass out copies of the CIAS Research Brief #80 “Mid-scale Food Value Chains Case Study: Organic Valley” and the Organic Valley Case Study Activity Sheet to each student.

Depending on your class, have students work individually, in partners, or in small groups reading the article and answering questions on the Case Study Activity Sheet. If students get done early with worksheet, have them log onto computers and go to [www.organicvalley.coop](http://www.organicvalley.coop) to find out more about the company, its farmers, and its products.

After all students are done, bring class back together to go over reading and questions in more detail. The instructor should help illustrate to students how Organic Valley’s cooperative business structure

allows farmers to set prices at a level that makes it possible for them to be economically sustainable in the long term. At the same time, the farmer-members own a stake in the overall company and get a return on their investment as the business grows. Besides having a different business structure that empower farmers, Organic Valley is also unique in that its farmers are small-scale family operations. Many of the larger companies in the natural and organic foods market are not small scale operations, replicating the production model of the conventional agriculture system despite using organic practices.

At the end of the class discussion, ask students again if it matters to them as consumers how a business is run as well as how their farmers grow their crops or raise their animals? Has the information the class looked at today influenced how you now answer this question?

### Organic Valley Activity Sheet

*Please answer the following questions as you read the CIAS Research Brief #80 “Mid-scale Food Value Chains Case Study: Organic Valley.”*

1. When was Organic Valley Co-operative (known at the time as the Coulee Region Organic Produce Pool or C.R.O.P.P.) formed and by whom?
2. How many farmer members does the Co-operative have today?
3. How many states and regions are represented in the membership?
4. What are Organic Valley’s gross sales today?  
What percentage of those sales comes from dairy production?
5. Concerned about the rollercoaster nature of dairy prices in the US, Organic Valley has a central mission of maintaining relatively stable farm prices that, over time, are above prices farmers would get for non-organic products. Explain at least two ways Organic Valley tries to do this:
6. As Organic Valley has grown, what key decisions related to supply chain partners has the co-op made to keep it successful economically?
7. How does a large company like Organic Valley maintain relationships with consumers in both the natural foods market and the conventional grocery market?

### **Extensions:**

Have students do a taste test comparison between Organic Valley and Horizon brand milk products to see if there is a difference in taste. Ask students to do online research about the Horizon brand to see what kind of business structure they use, what farms they get their milk from etc. Have students do a report about the two companies and their respective impacts on the natural and organic food market and the environment.

### **Accommodations:**

Students with disabilities should be partnered up in mixed ability groupings for the activity. When their group gets done with the first 4 questions on the Activity Sheet, have students with cognitive disabilities proceed to surf the Organic Valley website while other group members read about the economics discussed in the remainder of the article.

### **Unit 3: Local Foods**

In this section, students explore what foods can be grown locally. Students learn how to find foods and explore what parts of a plant can be eaten.

Eating with the Seasons

A Locavore Foodshed

Exploring Local Farms in WI

Edible Plant Parts

Exploring Your Local Grocery Store

## **Lesson Plan:** Eating with the Seasons

### **Unit:** Local Eating

#### **Objectives:**

- Students will learn about what foods are available in different seasons.
- Students will learn methods for saving food for other seasons.

**Materials:** Internet access or list of in season food, ingredients and equipment to prepare in season meal.

**Time:** 1-2 hours to discuss seasonal eating and plan a season meal, 3 hours to prepare seasonal meal.

**Vocabulary:** Hydroponics, seasonal, brassica, hoop house, greenhouse, warming foods, cooling foods

#### **Background Information:**

In the summer and fall a variety of foods are available throughout Wisconsin. During the winter months the same foods can be purchased at local grocery stores. However, these foods are often not produced in Wisconsin and they are not necessarily in season even if they are grown elsewhere around the world. There is a movement to encourage local independence for producing food. By eating food that is in season it is noted that food that is fresher is both more nutritious and tastier. As students learn about the global food system and where their food comes it is interesting to note which foods can be grown locally.

When your diet is based on local foods there is also a need to think about the seasonal production of food. There are many foods that are only available in certain seasons. These foods should be enjoyed to the fullest when there is plenty and preserved as necessary to save for latter seasons. Buying food globally does not require you to vary your diet. However, eating only foods when they are in season means that you can look forward to the ripe strawberries or tomatoes that not only taste better, cost less and better for your health.

There are research studies that show that at different points of the season there are different levels of vitamins in certain foods. When food is picked before being ripe to be safe for longer journeys it loses some of the nutritional value. Foods that are cooked or preserved by canning or freezing also lose nutritional value. Eating raw foods give you the highest levels of nutrition.

To start following a seasonal diet in the winter would be the most difficult time. However, by planning to follow a seasonal diet and then starting to eat seasonal during harvest season. To continue this diet is much easier than you may think. While many seasonal foods are also local it is also worthwhile to follow the seasons for when food is in season in different global regions.

Vegetables are often the most seasonal of foods with certain required lengths of growing seasons needed for maturation and specific outside temperature including having access to non-frozen soil. The outside vegetable growing season in Madison, last for about 150 days starting in Mid April to October. Some cool weather crops can be planted earlier while other crops require warmer summer time

temperatures to grow. Spinach, peas and brassicas including broccoli, cauliflower, collards and kale are cool weather crops that are harvest in the spring and a second crop can be grown in the fall. Tomatoes, peppers, eggplants, summer squash are warm weather plants that need heat to produce the fruit. Winter squash are harvested late in the fall and store well into the winter. Root vegetables including potatoes, carrots, beets, onions and garlic can be harvested throughout the summer and fall and also keep well into the winter. Vegetables can also be preserved for the non growing season by freezing, canning, or dehydration.

There are several different ways that growers in Wisconsin can grow vegetables outside of the growing season. One method is to grow sprouts which can be done inside in a dark location any time of year. One can also create a greenhouse, or hoop house depending on the location and size these facilities can be used to start plants earlier in pots or directly into the soil. Plants can also be grown hydroponically or without soil just misting with nutrient rich water in warm and lit environment. Grow rooms can also be established that use artificial light and heat to cause plants to grow. The more energy and building materials used in creating these operations adds to the cost of the food production. However, it is possible to have herbs or other plants grown in container gardens small scale in your home kitchen.

Fruits that grow in Wisconsin include strawberries, blueberries, raspberries, grapes, apples, peaches, and pears. Often during the summer or fall there is a peak harvesting season of a month or two for all of these fruits. Fruits can often be processed into jams, frozen or dried to be able to store them longer. Citrus fruits including oranges, grapefruit and tangerines do not grow in Wisconsin but it is nice to see they are in season during the winter months.

In addition, Animal products including meat, eggs, and dairy products can be produced in Wisconsin year round. While chickens do go through molting periods where egg production is reduced and it is necessary to provide artificial light for chickens to continue to produce eggs throughout the winter. Chickens can also be butchered at anytime.

Cows' milk production starts after the birth of a calf but with continued milking, milk is produced every day of the year. This milk can be used as milk, cream, sour cream, butter, ice cream or to make cheese. In addition to cow's goat and sheep milk can is also consumed. The meat from these and other animals including pigs can be butchered throughout the year. Wild animals including deer, bear, rabbits, squirrels turkeys and pheasant have hunting seasons that allow for procuring meat with the seasons. Fish can also be farmed locally or wild caught throughout the year including during the winter through the ice.

When planning a seasonal meal start first with items that are currently beginning produce then with items that have been stored. One way to find seasonal foods is to join a CSA or to shop a local farmer's market.

**Teacher Instruction:**

1. Create a chart with the four seasons.
2. Talk about the reasons for eating seasonally available foods.
3. Discuss what makes a food in season.

4. Talk about the difference between local and global seasonality.
5. Have students individually or as a group place foods in the different season.
6. Plan a meal based on season eating.
7. Cook a seasonal meal.

**Student Instruction:**

1. Place different foods into which seasons they are produced.
2. You can use this website to find some information. <http://www.eattheseasons.com/>
3. Plan a meal based on the foods in one season.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What are some of the benefits to eating with seasons?
2. What are some environmental costs with eating food out of season?
3. What types of foods might you have to give up in order to eat more seasonally?
4. Create a list of warming foods.
5. What are some similarities with foods grown within each of the seasons?

**Extensions:** Cook a seasonal meal during each of the seasons, visit a restaurant that focuses on seasonal meals.

**Resources:**

- Haas EM. Staying healthy with the seasons. Celestial Arts, Berkeley, CA 1981.
- Pitchford P. Healing with whole foods. Revised edition. North Atlantic Books, Berkeley, CA 1993.

<http://www.eattheseasons.com/> US site updates food that is in season nationally and also has information about ranges for when vegetables are in season.

<http://www.sustainabletable.org/shop/eatseasonal/> You can type in state and season and it will list what vegetables are in season for that state. Database seems to be a little small right now.

**Readings/Worksheets/Quizzes/Other Materials:**

## **Seasonal Eating**

Warming foods often take longer to grow than cooling foods that grow quickly.

- In spring, focus on tender, leafy vegetables that represent the fresh new growth of this season. The greening that occurs in springtime should be represented by greens on your plate, including Swiss chard, spinach, Romaine lettuce, fresh parsley, and basil.
- In summer, stick with light, cooling foods. These foods include fruits like strawberry, apple, pear, and plum; vegetables like summer squash, broccoli, cauliflower, tomatoes, peppers, and corn.
- In fall, warming, autumn harvest foods, including carrot, sweet potato, onions, and garlic.
- In winter, use more warming foods including fish, chicken, beef, lamb, and venison. And root vegetables, including carrot, potato, onions and garlic. Eggs, corn, and nuts are also winter foods.

## **March-- Foods in Season -- USA**

### **VEGETABLES**

asparagus | broccoli | broccolini | brussels sprouts | butternut squash | celery root | fennel | kale | leeks | mache | potatoes (maincrop) | rutabaga | salsify | sunchoke | turnips

### **FRUIT & NUTS**

blood oranges | grapefruit | kiwi fruit | oranges | ugli fruit

### **FISH & SEAFOOD**

clams | crab | mussels | oysters | scallops

<b>Spring</b>	<b>Summer</b>	<b>Fall</b>	<b>Winter</b>

## **Lesson Plan:** A Locavore Foodshed

### **Unit:** Local Eating

#### **Objectives:**

- Students will learn what about foodsheds.
- Students will create a map of their foodshed.
- Students will learn about local food and the difference costs associated with producing food globally and locally.
- Students will learn what locavores eat.
- Students will learn what types of food cannot be grown locally.
- Students will create a local foodshed map.

**Materials:** Map of the world. Map of Wisconsin

**Time:** 30 minutes to discuss concepts 1-3 hours to create food maps.

**Vocabulary:** Foodshed, Locavore, Watershed

#### **Background Information:**

A foodshed is similar to a watershed which maps the flow of food from the farm to your table. For most people in the United States their foodshed is a global foodshed that covers regions from around the world. The average distance that food travels to your table is 1200 miles. So food goes much farther. Even some of the food is grown locally and then shipped away to be processed and then returned.

Some people have become concerned with costs associated with participating in the global food network. Some of these concerns are environmental or social. Environmental concerns include the fuel needed to ship food especially when refrigeration is required. Social concerns could include whether producers are receiving a fair wage and if worker safety rules are in place and being followed.

There is also the issue of self reliance and sustainability. If you rely on others far away to produce your food and something happens to that food chain, it can disrupt your ability to grow healthy food to eat. In some parts of the world there is a lack of food because farmers are only growing food for export and have to import staples.

There is a movement for focusing on eating only food grown locally. These groups called locavores or localvores try to limit their food consumption to less than 100 miles from their home. This movement was started with the 100 mile diet in Canada; there is also a group in Berkley that invites people to take the 100 mile challenge. Groups in more places around the country are trying to encourage people to consider their food choices and the impact these choices have on the environment.

Some foods do not grow in all regions. To be a locavore one either needs to sacrifice some foods or bend the locavore rules. Tropical foods including coffee, chocolate, bananas, and citrus fruits cannot be grown in Wisconsin.

**Teacher Instruction:**

1. If you have the food in packaging or with labels you can find where it was produced. Often grocery stores will also list where the food was grown.
2. The maps can be created individually or as a group. When students share their food locations it can be interesting to point out how far some food travels and what types of food can be grown in different parts of the world.
3. Discuss issues surrounding global food production. Talk with students about what a locavore is.

**Student Instruction:**

1. List 10 foods you like to eat. These could be favorite foods, what you ate today, or just the first ten foods that come to your mind.
2. Research where these foods were produced. This information can be found on packaging or websites. Remember that some types of food can be grown in more than one location in the world. It is sometimes difficult to find exactly where a food is produced but you can find one location or discover where most of that type of food comes from.
3. Create a map of the food items you list.
4. Measure the distance between where the food was produced and your home. Add up the distance to see how far your meal traveled before you ate it.
5. Plan a menu that can be made with food produced within 100 miles of where you live.
6. Create a map of where these foods can be found. These 2 websites are helpful links <http://www.locavorenetwork.com/>, <http://www.localharvest.org/>
7. Create a list of foods that cannot be grown locally.
8. Prepare a meal of locally grown foods.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. How big is your current foodshed?
2. What foods would you have to give up if you limited your foodshed to 100 miles?
3. Create a balanced meal that can be produced locally.
4. How do you find foods produced locally?
5. What seasons of the year is it easier or harder to eat locally?
6. What can you do to insure that you have local food available in the winter?
7. Is local food more or less expensive than food grown far away?
8. What environmental costs are associated with transporting food around the globe?

**Extensions:** Prepare a taste tests of local foods and their global counterparts, visit local farms, cheese makers, bakeries, breweries, create a marketing piece encouraging buying local. Read [Animal, Vegetable, Miracle](#) by Barbara Kingsolver, [The Omnivores Dilemma](#) by Michael Pollen, or [The 100-Mile Diet: A Year of Local Eating](#) (Canada & Australia Edition), [Plenty: Eating Locally on the 100-Mile Diet](#) (US Edition) by Smith and MacKinnon.

**Resources:**

<http://www.locavorenetwork.com/> Nationwide network of locavore groups

<http://www.localharvest.org/> Nationwide listings of local food choices

“Eat your Foodshed” Gordon Hayward, Organic Gardening, Feb/Mar 2010.

<http://100milediet.org/> Site for original 100 mile diet in Vancouver

<http://www.reapfoodgroup.org/> Madison organization promoting local and healthy food.

<http://www.sustainabletimes.net/node/314> 100 mile food map for Madison

**Readings/Worksheets/Quizzes/Other Materials:**

## **Why should I become a Locavore?** (From the Locavore Network)

1. Local food tastes better & is better for you.
2. Local foods are seasonal & seasonal foods taste best.
3. Local foods maintain farmland and green space.
4. Local foods lower your carbon footprint.
5. Local foods support your local economy.
6. Local foods promote food safety.
7. Local foods support community.
8. Local foods support good health & immunities.
9. Local foods contribute to the legacy you leave.
10. Local foods support your local growers and neighbors.

## **How do I become a Locavore?**

1. Plant a garden (even a small herb garden in your home is a good start).
2. Visit your local farmers market.
3. Commit to one locally grown or raised meal per week.
4. Choose 5 foods you will only buy locally.
5. Preserve, can and freeze local food for off season enjoyment.
6. Barter with your neighbor (trade foods you grow with another local grower or neighbor for variety).
7. Buy foods grown and raised within a 100 mile radius of your home (for city dwellers, within 250 miles).
8. Share with your friends, neighbors, co-workers and family.

## **How do I stay a Locavore?**

1. Learn what's in season for your area.
2. Shop at farmers markets and your local growers' food co-op.
3. Visit locally owned food producers.
4. Buy family farmed or fair trade when local is unavailable.
5. Choose restaurants that use locally grown and raised food.
6. Encourage your local grocer to carry locally grown and raised foods.
7. Educate your friends, neighbors, co-workers and family.

**Lesson Plan:** Exploring Local Farms in Wisconsin

**Unit:** Local Eating

**Objectives:**

- Students will learn about the different kinds of farms operating in Southern Wisconsin.
- Students will become familiar with the Southern Wisconsin Farm Fresh Atlas, a directory of local farms available in print and online formats.
- Students will research how farmers are using online resources to market their unique products.

**Modified Curriculum Expectations:**

- Students will learn about the different kinds of farms operating in Southern Wisconsin.
- Students will become familiar with the Southern Wisconsin Farm Fresh Atlas, a directory of local farms available in print and online formats.

**Materials Needed:** Access to computers and internet, worksheets for students to complete for Farm Profiles, media projector and internet access to share online sites for farms profiled during student presentations.

**Time:** 2 class periods – one for computer research and the other to present findings

**Background Information:**

The online resource the Southern Wisconsin Farm Fresh Atlas is specific to farms located in Southern Wisconsin, but similar resources can be found in other regions of the country. Teachers may need to do some advance research to locate farms in their area to profile. If farms do not have websites or other internet resources for your area do not exist, instructors can ask local farms to send them written materials about their farm or ask students to conduct phone interviews with farmers. If direct farmer participation is needed, the lesson is best done during the off-season to maximize farmer availability and participation.

**Teacher Instruction:**

Have students go to [www.reapfoodgroup.org/atlas/index.htm](http://www.reapfoodgroup.org/atlas/index.htm)

Have slips of paper with 13 different categories of farms/farm products written on them ready for students to pick from. Have students surf around sites representing farms in the category they selected and choose one to complete a Farm Profile on (see below). Students can use information from the web to research a farm and/or call the farm to find out more information. Students share about their farm to the class on the following day.

Farm Profile

Name of Farm:

Farm Owner(s)/Operator(s):

Location:

What goods does the farm produce?

How many acres are under production by the farm?

What kind of ecosystem is the farm located in? Describe the natural area in and around the farm (hilltop, valley, forest, flat grassland, river/creek, etc.).  
How long has the farm been in operation?  
Have the farm always produced what it is currently growing or have things changed over time?  
Who does the farm sell to?  
What makes this farm a sustainable operation environmentally and economically?

Another great resource for interviews with farmers can be found at [www.cias.wisc.edu/curriculum/modI/secc/modi\\_secc.htm](http://www.cias.wisc.edu/curriculum/modI/secc/modi_secc.htm) Scroll to the bottom of the page and click on “Farm Interview Form” to download the document.

**Extensions:**

Have students who finish their Farm Profile early check out the other regional Farm Fresh Atlas sites linked to the Southern Wisconsin website. Ask them to compare the regions and share their findings with the rest of class.

Ask farmers representing a number of different growing operations to come into class as guest speakers. If feasible, arrange to tour several local farms during the growing season to see firsthand how each works.

**Accommodations:**

Partner students with differing abilities during the internet activity. Have students with more limited literacy abilities work with a staff person to take a count of how many of each kind of farm operation exists in the area (how many farms grow vegetables, herbs, flowers, etc.) and then graph the data onto a poster to share with the class.

## **Lesson Plan:** Edible Plant Parts

**Unit:** Local Eating

### **Objectives:**

- Students will learn the different parts of plants.
- Students will learn what parts of the plant can be eaten.
- Students will learn the difference between fruits and vegetables.
- Students will learn some different uses for a variety of foods.

**Materials:** Chart of Foods, Picture of a Plant, variety of foods to sample.

**Time:** 50 minutes

**Vocabulary:** Stem, Leaves, Roots, Flower, Tuber, Seeds, Fruit, Bulb

### **Background Information:**

When it comes to eating plants many parts of the plant can be eaten. Most plants have parts that are usually eaten, other parts than can be eaten but are not widely known to be edible and other parts that are not eaten at all. In addition there are some parts of edible plants that are poisonous and will make you sick.

There are six main parts of plants. The roots are underground, hold the plant in the soil and pull nutrients and water to the plant. The stem provides structure to the plant and supports the leaves. The leaves provide a surface to collect sunlight for photosynthesis to occur. The flower is the reproductive site of the plant which attracts pollinators and is where the fruit forms. The fruit is the enlarged ovary that hold the seeds. The seeds are the next generation of the plant. There are specialty parts of a plant such as bulbs and tubers which are modified leaves or stems that grow underground.

### **Roots**

Plants in which the root is the main crop include: carrots, rutabagas, beets, turnips, celeriac and parsnips.

Tubers are modified stems or roots that grow underground. These include potatoes, yams, sweet potatoes, and jicama.

Bulbs are modified leaves also grown underground including onions, leeks and garlic.

Peanuts also grow underground but are modified seeds.

### **Stems**

Plants in which the stem is the main crop include: celery, rhubarb and asparagus.

### **Leaves**

Plants in which the leaves are the main crop include lettuce, spinach, kale, cabbage, collards, basil, oregano, thyme, sage, parsley cilantro, endive and dandelions. The leaves of certain root crops can be eaten as well such as beet and turnip greens.

### **Flowers**

Plants in which the flowers are the main crop include broccoli, cauliflower, and nasturtiums. You can also eat the flowers of squash varieties.

### **Fruits**

Plants in which fruits are the main crop include traditional fruits like apples, oranges, peaches, pears, strawberries, cherries, blueberries, pineapples and bananas. In addition many vegetables are the fruit of the plant including squashes, tomatoes, peppers, eggplants, and cucumbers.

### **Seeds**

Often when eating the fruit of a plant you may eat the seeds with it. Corn, nuts, sunflower seeds, peas, beans, rice, wheat, barley, and poppy seeds are all examples of using the seed as the main part of the edible plant.

The leaves and stems of tomatoes and peppers are poisonous and this is the main reason Early Europeans refused to eat any part of the tomato. This makes sense because tomatoes, peppers, eggplants, and potatoes belong to the nightshade family of plants which include several types of poisonous berries including belladonna. The toxicity is relatively low but large quantities will make you sick. Rhubarb leaves are also toxic and only the stem should be eaten.

Mushrooms are not plants but members of the fungi kingdom.

### **Teacher Instruction:**

1. Discuss with students what parts of different plants are edible. Have students draw a picture of a plant a label the six main parts.
2. Discuss the parts of plants that do not fall under these six categories.
3. Give an overview of what types of foods fall into each of the categories.
4. Distribute handout, "Parts of Plants We Eat." Have students mark the correct column for each plant. Some plants have more than one edible part.
5. Prepare a taste test of different plant part foods.

### **Student Instruction:**

1. Draw a picture of a plant. Label the plant parts; roots, stem, leaves, flower, fruit, and seeds. Be sure to include the soil line on your diagram. Where would tubers and bulbs fit into this picture?
2. Place a check mark for which part of the plant you can eat. For some plants more than one part is edible.
3. Place a check mark if the food is eaten raw or cooked. For many foods it will be both.
4. Draw a picture of a hybrid plant that contains all edible parts.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What is the scientific definition of a fruit?
2. What happens to the fruit when you eat the flower?
3. Why do some plants have some parts that are poisonous while other parts are edible?
4. What benefit does a plant gain if animals eat the fruit of the plant?
5. How would you figure out if a plant part was edible?
6. Foods that grow underground are not all roots. Compare potatoes, onions, peanuts and carrots. How can you tell what is a root and what is something different?

**Extensions:** Go to a farm/garden so that you can see the foods on the plants. Grow your own plants. Research what part of a plant do foods you are unfamiliar with come from.

**Resources:** <http://www.clover.okstate.edu/fourh/aitc/lessons/primary/parts.pdf>



Food	Parts of Plants We Eat									How we eat	
	Stem	Fruit	Seed	Bulb	Root	Tuber	Leaves	Skin/peel	Flower	Cooked	Raw
Apple											
Avocado											
Banana											
Beet											
Broccoli											
Cabbage											
Carrot											
Cauliflower											
Celery											
Cherry											
Cucumber											
Garlic											
Green beans											
Green pepper											
Lemon											
Lettuce											
Onion											
Orange											
Pea											
Peach											
Peanut											
Pear											
Pineapple											
Potato											
Pumpkin											
Rhubarb											
Rutabaga											
Spinach											
Squash											
Strawberry											
Sunflower											
Tomato											
Walnut											
Watermelon											
Zucchini											

## **Lesson Plan:** Exploring Your Local Grocery Store

**Unit:** Local Eating

### **Objectives:**

Students will:

- Learn about the different kinds of Grocery Stores
- Learn about the impacts of local products on the environment, economy, and consumer
- Become familiar with the store
- Research and map the origins of the available produce and products

### **Modified Curriculum Expectations:**

Students will

- Become familiar with the store layout and function of the grocery store

### **Materials Needed:**

Local Grocery Store

Produce/Store manager

Scavenger Hunt Worksheet

Pencils

Clipboards or hard surface to write on (books)

World Map

Food and Utensils for lunch (if time and space permits the students to eat lunch at the store or at a local park)

**Time:** Field Trip 2-3 hours and one class period after field trip to present findings and have class discussion

### **Background Information:**

In general, grocery stores are huge and filled with a variety of products. Choosing a bag of potatoes can be overwhelming if not prepared to choose between 6 different products. In most grocery stores there are a lot of local products on the store shelves. Local can be defined differently: within the Midwestern states, within your state, or within a certain amount of miles (50-100) from your location. Choosing a product from any of the above categories is beneficial to the environment (less transportation fuel), the consumer (more nutrients from a newly harvested vegetable or fruit), and the economy (keeping money transactions within the local community). Finding the local products can be tedious and time consuming for the average shopper. Some stores will label local products to help consumers quickly identify the differences. It is important to help young people understand the benefits that exist with buying local products and feel comfortable finding such products in their local grocery store.

### Teacher Instruction:

1. Before going on the field trip the class should have a group discussion about advantages and disadvantages of buying local products.

Key issues that should be discussed are:

- Environment
- Consumer
- Farmer
- Economy

2. At the end of the discussion have students write one question for the store/produce manager. These could be compiled and given to the manager ahead of time.

### Student Instruction:

1. On the day of the field trip meet the store/produce manager at the store first. Ask several students to ask the manager the following questions:
  - What type of store is this? Is it a cooperative, large corporation, family business, or other?
  - Who determines what products will be sold at the store?
  - What are some advantages and disadvantages of local products in the store?
  - How is the community linked to the store?
2. Allow students to ask the store/produce manager questions at the end of the talk.
3. Ask the Manager to give the class a store tour.
4. Pair students accordingly and describe the scavenger hunt.
  - a. Students will take one worksheet, clipboard, and pencil
  - b. Students will work together to find the products that are italicized on the sheet.
  - c. Students will find one more product to fill any of the blank spaces.
  - d. Point out to the students the scoring system listed on the bottom of the worksheet.
    - i. 4 points: Product is made within 100 miles of the present location
    - ii. 3 points: Product is made in the state
    - iii. 2 points: Product is made in the Midwest States (or states for your regional area)
    - iv. 1 point: Product is found
5. If time allows as students return from the scavenger hunt have them help prepare lunch. If enough local ingredients are available it would be great to focus on choosing as many as possible.

*Quick and easy ideas include:*

Tortilla wraps with raw vegetables (carrots, lettuce, tomatoes, and cucumbers), cheese, and hummus

Yogurt

Apples with peanut butter

Tortilla chips with salsa

6. A class discussion of what they learned about the environment, consumer, farmer, and local economy should be used as a closure activity either at the store or at school.

**Extensions:**

After the field trip students can work together to place push pins on a world map of the locations of the products they found.

**Accommodations:**

Partner students with differing abilities during the scavenger hunt activity. Have students with more limited literacy abilities work with a staff person or less limited student giving each person in the pair a specific job. The student with more limited literacy abilities could be responsible for finding the item in the store or find where the city and state are listed on the product.

## GROCERY STORE SCAVENGER HUNT

<b>Dairy/Eggs</b>		
Product	Farm/Company	City, State
<i>Butter</i>		
<i>Milk</i>		
<i>Yogurt</i>		
<i>Eggs</i>		

<b>Meat</b>		
Product	Farm/Company	City, State
<i>Hamburger/Ground Beef</i>		
<i>Bacon</i>		

<b>Vegetables &amp; Fruit</b>		
Product	Farm/Company	City, State
<i>Carrots</i>		
<i>Potatoes</i>		
<i>Apples</i>		
<i>Oranges</i>		
<i>Bananas</i>		

## Cereal/Flour/Cookies/Bread/Sauce

Product	Farm/Company	City, State
<i>Cereal</i>		
<i>Spaghetti Sauce</i>		
<i>Bread</i>		

**4-points:** Product is made within 100 miles of the present location

**3-points:** Product is made in the state

**2-points:** Product is made in the Midwest States (or states for your regional area)

**1-point:** Product is found

## **Unit 4: Farm Planning**

In this unit, students begin to plan the plants that they will be planting in their plots. Lessons include tracking temperatures in the greenhouse and how to determine germination rates.

Designing Your Garden

How Are These Crops Planted?

Creating a Planting Schedule

What is a Seed?

How to Start Seeds

Temperature Readings in Greenhouse

Tracking Germination

## **Lesson Plan:** Designing Your Garden

### **Unit:** Farm Planning

#### **Objectives:**

- Students will understand what needs to and can be considered when designing a garden including size, climate, neighborhood, light, soil, drainage, traffic, and existing features.

#### **Modified Curriculum Objectives:**

- To understand gardens involve visioning and planning

#### **Materials:**

- Measuring tools (ruler, tape, sticks, etc.)
- Butcher block paper or other large group brainstorming space
- Children's Picture books (optional): *Apple Farmer Annie* or *Zinnia's Garden*, by Monica Wellington

**Time:** 2-3 class periods (approximately 3 hours total)

**Vocabulary:** scale, companion planting

#### **Background Information on Garden Design:**

KidsGardening: <http://www.kidsgardening.com/>

This site is run by the National Gardening Association. It's vast site covers everything from gardening schools nationwide to specific theme ideas to designing a school garden to fundraising. A good overall reference tool.

School Garden Wizard: <http://www.schoolgardenwizard.org/>

This site is maintained by the Chicago Botanic Gardens and will help and inspire you as you put together your school garden. From ideas to technical details, this is one site you should devote some time to before embarking on school garden design.

#### **Teacher/Student Instruction:**

6. Show students a range of photographs depicting various school and home gardens. Ask them to compare them on a range of criteria from size, shape, and climate, to crop selection, location and other features. Record these in a notebook, or common space.
7. Ask students to brainstorm a range of possible venues for a garden at their school (or home, community, etc.) If there *really* aren't any true options, you may wish to skip this step.
8. Either in groups or individually, have students draw base maps of these possibilities. These base maps should include actual planting space, as well as adjacent areas that would be considered part of the garden. Students may wish to include buildings and features not part of the garden to contextualize where their garden is situated.

9. With the list the whole group generates, break students up into small groups and have them discuss how the options differ. Guide students into a discussion of variables that farmers need to consider in making site selection decisions: time, location, volume, political goals, ecological goals, etc. (Be sure students have an adequate understanding of the definition of each of these options.) For groups needing more concrete direction, have them brainstorm a list of advantages and disadvantages for each base map.
10. Have students decide upon their garden space.
11. Once a decision has been made, students will begin creating a scaled map of their garden space. Have students measure the actual size of the site and then use grid or graph paper to create a scaled version of their garden. For younger students you can give them a scale (ie. 1 block = 1 foot or 10 feet) while older students can figure out an appropriate scale.
12. Students will want to add sunlight information to their garden map. Have them observe the light at various times of the day noting that full sun is more than 6 hours a day. Does the space have full sun? part sun? or shady conditions? How does that change throughout the day? The seasons? Note these conditions on the base map.
13. The next step for them can be deciding what will go where in their garden. Students can browse through seed catalogs can get them started thinking about size and space requirements for different plants. You can also have them think about companion plants. Consider having each student or small group submit a "dream garden" design. Students might draw their visions or cut out images of garden plants from seed catalogs and paste them on paper. The class can then choose the best—and most practical—elements of each to incorporate into a final design.
14. In addition to which plants they'd like to have in their garden, they'll also want to discuss form. Will the garden have beds separated by plant families? Will their garden be theme based (ie. a pizza garden and a dye color garden?) What shape(s) will they be? Will they be simple mounds or permanent raised beds made from wood or recycled plastic wood? Other ideas to consider would be extra wide paths to improve accessibility, hideaways (ie. sunflower 'houses', a compost area, weather stations, signs, worm bin, etc.

**Questions:** (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)

What do farmers have to consider when designing their garden or field? (Knowledge)

What are the variables that go into deciding which option is the most appropriate? (Comprehension)

Which option does the student see as best fitting their schoolyard or home? (Application)

How would different options affect their school or neighborhood community? (Synthesis)

**Extensions:**

1. Have students do some research to document various garden themes. Students can take digital photographs and include journal comments for each. The details of the garden designs can be compiled digitally or in a paper scrapbook and used by other students in their visioning exercise.

2. To increase the student's knowledge of climatology and geography, students can specifically research gardens found in different countries whose climates differ from their own. What plants can be grown there that aren't viable in our region?

**Resources:**

1. KidsGardening: <http://www.kidsgardening.com/>
2. School Garden Wizard: <http://www.schoolgardenwizard.org/>
3. Lovejoy, Sharon. (1999) *Roots, Shoots Buckets and Boots* and (2001) *Sunflower Houses : Inspiration from the Garden - A Book for Children and Their Grown-Ups*

## **Lesson Plan:** How Are These Crops Planted?

**Unit:** Farm Planning

### **Objectives:**

- Students will understand why some crops are direct seeded and why some are transplanted
- Students will learn which crops fall into each category

### **Modified Curriculum Objectives:**

**Materials:** posterboard, old seed catalogs, scissors, glue

**Time:** 1 hour

**Vocabulary:** transplant, direct seed, root crop, growing season, cold-hardy

### **Background Information:**

It is important to know which crops can be direct seeded and which are better grown from transplants. If you are planning on starting seeds in your classroom or greenhouse this lesson is especially helpful for creating your garden plan for the season.

Planting transplants in the garden means you are planting a seedling (plant) instead of a seed. Some seeds are started indoors in a greenhouse and allowed to grow to a certain size before they are put out into the garden. Plants that are started inside usually have seeds that are easier to start indoors than outdoors. In a greenhouse, you can more easily provide the perfect conditions for hard-to-germinate or very small seeds, including the ideal temperature, moisture, and fertility. This method is commonly used to get a head start growing some vegetables that have a long growing season or to get a early start on vegetables you want to harvest sooner than you would be able to if you just planted a seed in the ground. In areas with short growing seasons like WI, starting seedlings indoors gives many plants a head start before the weather warms up. The best vegetables for starting inside are plants that tolerate root disturbance and benefit from a jump on the season: basil, broccoli, Brussels sprouts, cabbage, cauliflower, celery, eggplant, leeks, lettuce, onions, parsley, peppers, tomatoes, and tomatillos.

Direct seeding means sowing the seeds of a plant directly into the soil by hand or machine. Some types of vegetables do not like being transplanted and much prefer direct seeding. Direct seeding can also be cheaper (if you usually buy your transplants instead of growing your own) and less work (if you grow your own transplants). Direct seeded vegetables include many of the root crops, such as carrots, beets, turnips, and parsnips. They're cold-hardy vegetables, (meaning they grow well in the garden when it is cold outside in the spring and fall) so they can be direct seeded early in the spring. Crops like corn, beans, and peas do not like to be transplanted and grow better when direct-seeded.

### **Teacher Instruction:**

Give students a few hints to help them along: many warm season crops like to be grown as transplants many root crops like to be grown as seed, and most large seeded vegetables like to be direct seeded. If you have

seed packets as well as pictures of the vegetables it would be great to let the students look at the seeds to help them figure it out.

Direct Seeded Crops: beets, radish, spinach, peas, carrots, swiss chard, kohlrabi, salad mix, potatoes, cilantro, dill, green beans, corn, edamame, summer squash

Transplanted Crops: onions, leeks, broccoli, celery, lettuce, kale, cauliflower, eggplant, peppers, brussels sprouts, cabbage, tomatoes, basil, tomatillos

Either/Both: lettuce, cucumber, winter squash, melons

**Student Instruction:**

1. Hang up posterboard with three categories on it: Direct Seed, Transplant, Either
2. Have students choose a vegetable and then present which category they think it should go into and why.  
  
Or
3. Have students research their vegetable in a seed catalog or on the Internet and then put it up in the correct category.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. Why is it important to know which vegetables are direct seeded and which are transplanted?
2. How does knowing how seeds are planted help you plan out your garden?

## **Lesson Plan:** Creating a Planting Schedule

**Unit:** Farm Planning

### **Objectives:**

- Students will understand why having a Planting Schedule is important.
- Students will learn the times of year when crops are planted.
- Students will understand how to create a plan for the garden.

**Materials:** list of vegetables that will be planted in the garden, desk calendar or other large calendar, old seed catalogs, map of WI with last frost dates

**Time:** 1 hour

**Vocabulary:** frost, cool season crop, warm season crop

### **Background Information:**

Creating a Planting Schedule is a great wintertime activity and a one of the first steps for preparing for the next season. It will also begin to give the students a more clear timeline of what needs to happen in the greenhouse and garden in the spring.

Most crops are known as either cool or hot season crops. Cool season crops do not do well in the heat and are planted in the early spring and then again in late summer for a fall harvest. Examples are radishes, spinach, salad mix and lettuce, broccoli, cabbage. Some cool season crops taste much better after a frost. The plants use sugar as antifreeze in cold weather so a frost will bring up the sugar content and the flavor. Examples are spinach, Brussels sprouts, kale.

Warm season crops do not grow well in the cold. In Wisconsin they are planted between the end of May and early August – after danger of spring frost and in enough time of crop to mature before the first fall frost. Examples are beans, basil, tomatoes, peppers, eggplant, winter and summer squash, cucumbers.

### **Teacher Instruction:**

The first step in creating a planting schedule is to identify the average last frost date. Some crops thrive in cool weather, while others only grow well when it's warmer. So how do you know when to plant what? The key factor that should guide your decisions is your average last spring frost date. Most cool season crops, like cabbage, broccoli, lettuce and many others, can tolerate a light frost and will grow best when sown a couple weeks before your last spring frost. Some, like peas and spinach, are so cold-hardy they can even be planted "as soon as the ground can be worked," as many seed packets say. But warm season crops like squash, cucumber, and basil will be killed by frost if your seeds come up too soon. And for warm season transplants such as tomatoes, peppers and eggplants — if you don't wait until danger of frost has passed before you set them out, a late frost will kill them. A frost is defined as a light freeze of temperatures ranging from 29 to 32 degrees. The first average frost date in fall is the first time it gets down below 32 degrees.

UW Extension has a chart that lists the Median and Early Last Frost Dates:

<http://wihort.uwex.edu/links/FrostDates.htm> for the whole state. There is also another map that lists the typical last frost dates: <http://www.wisconline.com/almanac/gardening/springfrost.html> It is interesting to note that where you live in the state dictates when you may get a last frost. Remember, this climate data is collected over many years, it is still possible to get a frost after that date and it is important for gardeners to monitor the weather in the spring.

The next step after determining the last frost date is to begin to figure out when you will need to plant certain crops. Use seed catalogs or seed packets to determine the harvest date. This is usually stated in the listing for each vegetable in the seed catalog under days to harvest. Students should find their vegetable in the seed catalog, note how many days it will take to harvest, and count backwards to the date it can be planted in the garden. Note, when you are transplanting crops Safe to Set Out date is the first day you can plant the seedlings into the garden, they need to be started earlier in the greenhouse.

### **Student Instruction:**

1. Determine last frost date for Madison and fill it in on the Planting Schedule.
2. Each student will get to pick a vegetable and research when it should be planted.
  - a. Step 1: Write your average last frost date in the blank space at the top of the chart.
  - b. Step 2: Look in seed catalog to determine Estimated Days Until Harvest and fill in the chart next to the vegetable.
  - c. Step 3: Get a calendar and add or subtract the number of weeks in the Safe to Set Out Time column from the average last frost date. This is the Plant in Field Date when you can safely plant the crop in the garden.
  - d. Step 4: Determine whether the crop is direct seeded or transplanted (See **How Are These Crops Planted?** Lesson).
    - i. If the crop is transplanted find the greenhouse starting date by taking the date from column 5 (Plant in Field Date) and subtracting the number of days shown for that crop in column 3 (Est. Date of Harvest) and record that date in column 2 (Greenhouse Start Date).

### **Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What would you do if you already planted warm weather crops in your garden and you hear there was a frost predicted?
2. Why do you think different areas of the state have different last frost dates?

## Creating Your Seed-Starting Plan

YOUR GARDEN PLAN					
Average Last Frost in Madison is <u>5/13</u>					

CROP	GREEN-HOUSE START DATE	EST. DAYS UNTIL HARVEST	SAFE TO SET OUT TIME (RELATIVE TO AV. LAST FROST DATE)	PLANT IN FIELD DATE	PLANTS OR SEEDS?
Basil			1 week after		
Beans			1 week after		
Beets			2 weeks before		
Broccoli			2 weeks before		
Brussels Sprouts					
Cabbage			4 weeks before		
Carrots			2 weeks before		
Cauliflower			2 weeks before		
Chard			2 weeks before		
Collards			4 weeks before		
Corn			0 to 2 weeks after		
Cucumber			1 to 2 weeks after		
Eggplant			2 to 3 weeks after		
Garlic					
Kale			4 weeks before		
Kohlrabi			4 weeks before		
Leeks					
Lettuce			3 to 4 weeks before		
Melons			2 weeks after		
Okra			2 to 4 weeks after		
Onions			4 weeks before		
Parsley			2 to 3 weeks before		
Peas			6 to 8 weeks before		
Peppers			2 weeks after		
Potatoes					
Pumpkins			2 weeks after		
Radish					
Spinach			3 to 6 weeks before		
Squash, Summer			2 weeks after		
Tomatoes			1 to 2 weeks after		
Tomatillos					

Adapted from [organicgardening.com](http://organicgardening.com)

**Lesson Plan:** What is a Seed?

**Unit:** Farm Planning

**Objectives:**

- Students will understand how a seed functions.
- Students will understand what a seed needs to germinate.

**Modified Curriculum Objectives:**

**Materials:** seed packets, plates, knives, diagram of a seed, beans soaked in water overnight

**Time:** 1 hour

**Vocabulary:** germinate, cotyledons, embryo, seed leaves, seed coat,

**Background Information:**

**Teacher Instruction:**

A seed is a small embryonic plant enclosed in a covering called the seed coat. A typical seed includes three basic parts: (1) an embryo, (2) a supply of nutrients for the embryo, and (3) a seed coat. Depending on what type of plant it is the embryo has either one or more cotyledons or seed leaves.

Seed germination is a process by which a seed embryo develops into a seedling. Three fundamental conditions must exist before germination can occur. (1) The embryo must be alive, called seed viability. (2) Any dormancy requirements that prevent germination must be overcome. (3) The proper environmental conditions must exist for germination. The first step in a seed's awakening is absorbing water. This activates enzymes that make the stored food available to the embryo. As water is taken in, often doubling the original seed volume, the coat splits, making oxygen in the soil available to the tiny plant. The energy that drives the seedling's cells to quickly divide and grow comes from the food stored in the cotyledons and endosperm. The tip of the root, which emerges first from the seed, anchors the plant and enables it to absorb water and nutrients. Next, the young shoot begins to grow, relying in the early stages on food supplies from the cotyledons and endosperm. When the seedling's first real leaves come through the soil, the plant finally shifts to making its own food through photosynthesis. The greater the stored food supply (i.e., large seeds), the deeper a seed can be planted and survive until the plant begins producing its own food.

Although relative warmth is required for germination and growth, the ideal range of temperatures varies with different seeds. Not surprisingly, seeds of many plants native to warmer climates (e.g., tomatoes and peppers) require warmer temperatures to germinate than those native to cooler climates (e.g., lettuce). Although germinating seeds are not dependent on sunlight to produce energy, in some cases light can trigger or prevent germination.

Adapted from [kidsgardening.com](http://kidsgardening.com)

**Student Instruction:**

1. Why would gardeners choose to start their own seeds in a greenhouse or under lights? *Puts them in touch with whole process, excuse to start gardening early, like having plants in house, saves money, can buy certain varieties that are hard to find elsewhere.*
2. Pass out different seed packets to students. Let them pour them out on a plate or into a small container and examine the different shapes, sizes and textures. (Be careful not to handle them too much as the moisture from hands can damage the seeds. Consider giving the students plastic knives to move the seeds around. Keep varieties separated.)
3. Ask for observations about the features of different vegetable seeds.
4. Are seeds alive? *They are considered dormant, but when conditions are right they start to grow. What conditions do they need? Water, warm temperatures, soil, and some seeds need light.*
5. Explain process of germination. *Germination is the process in which a plant emerges from a seed and begins growth. The tough outer layer, or seed coat, protects the seed and the young plant, or embryo, inside. The embryo consists of a preliminary root, shoot, and one or two seed leaves called cotyledons, which store food for the embryo. Some seeds also have endosperm tissue that contains food reserves to nourish the young plant until it can make its own food using light energy.*
6. Pass out beans seeds that have been soaked in water overnight so that they are easy to open. Have the students open the seeds carefully so that they can see the inside. Use the below illustration of a seed to discuss what they see inside and how the parts function during germination.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. How do seeds get from a plant into a seed packet – what is the process?
2. Where does the seed of a plant come from?
3. How do plants produce seeds?
4. Why do plants produce seeds?

**Extensions:**

Germination Rates

Most seed packets list the germination rate. This indicates the percentage of seeds in the packet that are likely to germinate when planted according to directions. Even a packet of the freshest seeds will have a germination rate of less than 100%. Seeds may experience damage from the environment (too dry, too wet); some may not be mature; others may possess genetic defects that hamper growth. Measuring the germination rates and then translating that into charts or graphs can make an excellent math lesson.

Point out how most seeds for a type of vegetable look very similar even though they will produce different varieties. For example, the seeds for a red onion and yellow onion look the same from the outside. But, the DNA inside the seed differs in order to produce the specific variety. Compare seeds for different varieties of the same vegetable to see if the students can observe differences.

**Readings/Worksheets/Quizzes/Other Materials:**

The below illustration is from: <http://www.teachersdomain.org/resource/tdc02.sci.life.stru.insideseed/>

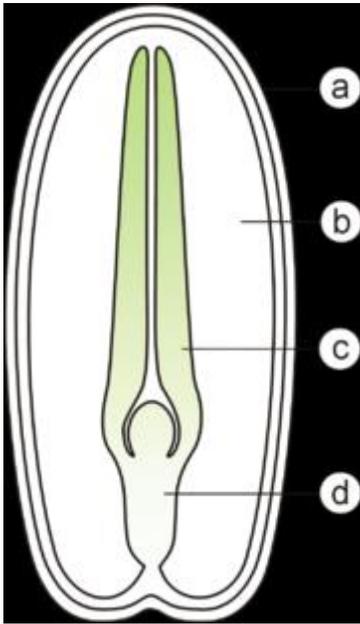
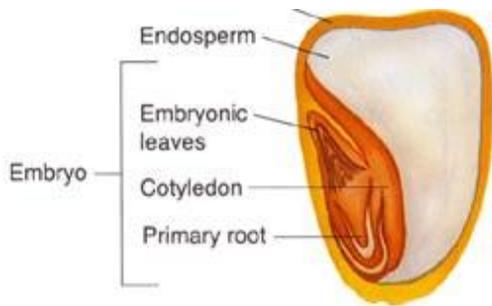


Diagram of the internal structure of a dicot seed and embryo. (a) seed coat, (b) endosperm, (c) cotyledon, (d) hypocotyl. *Illustration from Wikipedia.org*

## **Lesson Plan:** How to Start Seeds

### **Unit:** Farm Planning

#### **Objectives:**

- Students will learn how to germinate seeds indoors in preparation for transplanting into a spring garden.
- Students will learn how to care for seedlings indoors.
- Students will learn how to transplant seedlings.

#### **Modified Curriculum Objectives:**

- Students will learn how to germinate seeds indoors in preparation for transplanting into a spring garden.
- Students will learn how to care for seedlings indoors.
- Students will learn how to transplant seedlings.

**Materials Needed:** Climate Zone Map for your area, frost dates for your area, seed packets for vegetables and flowers, seed trays (48's and 72's are most popular) or other containers, trays with holes, dome hoods for trays (optional), hanging lights or access to a greenhouse, timer (if using hanging lights), watering can or water source with watering wand, potting soil\* for germinating seeds, garbage bins for keeping soil in and a few larger containers to use for scooping soil, concrete mixing tub (unused), a flat stick approximately the width of a seed tray or slightly larger, old newspaper to cover work surfaces for easy cleanup, plates or other containers to hold seeds while seeding up trays, plant tags, (These can easily be made by cutting apart some old plastic blinds or yogurt containers!), sharpie marker.

*\*Note: our local greenhouse is able to provide two good sources of pre-mixed soil in 50 lbs. Bags – the finer soil is used to germinate very small seed (ex. Lettuce) and the other for larger seeds (ex. Tomato, eggplant). Although not 100% organic, it's a convenient way to get soil for seed germination in smaller spaces. If desired, hook up with a local farmer that makes their own soil mix, ask for their recipe, and make your own.*

**Time:** This hands-on activity is best done over two class periods and will be repeated many times if preparing plant starts for an outdoor garden. Ongoing, daily care is required while plants mature and arrangements must be made to ensure plants are cared for on non-school days.

#### **Vocabulary:**

**Climate Zone Maps** A map that shows what planting zone you are located in to help determine which crops will grown in your area given the weather conditions (often found in seed catalogs).

**Frost Date** Two dates that mark the start and end of frost potential outdoors – in spring, the date that plants can safely be placed outdoors and in fall, when frost can start.

Direct seeding	Plants that should be started by placing seed directly in the ground once soil can be worked and/or danger of frost has passed. Plants usually need to be thinned after a crop is direct seeded.
Planting depth	How deep into the soil a seed should be planted to germinate.
Germination	When a seed sprouts into a new plant; also a rate tracked by grower to determine what percentage of seeds one can expect to grow.
Transplanting	Moving plant seedlings either into larger containers to accommodate more growth or moving them outdoors for growth in the garden.
Hardening Off	The process of gradually exposing seedlings started indoors to outdoor conditions in preparation for transplanting into the garden.
Days to Maturity	The number of days it takes from the time of planting the seed to when the plant is ready for harvest.

### **Background Information:**

Depending on your climate zone, research when spring seeds should be planted indoors and plan your seed-starting activities accordingly. Consider planting some crops in succession, so that not all plants are ready for harvest at the same time, but instead mature over a period of time in stages.

### **Teacher Instruction:**

The instructor should decide what seeds are to be planted and start class by familiarizing students with the information on the back of each seed packet. Discuss your local growing conditions, showing students a local climate zone map and share your area's frost dates with class to help them get a better understanding of the local growing season and its duration. Introduce terms like direct seeding, planting depth, germination rates, and days to maturity as students look at seed packets.

### Getting Trays Filled with Soil

Divide students up into work groups so that two people are working together on each seed tray. Have students lay newspaper out on tables and then take a 48 or 72 cell tray, placing each into a tray with holes at the bottom – this will provide additional strength to each tray once they are filled with soil. Students can either place their tray in a concrete mixing tub or on a newspaper-lined table, then scoop soil out of garbage bins into tray to fill up cells. The mixing tubs are nice because they allow for extra soil to easily be returned to the bins. Use a flat stick to level off the soil in all the cells and then move finished trays to an area set up for watering.

Have students prepare enough trays to cover the seeds you are trying to start. If seeds are larger, use the bigger soil mix, for tiny seeds use the finer variety. Most seeds will be sown in at 2 seeds per cell. If you are using older seeds from a year or two ago, increase the number to 4 seeds per cell since germination will be much lower. Most seed packets will list how many seeds are inside – students can help do the math to determine how many trays will be needed.

Depending on how much time you have and how many seeds you want to start at one time, decide if you will start seeding up trays next or wait until the next time. If starting now, have students use a watering wand set on mist or another light setting to start wetting the trays of soil. If not starting now, set aside filled trays and start the next class session by watering them.

### Seeding up Trays

Again place old newspaper on tables and have student work across from each other, two students per tray. Ask students to check their seed packets for planting depth, then make a hole in each cell for seeds to go into. Students should pour their seeds out of the seed packet and onto a plate, then try to minimize touching the seeds as much as possible as they begin placing them into holes. There are a lot of strategies out there on how to best do that, so tell students to experiment a little to see what works well for them. Using plant tags with pointed tips instead of fingers to move seeds is helpful, but requires a steady hand and may not be possible for all students.

Once seeds have been deposited in holes, have students take trays back to soil stations and lightly fill holes with the finer type of soil. Trays are then placed in the watering area again and seeds watered in gently and thoroughly.

### Caring for Seedlings

Most seeds need to be covered with a light amount of soil and kept moist during germination. Once seedlings are formed, watering continues to be a delicate, but critical operation to ensure new plants do not wilt in the heat or get damaged by heavy water pressure. Cold weather crops like lettuce and brassicas will do best if trays are placed in cooler parts of the greenhouse or classroom, but others like tomatoes will thrive in higher temperatures and sun, so placing things in the best suited location is important.

As seedlings grow and mature, transplanting them to larger cells or containers prior to moving outdoors may be necessary. If using 72s for seed trays, expect to do some transplanting. If using 48s, it may not be necessary. As plants grow, fill in empty cells where seeds failed to germinate by dividing up pairs from other cells and moving them. If one part of a pair of seedlings is distinctly smaller and weaker, thin it to allow for more room for the stronger partner to grow. Watch for plants to get too leggy – a sign that they are reaching for the light and some adjustment to placement or lighting might be necessary. Also look for yellowing on leaves or other signs of distress, looking up problems in seed starting books, online or by contacting your local greenhouse for advice.

Once you are close to the time to transplant seedlings into the garden, begin to harden off plants by exposing them to outdoor conditions for short periods of time. It is best to not place trays into full sun initially and to keep them somewhat protected from direct wind if possible. Gradually making the conditions more challenging over a period of one to two weeks is helpful to acclimate plants to their new environment and ensure their success in the garden.

### **Accommodations:**

This is a great hands-on activity for all students. Mixed-ability partners are recommended and size of seeds worked with should be matched appropriately to each student's fine motor skill level. Plant tags can be used to keep students on track with seeding up cells in rows and not skipping holes accidentally.

**Lesson Plan:** Temperature Readings in Greenhouse

**Unit:** Farm Planning

**Objectives:**

- Students will learn about the different temperature zones in a greenhouse by collecting data as the growing season progresses.
- Students will become familiar with what temperature ranges different plants need in a greenhouse.
- Students will use the knowledge gained to make informed decisions about placing seedling trays in appropriate locations to maximize growth.

**Modified Curriculum Expectations:**

- Students will learn to read a thermometer.
- Students will describe how the weather outside effects how hot it is in the greenhouse.
- Students will understand that different plants need different temperatures to grow in a greenhouse.

**Materials Needed:** Thermometers, Temperature Tracking Worksheets, Clipboards, Pencils/Pens, Internet Access, List of Plants to be Started in the Greenhouse

**Time:** 3 hours

**Key Vocabulary:** thermometer, temperature, germination

**Background Information:**

This activity can be done regularly throughout the year to provide a long-term view of the temperature variations in the greenhouse. Data collected can be tracked on spreadsheets and displayed in a graph format to enhance classroom discussions on how temperature affects plants and the growing decisions a farmer makes.

**Teacher Instruction:**

The number of thermometers you use will vary depending on the size of your greenhouse. Begin by assigning each thermometer a number and then place them in various locations around the greenhouse. Make a note of where each one is placed on the Temperature Tracking Worksheet and run some copies of each for students to use during the activity.

At the start of class, partner students up, making sure students who are learning to read temperature are working with peers who already know how to do so. Give each team a clipboard with an assigned thermometer listed on their **Temperature Tracking Worksheet**. Have teams pick someone to record data and head into the greenhouse.

In the greenhouse, have each team locate their thermometer and record the temperature and the kind of weather outdoors today. Have each team share with the group what they found and ask the class for explanations for the results found.

### **Student Instruction:**

#### Discussion Questions:

1. Are some locations getting light more directly during this part of the day?
2. What about parts of the greenhouse that are more shady?
3. How does the fact that heat rises impact the readings each team is getting?
4. Would results be different if the weather outside changed tomorrow?
5. How does the time of year impact how warm it is in the greenhouse?

Repeat the process of collecting temperature readings regularly during class and periodically revisit the discussion questions raised to see how student's awareness changes as more data becomes available.

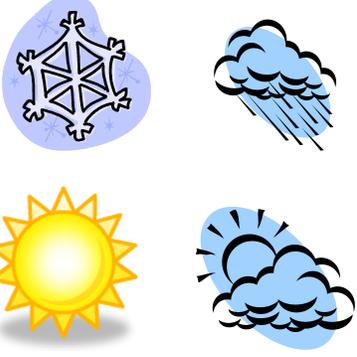
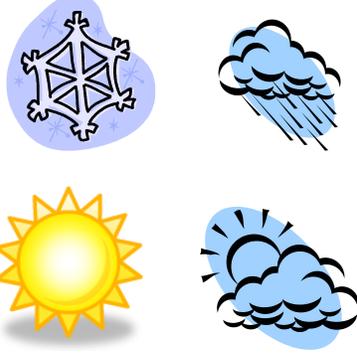
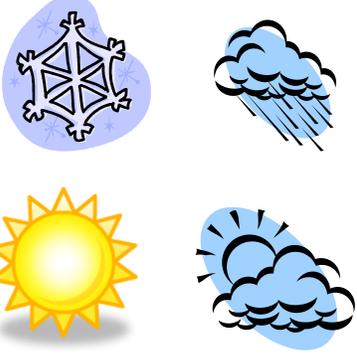
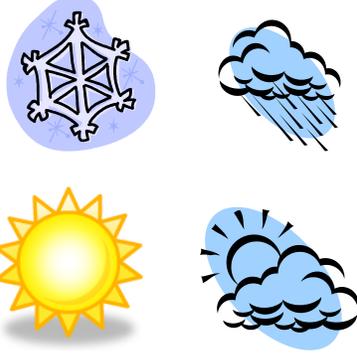
During another class period, divide students into two larger groups. Assign half the students to work in smaller groups to take the temperature information from each thermometer and convert them into graph formats. At the same time, the other half of the class uses computer internet search engines to do some research. Provide students with a list of plants that the class plans to grow in the greenhouse. Divide up the list and have students find out what assigned plants on the list are considered cold season crops and which ones enjoy the heat of the summer.

During the next class period, have the two groups share their results. Start by asking each team that graphed thermometers to present their results to the group. At the end of the presentations, ask the class to make some general statements about which locations are the hottest and coolest spots in the greenhouse and write the conclusion on the board. Next, ask the students who classified plants into cold- and heat-loving categories to share their results with the group. Invite each student to make suggestions about which location in the greenhouse would be best suited for each plant they researched. Write names of plants next to each thermometer number on sheets of paper and use the information to guide placement of newly seeded trays at the start of the growing season.

# Greenhouse Temperature Readings

Thermometer # \_\_\_\_\_

Location: \_\_\_\_\_

<p>Date: _____</p> <p>Temperature in Fahrenheit: _____</p> <p>Today the weather outside was (circle):</p> <div></div> <p>Recorded by: _____</p>	<p>Date: _____</p> <p>Temperature in Fahrenheit: _____</p> <p>Today the weather outside was (circle):</p> <div></div> <p>Recorded by: _____</p>
<p>Date: _____</p> <p>Temperature in Fahrenheit: _____</p> <p>Today the weather outside was (circle):</p> <div></div> <p>Recorded by: _____</p>	<p>Date: _____</p> <p>Temperature in Fahrenheit: _____</p> <p>Today the weather outside was (circle):</p> <div></div> <p>Recorded by: _____</p>

## **Lesson Plan:** Tracking Germination

**Unit:** Farm Planning

### **Objectives:**

- Students will learn about the requirements for seeds to germinate
- Students will use the scientific method to analyze the germination results
- Students will compare seedling progress
- Students will track the progress of various seeds
- Students will graph the data collected

**Materials:** Petri dishes, seeds, water, Germination Tracker worksheet, soil packs, thermometer, pencil, spray bottle, paper towels

**Time:** 45 min/day

**Vocabulary:** germination, angiosperm, gymnosperm, quiescence, metabolism, imbibe, aerobic respiration, dormancy, germination rate, scientific method

### **Background Information:**

As a gardener/farmer germination is very important. The number of seeds you plant is based on the germination rate of the seeds. Germination rate can vary depending on the seeds, the age of the seeds, the environment the seeds were stored in, and external factors during and after planting.

Seeds require certain amounts of water, oxygen, and particular temperatures to germinate. Seeds are dry during storage and require large amounts of water before growth can occur. When a seed imbibes (absorbs) water it enlarges and breaks the hard seed shell. As the seedling grows it needs energy. The energy comes from aerobic respiration, a process which oxygen is essential. The amount of oxygen that is available is based on planting depth and water amount. If the seed is planted too deep or the soil is over-watered there will be a lack of oxygen available for the aerobic respiration to occur. Temperature for germination varies depending on the seed. Every seed has a range of adequate to optimal temperatures for germination depending on the type and origin. Some seeds germinate well at room temperature while others prefer warmer or colder.

### **Teacher Instruction:**

- Have a class discussion on the variables of seeds germinating and the background knowledge above. Use the scientific method to analyze the activity. On the board the teacher will write the steps of the scientific method:
  - Ask a question
  - Do background research
  - Construct a hypothesis
  - Test the hypothesis

- Analyze the data and draw a conclusion
- Communicate the results
- Ask the class, what type of question could be developed from our knowledge of seeds? (focus the class on water, oxygen, and temperature)
- Ask each student to write a hypothesis of the question
- Ask the class how the hypothesis could be tested.
  - Based on the above answers the student instruction may be modified

### **Student Instruction:**

1. Compare two types of seed in two different temperatures
  - a. Students are given 4 Petri dishes and two types of seeds. The students label each dish Seed1-Warm, Seed1-Cold, Seed2-Warm, and Seed2-Cold then put about 10 seeds in each dish.
  - b. Students place a halved paper towel on the dish, wet it with a spray bottle until saturated then lay out 10 seeds. Fold the paper towel over the seeds and spray the top until saturated (the dishes can be put inside a plastic bag to keep it more moist.
  - c. The students should have at least two areas to place the seeds that have different temperatures and a thermometer to check.
  - d. Students check on the seeds each day, record the temperature, and moisten the towel with the spray bottle if it seems dry.
  - e. The students can use the germination tracker to record when seeds start to germinate to determine the germination rate.
2. Temperature
  - a. Students are given 4 Petri dishes and two types of seeds (try to use two types of seeds that have different preferences for temperature: broccoli and tomatoes, etc.)
  - b. The students label each dish seed 1-warm, seed 1-cold, seed 2-warm, seed 2-cold
  - c. Fold a paper towel in half, place half on the dish. Wet the towel with a spray bottle then place 10 seeds in the dish and make note which seed is #1/#2 on the Scientific Method sheet. Fold the paper towel over the seeds and wet it with the spray bottle.
  - d. Repeat 'c' with the other 3 Petri dishes.
  - e. The students should place one Petri dish of each seed variety in a warm area (66-85) and one in a cold area (50-65), students should have thermometers available in that area.
  - f. Students use the Germination Tracker to record when seeds start to germinate. The different Petri dishes should be labeled in the plant column: S1-W, S1-C, S2-W, S2-C.

### 3. Soil Compaction and water amount

#### a. Fill two small pots with soil

- Pot A will be filled lightly with soil. Pour the soil into the pot until it fills to the top. Pack lightly to create a level planting surface.
- Pot B will be filled with soil then packed down and more soil is added and packed down. (the soil used for Pot B should be close to two times the amount of Pot A)
- Poke 10 holes in each pot all about the same level down (1/2 inch)
- Plant one seed (same type in both pots) in each hole then cover with soil and water.
- Start the Scientific Method sheet for activity #2 completing #1-4.
- Water the plants on a regular basis 1-3 times a day.
- Use the Germination Tracker worksheet to record your observations of the seeds. Label the seeds as Pot A or Pot B in the plant column.
- After a majority of the seeds have sprouted have the students analyze the results and finish the Scientific Method sheet #5-6.

### 3. Planting Depth

1. Students work in pairs with a soil 6-pack and 12 seeds.
2. Each row of 2, is labeled 1 inch, 1/2 inch, and 1/4 inch
3. The students pack the soil then use a ruler to determine the depth of each hole based on the label for that row. Two seeds are placed in each hole, covered lightly with soil, and then watered.
4. In partners the students will start the Scientific Method sheet completing #1-4 for activity #3.
5. Daily observations are made to determine the differences that exist in planting depth.
6. Use the Germination Tracker worksheet to record the observations of the seeds. Label the seeds as 1 inch, 1/2 inch, or 1/4 inch in the plant column.
7. After a majority of the seeds have sprouted have the students analyze the results and finish the Scientific Method sheet #5-6.

### **Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What type of external factors can we control as the farmer/gardener?
2. What can we do to help the factors that we cannot control?
3. Do we need to work through the above activities each time before we plant?

**Extensions:**

As an extension exercise students can graph the class data and determine average, optimal, and poor external conditions for the above activities.

**Accommodations:**

Accommodations could include help with fine motor skills using a device or having someone else put the seeds in the holes.

1. Question:

2. Background Information:

3. Hypothesis:

4. How the hypothesis is tested:

5. Data found:

6. Was the hypothesis correct? Yes\_\_\_\_\_ No\_\_\_\_\_

Explain if needed:



# Germination Track



Plant	Date planted	Daily External Factors										Date sprouted	Notes	
		1	2	3	4	5	6	7	8	9	10			

Key					
Sun	Shade	Wet	Dry		
<b>S</b>	<b>Sh</b>	<b>W</b>	<b>D</b>		

## **Unit 5: Planting and Harvesting**

In this unit, students explore cultural celebrations surrounding planting and harvesting. In addition, lessons cover the hands-on aspects of growing plants in the field including preparing the soil, transplanting, mulching, weeding, watering, and fertilizing. Students also learn about completing the cycle of vegetable waste into soil by studying the composting process.

Spring Cultural Celebrations

Fall Harvest Cultural Celebrations

Spring Gardening Topics

Direct Seeding and Transplanting

Harvesting Techniques

Water Needs of Crops

Nutrient Cycle: What Plants Need

Compost MacroInvertebrates

Compost, Recycling and Trash

## **Lesson Plan:** Spring Cultural Celebrations

**Unit:** Planting and Harvesting

### **Objectives:**

- Students will understand why seasons in temperate regions begin and end when they do
- Students will understand why spring is the beginning of planting season in the Northern hemisphere
- Students will understand how various cultures celebrate the onset of Spring
- Students will understand why seasons occur

### **Modified Curriculum Objectives:**

- To understand why spring is a good time to start plant

### **Materials:**

1. National Geographic Cosmic Map:  
<http://www.nationalgeographic.com/xpeditions/activities/07/popup/cosmic.html>
2. Paper/crayons/markers for *Our Changing Seasons* handout.
3. Internet sites discussing Rites of Spring or Equinox Traditions
  - a. <http://www.timeanddate.com/calendar/march-equinox-traditions.html>
  - b. <http://paganwiccan.about.com/od/ostarathespringequinox/p/SpringEqWorld.htm>
  - c. [http://en.wikipedia.org/wiki/Equinox#Vernal\\_equinox\\_commemorations](http://en.wikipedia.org/wiki/Equinox#Vernal_equinox_commemorations)

**Time:** 75 minutes

**Vocabulary:** equinox, solstice

### **Background Information on the Spring Equinox**

*(Can also be called **the March Equinox** which is accurate for both the Northern and Southern Hemispheres.)*

National Geographic Expeditions

<http://www.nationalgeographic.com/xpeditions/activities/07/season.html>

“Because the direction of the Earth's tilt changes in relation to the sun, the northern and southern halves of our planet get differing amounts of sunlight over the course of the year. When the Northern Hemisphere of the Earth is leaning toward the sun, it receives direct rays of sunlight and is warmer, while the Southern Hemisphere receives more indirect rays.

When the northern part of the Earth is leaning away from the sun, the situation is reversed—the Northern Hemisphere gets cooler, more indirect sunlight while the southern half receives direct

rays. Because of this, the seasons in the Northern and Southern Hemispheres are reversed, about six months apart from each other.

The changing position of the Earth's tilt is the reason for the differences in temperature and length of daylight that distinguish the seasons. (*This is contrary to the common misconception that the distance from the sun is the reason for Earth's seasons.*) When the Northern Hemisphere is leaning toward the sun, the warmth of direct rays causes spring and then summer in that part of the globe. When the Northern Hemisphere is leaning away from the sun, the cooling effects of more indirect sunlight cause autumn and winter.

Because the astronomical position of the Earth causes the seasons, the start of spring, summer, autumn, and winter are marked by special days that correspond to different points in the Earth's orbit:

The **summer solstice** is the first day of summer and the longest day of the year, occurring in the Northern Hemisphere when the North Pole is leaning more directly toward the sun than it does on any other day. During the period marked by the summer solstice, the Northern Hemisphere is warmed by more direct sunlight and days are long and hot.

The **winter solstice**, by contrast, is the first day of winter and the shortest day of the year. As you might have guessed, the winter solstice in the Northern Hemisphere occurs when the North Pole is leaning away from the sun. When the North Pole is pointing away from the sun, the Northern Hemisphere receives only indirect sunlight; that is why winter is so much colder than summer. Brrrr!

Equinoxes, on the other hand, occur during transition periods when the North Pole is pointing neither directly toward nor directly away from the sun; these days are marked by equal periods of light and darkness. The **autumnal equinox** is the first day of autumn and occurs when the North Pole begins to lean away from the sun; **the vernal equinox** is the first day of spring and occurs when the North Pole begins to lean toward the sun again.”

### **Teacher/Student Instruction:**

Ask students:

- What are our four seasons? What is different about each? (Students can identify activities that are part of each season. They may wish to draw these activities or list them.)
- Why do our seasons happen? Using the background information provided, explain to students how it's both the Earth's rotation and its tilt that creates the variations in temperature and daylight throughout the year.
- Do a simple simulation with students to show the Earth's rotation and tilt. Have one student stand still, acting as the Sun. Have another student point to an object across

the room, acting as the Earth. Have the Earth student rotate counterclockwise around the Sun, showing how sometimes she is tilted (via her finger) toward the sun, and other times away from it. Have students speculate at four different positions, which would be the coldest times, and which would be the warmest.

- Using a sunrise/sunset table for your own city (available here: [http://aa.usno.navy.mil/data/docs/RS\\_OneYear.php](http://aa.usno.navy.mil/data/docs/RS_OneYear.php)) Have students calculate the changing numbers of daylight for the 21<sup>st</sup> of each month (or more frequently, depending on the level of your students.) Ask them to draw conclusions about their data. What do they notice about the month's data? Help them understand that the time period between the vernal equinox and the autumnal equinox offers growers the warmest temperatures and the longest periods of daylight.
- Arbor Day is celebrated in the United States at various times throughout Spring. Its goal of planting trees underscores the importance of plants and its variable celebration date is reflective of the various dates Spring arrives. As a class via a data projector, identify the different dates Arbor Day is celebrated using the interactive map. (<http://www.arborday.org/>) Discuss other celebrations that happen in our country during this time.
- Using web-based sources, or picture books (*The Spring Equinox: Celebrating the Greening of the Earth* by Ellen Jackson is a good choice) share with your students ways other cultures celebrate Spring.

**Questions:** (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)

What are our four seasons? (Knowledge)

What is different about each season? (Comprehension)

What happens between the earth and the sun to create our seasons? (Application)

Why do growers in the Northern Hemisphere begin their planting in Spring? (Synthesis)

**Extensions:**

1. Have students change locations to gather daylight hours. Have them choose a location in the Southern Hemisphere or one near the North Pole. Ask them to speculate how the change will affect their daylight hours and their seasons.
2. Have students research additional cultural celebrations of Springtime.
3. There is a much more detailed analysis of the Earth-Moon-Sun connection at:  
<http://ncisla.wceruw.org/muse/earth-moon-sun/index.html>

## Our Changing Seasons

What are the characteristics that make up each season? What kinds of things do you do in the different seasons? What is the weather like in these seasons? Using pictures or words, create a picture of each season and all that it brings.


**Lesson Plan:** Fall Harvest Cultural Celebrations

**Unit:** Planting and Harvesting

**Objectives:**

- Students will understand why seasons in temperate regions begin and end when they do
- Students will understand why fall is the end of planting season in the Northern hemisphere
- Students will understand how various cultures celebrate the onset of Fall and Harvest time

**Modified Curriculum Objectives:**

- To understand why fall is the time we harvest

**Materials:**

1. National Geographic Cosmic Map:  
<http://www.nationalgeographic.com/xpeditions/activities/07/popup/cosmic.html>
2. Paper/crayons/markers for *Our Changing Seasons* handout.
3. Picture Books: (i.e. *Autumn Equinox: Celebrating the Harvest*, by Ellen Jackson)
4. Internet sites discussing Harvest Festivals
  - The Family Culture. A description of various harvest celebrations around the world.  
<http://www.familyculture.com/holidays/harvestcelebrations.htm>
  - *Pongal. The Harvest Festival of South India.*  
<http://www.pongalfestival.org/>
  - *Harvest Celebrations in the United Kingdom*  
<http://www.teachernet.gov.uk/teachingandlearning/library/harvestfestivals/>

**Time:** 75 minutes

**Background Information on the Fall Equinox**

National Geographic Expeditions

<http://www.nationalgeographic.com/xpeditions/activities/07/season.html>

“Because the direction of the Earth's tilt changes in relation to the sun, the northern and southern halves of our planet get differing amounts of sunlight over the course of the year. When the Northern Hemisphere of the Earth is leaning toward the sun, it receives direct rays of sunlight and is warmer, while the Southern Hemisphere receives more indirect rays.

When the northern part of the Earth is leaning away from the sun, the situation is reversed—the Northern Hemisphere gets cooler, more indirect sunlight while the southern half receives direct

rays. Because of this, the seasons in the Northern and Southern Hemispheres are reversed, about six months apart from each other.

The changing position of the Earth's tilt is the reason for the differences in temperature and length of daylight that distinguish the seasons. When the Northern Hemisphere is leaning toward the sun, the warmth of direct rays causes spring and then summer in that part of the globe. When the Northern Hemisphere is leaning away from the sun, the cooling effects of more indirect sunlight cause autumn and winter.

Because the astronomical position of the Earth causes the seasons, the start of spring, summer, autumn, and winter is marked by special days that correspond to different points in the Earth's orbit:

The **summer solstice** is the first day of summer and the longest day of the year, occurring in the Northern Hemisphere when the North Pole is leaning more directly toward the sun than it does on any other day. During the period marked by the summer solstice, the Northern Hemisphere is warmed by more direct sunlight and days are long and hot.

The **winter solstice**, by contrast, is the first day of winter and the shortest day of the year. As you might have guessed, the winter solstice in the Northern Hemisphere occurs when the North Pole is leaning away from the sun. When the North Pole is pointing away from the sun, the Northern Hemisphere receives only indirect sunlight; that is why winter is so much colder than summer. Brrrr!

Equinoxes, on the other hand, occur during transition periods when the North Pole is pointing neither directly toward nor directly away from the sun; these days are marked by equal periods of light and darkness. The **autumnal equinox** is the first day of autumn and occurs when the North Pole begins to lean away from the sun; the **vernal equinox** is the first day of spring and occurs when the North Pole begins to lean toward the sun again. “

### **Teacher/Student Instruction:**

Ask students:

1. What are our four seasons? What is different about each? (Students can identify activities that are part of each season. They may wish to draw these activities or list them.)
2. Why do our seasons happen? Using the background information provided, explain to students how it is both the Earth's rotation and its tilt that creates the variations in temperature and daylight throughout the year.
3. Do a simple simulation with students to show the Earth's rotation and tilt. Have one student stand still, acting as the Sun. Have another student point to an object across the room, acting as the Earth. Have the Earth student rotate counterclockwise around the Sun, showing how sometimes she is tilted (via her finger) toward the sun, and other times

away from it. Have students speculate at four different positions, which would be the coldest times, and which would be the warmest.

4. Using a sunrise/sunset table for your own city (available here: [http://aa.usno.navy.mil/data/docs/RS\\_OneYear.php](http://aa.usno.navy.mil/data/docs/RS_OneYear.php)) Have students calculate the changing numbers of daylight for the 21<sup>st</sup> of each month (or more frequently, depending on the level of your students.) Ask them to draw conclusions about their data. What do they notice about the month's data? Help them understand that the time period between the vernal equinox and the autumnal equinox offers growers the warmest temperatures and the longest periods of daylight.
5. Using web-based sources, or picture books share with your students ways other cultures celebrate Autumn in general and the fall harvest in particular. Use the resources in the Materials section above to allow children access to other cultures' celebrations.
6. Consider a wide range of lesson ideas throughout the season such as these listed here from the Farming Friends (<http://farmingfriends.com/harvest-festival-lesson-ideas/>) web site:
  - Discuss the meaning of harvest festival with the children and then the children explain what harvest festival means in their own words.
  - Children complete a story board of the meaning of harvest.
  - Research how harvest is celebrated in different countries.
  - Visit a farm during potato harvest.
  - Get a farmer to talk to the class or school about crops that are harvested.
  - Children research different crops that are harvested and draw pictures and write about the different crops.
  - Look at food products made from harvested produce.
  - Draw fruit, vegetables and loaves of bread in crayon or pastel to show in assembly.
  - Learn about when arable crops are planted and harvested and draw storyboard explaining the planting and harvesting calendar.
  - Draw up a timeline of the farming year.
  - Sequence pictures of farming activities to learn about how crops are grown and harvested.
  - Learn about area and perimeter in math using field measurements.
  - Learn about weight and mass through the study of farm produce.
  - Write poems about harvest.
  - Draw self portraits by drawing fruit and vegetables to create the features of the face – look at artists work portraying vegetable faces.
  - Create fruit and vegetable faces using real fruit and vegetable.
  - Write a recipe using harvested ingredients.
  - Bake bread and make sandwiches.
  - Visit a mill and watch the corn being milled and made into flour.
  - Find out about the nutritional value of bread.
  - Make corn dollies.

- Learn about local seasonal food products.
- Pick a food product or meal and work out where all the ingredients have come from and how many air miles used to bring the food to the children.
- Act out farming activities.
- Draw one thing the children could harvest this week from their own garden, park, allotment or roadside.

**Questions:** (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)

What are our four seasons? (Knowledge)

What is different about each season? (Comprehension)

What happens between the earth and the sun to create our seasons? (Application)

Why do growers in the Northern Hemisphere harvest their crops in the Fall? (Synthesis)

**Extensions:**

4. Have students change locations to gather daylight hours. Have them choose a location in the Southern Hemisphere or one near the North Pole. Ask them to speculate how the change will affect their daylight hours and their seasons.
5. Have students research additional cultural celebrations of Autumn.

**Accommodations:**

Have students work in mixed ability groupings to support each other with literacy activities and other parts of lessons that can be a challenge for students with disabilities. Select text appropriate for each group's literacy skill levels and support text with visuals where possible.

## Our Changing Seasons

What are the characteristics that make up each season? What kinds of things do you do in the different seasons? What is the weather like in these seasons? Using pictures or words, create a picture of each season and all that it brings.


**Lesson Plan:** Spring Gardening Topics

**Unit:** Planting and Harvesting

**Objectives:**

- Students will understand and participate in spring gardening tasks and preparations.

**Materials:** Depends on activity.

**Time:** 15 minutes – 1 hour

**Vocabulary:** organic matter, reemay, row cover, mulch, rototill, compost, amendments

**Background Information:**

### **Spring Bed Preparation**

Spring is a very exciting time in the garden and on the farm. If you have an already established garden it is time to get the students outside to experience the hands on tasks of growing food. The first step in the spring is to prepare your soil for planting. You want your soil to be well aerated, fluffy, and able to drain well. It is a balancing act because you want a nice smooth bed for planting seeds and seedlings, but you don't want to work the soil so much that you cause compaction, crusting or encourage the weed seeds to germinate. Prepare your bed according to what you are planting. Seedlings need less fine soil because you are planting sizable plants into the bed (onions would be an exception to this). Direct seeding is easier with a more fine soil.

In the fall it is best practice to covered the beds in hay mulch or cover crop to protect the soil over the long winter. If you planted a cover crop that dies over the winter you can incorporate that back into the soil. If you mulched the beds, you can leave the mulch on the beds and plant seedlings right into them by creating a spaces in the hay at the proper spacing intervals. If you have very compacted or clay soils, or are planting seeds or delicate seedlings, consider removing the mulch and loosening up the top three inches of the bed to prepare it for planting. It is not necessary to rototill your beds each season. In fact, excessive tillage can be very detrimental to the soil. When the soil is worked too often or too finely, organic matter can be lost. Organic matter is that part of the soil that was once alive. As living tissue decomposes it releases nutrients, improves soil structure, and increases the biological activity in the soil.

### **Mulching**

Mulching all beds thickly with hay mulch in the spring and fall helps foster healthy soil. Hay mulch is much better than straw because it builds more soil nutrients. The benefits of mulching are that it suppresses weeds – (you don't have to weed as much and your garden looks much nicer), prevents soil erosion, improves water retention (conserves water by allowing you to water less), prevents soil erosion, helps control soil diseases by preventing the soil from splashing onto

plants during rain storms and spreading disease (this is vitally important when planting tomatoes), and adds organic matter to the soil. Note: Make sure the hay mulch you purchase does not have weed seeds in it or you will be introducing more weeds into your garden.

### **Compost and Amendments**

Add compost to your garden each year in the spring and/or fall. Use compost from your home composting system, free compost from your city or town, free manure from area farms or bagged compost from a local garden center. (Add only well composted animal manure to garden beds in the fall to allow time for the manure to compost more fully before it comes in contact with food.) When transplanting seedlings place a handful of compost in each hole with the plant. It is also recommended to get a soil test done on your garden every few years. Soil samples can be sent to your local university or extension office. The soil test will help you determine what nutrients, if any, are lacking in your garden.

### **Reemay or Row Cover**

Reemay is a reusable polyester fabric that floats over the plants in the row while allowing 75% light transmission. The porous fabric allows light, air, and moisture to reach the plants. Reemay is useful for protecting young seedlings from insects and bigger pests like rabbits and groundhogs, traps heat, and retains soil moisture. Immediately after planting, watering and mulching seedlings or seeds put reemay over the entire bed. If you are trying to protect your crops from a pest such as flea beetles or cucumber beetles you must bury the entire length of reemay so that it doesn't have any openings. Take a hoe or shovel and dig up the soil in the aisle to bury the perimeter of the reemay. If you are using the reemay to protect from larger pests or animals, use rocks, t-posts or other heavy objects to weigh down the reemay. You don't have to worry about creating a seal. Do not pull the reemay taut over the bed, leave it loose across the top so that the plants have room to grow into it.

Some tests have shown temperatures under the reemay are 3-7°F warmer than surrounding uncovered areas. Use reemay to cover hot weather crops like eggplant and peppers in the spring to give them a temperature boost. Once the crops are flowering you must remove the reemay so that the plants are able to be pollinated. Reemay lasts 1-4 growing seasons depending on its accumulated exposure to the sun.

### **Proper Watering**

Water is necessary for all stages of vegetable growth from seed germination through flowering, fruit maturation and seed development. It is essential for crops to reach their full production potential. Watering or irrigation is often abused by the gardeners through overwatering, underwatering or watering at the wrong time.

Vegetables generally require 1 inch of water per week for normal growth. When rainfall does not supply this amount, supplemental water is necessary. Soil moisture will vary with temperature, wind conditions and soil type. Consider installing a simple rain gauge in the garden to track the

rainfall each week. If it rains an inch or more then you don't need to water the garden. Mulching is an important factor in watering – it cuts down on the weeds that compete with the plants for water and also retains moisture in the soil. If you are in doubt about whether to water the garden, stick your hand into the soil. If it feels moist then there is no need to water.

It is best to water vegetable crops in the morning. Plants need moisture most during the day while they are photosynthesizing. It is important that plants go into the night with their leaves dry because moisture on leaves promotes fungal disease. If evening is the only possible time to water, avoid splashing water on the foliage by directing the flow onto the soil. It is also best to water only once a week, thoroughly soaking the soil. Water vegetables deeply by soaking soil to a depth of 5 to 6 inches. The ideal watering system delivers the water to the soil without getting the foliage wet. Emitter-type systems, soaker hoses and hand-held watering wands work well. Hold the wand directly up to the bottom of the plant to ensure that the water is flowing deeply to the roots only. Avoid frequent, light sprinklings. These result in shallow root growth that makes crops more susceptible to drought stress. Frequent evening sprinklings increase the potential for foliar diseases.

The stages of crop development where water is critically important in terms of moisture requirements are seed germination and transplant establishment. Different vegetables require water at specific times during their development for best quality. Root crops need a constant supply of water during root development. Fruit crops, like tomatoes and peppers, should not be allowed to wilt between flowering and fruit production. Adequate water during the tasseling stage results in best ear development in corn.

Adapted from the Troy Community Farm Intern Training Manual, author Claire Strader, Madison FarmWorks ([troygardens.org](http://troygardens.org)), and <http://www.hcs.ohio-state.edu/mg/manual/veg3.htm>

### **Teacher Instruction:**

These are lessons designed for the spring planting season as mini topics to cover as the students work through the different tasks of preparing the garden and planting.

### **Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What are the benefits of mulch?
2. What are the steps of preparing a garden bed for planting?

**Lesson Plan:** Direct Seeding and Transplanting

**Unit:** Planting and Harvesting

**Objectives:**

- Students will learn how to correctly plant seeds and seedlings.
- Students will learn about planting spacing and why it is important.

**Materials:** seeds, seedlings, tools, compost, watering cans, measuring tape

**Time:** 1 hour

**Vocabulary:** seed, seedlings, trowel, compost, direct seed, transplant, transplant shock, hardening off

**Background Information:**

Refer to the *How Are These Crops Planted* lesson for background information on direct seeding vs. transplanting.

**Teacher Instruction:**

If the class grew the seedlings inside a greenhouse or classroom then the plants should be hardened off before transplanting. A week or two before planting the seedlings in the garden put them outside during the day for short periods of time at first and gradually lengthening the time they spend outside. This accustoms them to the more rough conditions outside of the greenhouse such as sun, wind, rain and temperature fluctuations. A day or two before transplanting, leave the seedlings out overnight. Hardening off plants helps thicken their leaves which gives them a better chance of surviving transplant shock. If you are buying plants from a nursery they most likely have been hardened off already, but it is always wise to ask when purchasing the plants.

Seedlings should be strong and healthy to help them survive transplant shock. Moving the plants from an indoor environment to the tougher conditions outside is traumatic. Disturbing the plants' root systems during transplanting also contributes to shock and it takes them a few days to repair their root systems and continue to grow. Give them plenty of water when planting them in the garden, but don't over water in the following days. Plants may look droopy for a few days as they adjust to their new environment.

Some crops prefer to be direct seeded and some are best transplanted. Review some of the learning points in the *How Are These Crops Planted* lesson with the students.

Discuss the attached Crop Spacing Guide with students. Explain how crops prefer different spacing due to their growth habits. Tomatoes get big and bushy so they need to be given room to grow. Basil grows more compactly so can be planted closer together.

Demonstrate how to take a seedling out of its container. Remove the plant from the container very carefully. Try to keep as much of the soil and roots as intact as possible. Turn the container upside down and support the plant with your hand so it doesn't fall onto the ground. Gently tap the bottom and sides of the container. Do not pull on the stem of the plant.

### **Student Instruction:**

Steps for transplanting seedlings:

1. Pick a vegetable to transplant and consult the attached Crop Spacing chart to note how close to plant the seedlings and how many rows to put into the garden bed.
2. Run a measuring tape down the length of the bed and secure the end with a stake or rock. Use a trowel to make holes at the appropriate intervals. Make a hole twice the size of the root ball. E.g. Tomatoes are planted at 18 inch spacing so a hole needs to be dug at every 18 inches on the measuring tape. *This is a good math exercise. Consider having another student following along to check on the lead student's math calculations. Another variation is to have a long stick with a hash marks every 18 inches that can be moved along the bed instead of using a measuring tape.*
3. Another student will follow the first student with a bucket of compost. He will put a scoop of compost into the hole.
4. The next student will follow with the seedlings. She will remove a seedling from its container, break apart the roots and place it in the whole. Then she will cover up the roots of the seedling by spreading the soil around the plant. *Note: Do not plant seedlings too deep. All seedlings need to be planted at the same depth that they were growing in the container. The exception to this is tomatoes which can be planted up to their first set of leaves.*
5. Another student will follow the planter with a hose or watering can to water in each seedling.
6. A final group of students will mulch the plants using hay, leaves or straw.

Steps for direct seeding:

1. Pick a vegetable for direct seeding and consult the seed packet for appropriate spacing. Decide how many rows you will plant in the garden bed.

2. Use a long stick or the handle of a tool to make trenches of the appropriate depth for planting the seeds.
3. Demonstrate the correct seed spacing to students and then allow 1-2 students on each side of the bed to begin seeding.
4. Other students can follow along after the seeders and cover up the seeds and water the rows with a watering can or hose. *Note: Sometimes it is useful to leave the entire row uncovered until after they are done seeding it so they can go back and survey the row to check on their own seed spacing.*

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. Why do we transplant some crops and direct seed others?
2. What is the purpose of adding compost to each planting hole?
3. Why do we mulch the plants after planting?
4. Why does the spacing differ for various vegetables?
5. How long do you think it will take for the seeds to germinate? How do we find that out?
6. What do the seedlings need in order to begin growing in the garden bed?
7. How much food do you think each of these seedlings and seeds will produce?

**Vegetable Spacing Guide** (Developed by Troy Community Farm and Madison FarmWorks)

Based on a 3.5 ft. wide bed system. Plant crops as close together as possible so they make a canopy to shade the ground and prevent weed germination and growth, but careful not to plant crops so thickly that they do not have enough nutrients in the soil to grow.

Vegetables	Spacing
Beans	2 rows 2.5' b/w rows
Beets	3 rows/bed
Broccoli	2 rows/bed 12" b/w plts
Brussels Sprouts	2 rows/bed 18" b/w plts
Cabbage	2 rows/bed 18" b/w plts
Carrots	3 rows/bed
Cauliflower	2 rows/bed 18" b/w plts
Celeriac	3 rows/bed 18" b/w plts
Celery	3 rows/bed 12" b/w plts
Chard	3 rows/bed
Collards	2 rows/bed 12" b/w plts
Corn	2 rows 2.5' b/w rows
Cucumber	2 rows/bed 12" b/w plts

Vegetables	Spacing
Eggplant	3 rows/bed 18" b/w plts
Fennel	3 rows/bed 12" b/w plts
Kale	2 rows/bed 12" b/w plts
Kohlrabi	4 rows/bed 12" b/w plts
Leeks	3 rows/bed 4" b/w plants
Lettuce	4 rows/bed 12" b/w plts
Melon	2 rows/bed 18" b/w plts
Onions	5 rows/bed 6" b/w plants
Pac Choi	4 rows/bed 12" b/w plts
Peas, Shell & Snow	2 rows 3' b/w rows
Peas, Snap	Double rows 3' b/w rows

Vegetables	Spacing
Peppers	3 rows/bed 18" b/w plts
Potatoes	2 rows 12" b/w plts
Fingerling	6" b/w plants
Radish	4 rows/bed
Rutabega	3 rows/bed
Salad Mix	6 rows/bed
Spinach	4 rows/bed
Squash, Gourds	1 row/bed 12" b/w plts
Squash, Summer	1 row/bed 12" b/w plts
Squash, Winter	1 row/bed 18" b/w plts
Tomatoes	2 rows/bed 18" b/w plts
Tomatillos	2 rows/bed 18" b/w plts

## **Lesson Plan:** Harvesting Techniques

**Unit:** Planting and Harvesting

### **Objectives:**

- Students will understand how to harvest different crops correctly.
- Students will learn how to process crops after harvesting.

**Materials:** Farm field with vegetables to harvest

**Time:** varies, ongoing activity

**Vocabulary:** harvest, hydro-cooling, bunching, rehydrate

### **Background Information:**

The part we've all been waiting for. All the planting, weeding, trellising, mulching, insect control and everything else we've been doing has all been leading up to this task. As the season progresses, other tasks take up less and less of the time on the farm, until fall when we spend the majority of our time pulling in our bounty. Many vegetable farms harvest over 40 different crops through the season. Describing the process for each of these crops here would be tedious. So we will concentrate on some harvesting basics.

### **Timing**

As with so many tasks on the farm, proper timing for harvest can make all the difference in efficiency and quality of the job. Timing is important in terms of pulling in the crop at right time in its own life cycle (maturity), but also in terms of the right time of the harvest day. A leafy crop that is mature and still perfectly tender and delicious can be ruined if it is harvested under the wrong conditions.

#### *Early Morning*

In the hours just after sunrise crops are as cool and crisp as they will ever be in the field. The cooler night temperatures and dew combine to hydrate and refresh all crops. These cool, damp conditions are perfect for harvesting all leafy crops such as lettuce, salad mix, kale, chard, spinach and cilantro. Peas, broccoli, cabbage, carrots, and beets will also benefit from being harvested before the sun has a chance to warm and dry the foliage, but these crops can also be safely harvested a little later in the day.

#### *Mid Morning*

By this time crops are usually dry and beginning to get warm in the sun, but they are generally still fairly crisp. This time is perfect for green beans, summer squash and cucumbers in particular. These crops are especially susceptible to disease, and they are harvested several times over a period of weeks. When they are harvested with wet foliage, disease can spread rapidly and negatively affect the long-term health of the crop. But if they are harvested later in the day, the fruit can get limp. It is also good to harvest

eggplant and peppers during the mid-morning, though they are not as susceptible to disease or to wilt, and can tolerate being harvested most any time of the day.

### *Afternoon*

Unless it is a particularly overcast or rainy day, the fields should be quite warm and dry by afternoon. Now is the time to harvest tomatoes as well as other crops that should be quite dry when they come from the fields such as onions, dry beans, and pop corn. Dry conditions are important for tomatoes because they (like beans and summer squash) are harvested over a longer season and can be devastated by disease spread in wet conditions. Also, the fruits are easier to clean and prepare for market when they come from the field dry. Dry product ready for curing is the real key with onions, dry beans, and popcorn. These crops are harvested at the end of the plant's life cycle when disease is no longer an issue.

Most of the other crops can be harvested at any time of day. Leeks, scallions, potatoes, winter squash, edamame, and others are not greatly affected by the timing of their harvest.

## **Technique**

We can group crops into general categories, and discuss the basic harvesting techniques used for each.

### *Field Bunching*

Kale, chard, cilantro, and parsley are the crops we most commonly bunch in the field. All of these crops are easy to size in the field and tend to come out pretty clean. The bunches only need to be dunked in water for a quick wash and cool once they are harvested. A knife and rubber bands are needed for field bunching. Since collecting a specific number of bunches is also part of the job, it's a good idea to count out the correct number of rubber bands before you begin. You can often store the rubber bands on the handle of your knife for easy access as you work.

The general procedure here is to break or cut the stems from the main plant, make an attractive bunch of the appropriate size, band the bunch, and trim the ends evenly. Stack bunches into crates or buckets. While working, you should keep your bunches in the shade, if possible. You can often tuck the crates or buckets up under leafy crops to keep them out of the direct sun. Working quickly will also reduce sun exposure and unnecessary wilting.

### *Bulk Harvest for Wash Shed Bunching*

Some crops cannot be bunched in the field either because they cannot be adequately cleaned once they are in bunches, or because they need to be inspected and/or sized before bunching. These crops are harvested in bulk and brought back to the shed for bunching. It can be difficult to estimate how much to harvest in order to achieve the necessary number of bunches. The farmer can give you pointers, but practice is the best teacher. Many of the crops in this category are root crops like radishes, beets, and carrots. Scallions and leeks also fall into the category. You will simply pull some of them out of the ground (radishes and beets), some will come out with a fork (carrots) and

some will need to be trimmed in the field once they are pulled from the ground (scallions and leeks).

### *Picking*

Most everything else is harvested individually in the field and then cleaned and packed in the wash shed. Different tools and containers are used for different crops. For instance, all summer squash is harvested into shallow crates lined with towels to protect their delicate skin. Zucchini must be harvested with a knife, but yellow squash and patty pans can simply be twisted from the plants by hand. Peas, beans, peppers and others are harvested into buckets for easy portability down the row. Bulkier crops like fennel, lettuce, or cabbage are harvested into crates in order to accommodate their size.

Tomatoes are one crop that is harvested, sorted, and packed right in the field. Most tomato fruits come off the vine rather clean, unless they are touching the ground or there has been a lot of soil splash with recent rain. As each fruit is plucked, the picker removes the calyx (stem) and grades the tomato as a first or second. The firsts are packed directly into boxes for wholesale or market. The seconds are gathered into buckets for further sorting and packing in the wash shed. Unacceptable fruits are tossed into empty beds between tomato rows right away.

Once you have a good understanding of what is acceptable and what is not, you should always remove unacceptable fruits and transport them to decompose in the compost pile. Bad or blemished fruits that are left on the crop will continue to use the plant's energy without resulting in a usable product. So spotty, over-mature, rotten, or otherwise blemished fruits are picked and discarded with every harvest. This practice applies to all crops that are harvested more than once: peas, beans, peppers, tomatillos, tomatoes, squash, cucumbers, and even kale or chard, as examples.

### **Post-Harvest Handling**

As crops are brought in from the field, they are cooled, cleaned, and packed in the wash shed. The main technique here is called hydro-cooling, which simply means cooling with water. Crops are dunked into cold water in order to quickly remove any field heat, and rehydrate their cells. The water also washes away dirt. Greens, peas, beans, and many other crops are treated in this way. Most crops will be packed wet right after hydro-cooling. But some, like beans and salad mix, are left out to dry a bit before being packed away. Excess water can rust beans and rot salad mix.

Carrots, beets, radishes, scallions and leeks are examples of crops that are not hydro-cooled exactly, but rather spray washed before bunching. The bulk crop is laid out on the screens in neat rows, sprayed, and bunched. Except for scallions, we bunch all these crops like with like. So all the short, stubby carrots are bunched together, and all the long, skinny carrots go together. Scallion sizes can be mixed in the bunch. Bunch sizes for each crop must be consistent within each harvest, but can vary somewhat from week to week, depending on quality and quantity of crop. After the harvest is bunched, all the bunches are sprayed one more time to remove any dirt spread around in bunching.

Packing vegetables can be tricky. The goal here is always to fit as much as possible into a crate without crushing anything. In general only one type of vegetable should go into a crate. Most crops are covered with a dripping wet towel once they are packed. The wet towel helps keep the food hydrated while in the cooler, which has a tendency to dry as it cools. Beans and salad mix are notable exceptions to this rule. These crops are packed in dry towels.

There are a few crops that are not cooled before sale. Tomatoes, potatoes, onions, garlic, and winter squash are examples. These crops are stored in a dry shady place, after some wet or dry cleaning, but are not refrigerated.

### **Recording and Flow**

We keep a harvest recording sheet on a clipboard in the wash shed. As each crop comes into the shed and is packed, we record how much we've got. We always keep these records in the same units that the crops are sold in. So, for instance, broccoli will be recorded in pounds, lettuce heads by the piece, and carrots by the bunch. The record sheet indicates the appropriate unit for each crop. At the end of the season, these records are transferred to our overall crop records and we can calculate how much we harvested and earned from each planting.

*Adapted from Troy Community Farm Training Manual: A Guide to Farm Practices and Procedures, by Claire Strader.*

### **Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. Why is it important to know how each vegetable is harvested and handled?

**Extensions:** Have each student choose a crop and walk the group through the proper harvesting, washing and packing techniques.

See Wash Shed Record attached.

## Wash Shed Record Sheet

Beans (lbs)

Maxibel

Yellow

Italian

Beans, Soy (lbs or bunch)

Butterbeans

Shiriofumi

Beets (bunch)

Broccoli (lbs)

Brussels Sprouts (lbs or pints)

Cabbage (piece)

Carrots (bunch)

Cauliflower (piece)

Collards (bunch)

Sweet Corn (piece)

Cucumber  
(piece)

Slicer

Pickle

Eggplant (piece)

Orient

Express

American

Special

Fennel (piece)

Kale (bunch)

Kohlrabi (bunch)

Leeks (lbs or bunch)

## Week:

Onions (bunch or pint)

Green

Cipollini

Pac Choi (bunch or piece)

Peas, Shoots (bunch)

Peas, Shell (lbs)

Green Arrow

Knight

Mr. Big

Eclipse

Peas, Snap (lbs)

Sugarsnap

Sugar Ann

Peas, Snow (lbs)

Sumo

Radish (bunch)

Salad Mix (lbs)

Spinach (bunch or lbs)

Squash, Summer (piece or lbs)

Raven

Seneca Supreme

Sunburst

Tomatoes, Cherry (pint)

Tomatoes, Paste (lbs)

Tomatoes, Slicer (lbs)

Tomatillos (lbs)

**Herbs (bunch)**

Basil

Celeriac (piece)

Lettuce (piece)

Peppers, Hot (piece)

Cilantro

Chard (bunch)

Melon (piece or lbs)

Peppers, Sweet (piece)

Dill

Parsley

## Bulk Harvest Record Sheet

Dry Beans (lbs)

Vermont Cranberry

Jacob's Cattle

Black Turtle

Potatoes (lbs)

Carola

Dark Red Norland

Rose Villette

All Blue

Garlic (piece)

Seed

Large

Medium

Small

Squash, Winter (piece or lbs)

Pumpkins

Acorn

Spaghetti

Delicata

Carnival

Butternut

Onions (lbs)

Super Star

Copra

Mars

Red Ring

Shallots

Saffron

**Lesson Plan:** Water Needs of Crops

**Unit:** Planting and Harvesting

**Objectives:**

- Students will understand how to properly water plants in the garden.
- Students will understand why it is important to water plants at certain times using specific techniques.

**Materials:** watering cans, hoses

**Time:** Ongoing throughout the season

**Vocabulary:** rain gauge, precipitation, evaporation

**Teacher Instruction:**

Some plants are composed of up to 95 percent water. Water is vital from the moment seeds are sown through sprouting to the end of the growing season. Plants need water for cell division, cell enlargement, and even for holding themselves up. If the cells don't have enough water in them, the result is a wilted plant. Water is essential, along with light and carbon dioxide, for producing the sugars that provide the plant with energy for growth. It also dissolves fertilizers and carries nutrients to the different parts of the plant.

Ideally, water for plants comes from rain or other precipitation and from underground sources. In reality, you'll often have to do extra watering by hand or through an irrigation system. How often you should water depends on how often it rains, how long your soil retains moisture, and how fast water evaporates in your climate. Soil type is another important factor. Clay soils hold water very well -- sometimes too well. Sandy soils are like a sieve, letting the water run right through. Both kinds of soil can be improved with the addition of organic matter. Organic matter gives clay soils lightness and air; it gives sandy soils something to hold the water.

Other factors may also affect how often you need to water your garden:

- More water evaporates when the temperature is high than when it's low. Plants can rot if they get too much water in cool weather.
- More water evaporates when the relative humidity is low.
- Plants need more water when the days are bright.
- Wind and air movement will increase the loss of water to the atmosphere.
- Water needs vary with the type and maturity of the plant. Some vegetables are tolerant of low soil moisture.

- Sometimes water is not what a wilting plant needs. When plants are growing fast, the leaves sometimes get ahead of the roots' ability to provide them with water. If the day is hot and the plants wilt in the afternoon, don't worry about them; they will regain their balance overnight. But if plants are wilting early in the morning, water them immediately.

So much depends on climate and the ability of different soil types to hold moisture that it's difficult to give specific directions for watering your garden. Generally, however, vegetable plants need about an inch of water a week. The best time to water your garden is in the morning. If you water at night when the day is cooling off, the water is likely to stay on the foliage, increasing the danger of disease.

When watering crops always soak the soil thoroughly. To encourage deep rooting, it's better to apply one heavy watering to the garden than several light waterings. Encourage students to hold the watering can close to the surface of the soil not over the leaves. It is the roots of the plant that need the water, not the leaves. Some vegetables such as tomatoes and squash are susceptible to diseases that are encouraged by moisture.

Consider placing a rain gauge in the garden. They are an inexpensive way to monitor the amount of rain the garden is getting each week. Pick a day for watering. For example, if Monday is watering day, leave the rain gauge untouched from Monday to Monday. On that day, check the gauge to see how much rain the garden received. If it received an inch or more, no need to water. If it received less, have students water deeply.

If you are in doubt about whether to water or not, stick your hand into the soil, if it feels dry then it is necessary to water the crops.

An important note: Newly planted seeds like to remain moist until germination. If you have beds with seeds waiting to germinate, it is best to water them more frequently until the seeds germinate. Once germination occurs, you can water them weekly with the rest of the garden.

Mulching in the garden is a great way to retain moisture in the garden beds. It also builds organic matter. The presence of organic matter in the soil also helps retain moisture. See Spring Topics Lesson for more information about mulching your garden.

Adapted from [howstuffworks.com](http://howstuffworks.com)

### **Student Instruction:**

Bring students out to the garden and demonstrate proper watering of crops. Have them practice watering. Set up rain gauge and talk about how it works and why it is useful to have one in the garden.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What would happen if we stopped watering the garden?
2. What do you think would happen if we gave the garden a deep watering every day?
3. Why do we water deeply less often instead of a little bit every day?
4. How does mulching the garden affect the water needs of plants?

**Extensions:**

Learn about your watershed. Teach the students where the water they use in the garden is coming from. Discuss why it is important to use water efficiently in the garden.

## **Lesson Plan:** Nutrient Cycle: What Plants Need

**Unit:** Planting and Harvesting

### **Objectives:**

- Students will learn about three important nutrients plants need to grow.
- Students will learn different ways that farmers add fertilizers to the soil

**Materials:** Nitrogen cycle handout, fertilizer labels, Manure Tea (manure/compost, coffee filters, string, water, containers, and seedlings)

**Time:** 1 hour background discussion, 30 minutes to make tea, part of each day for 2 weeks to record observations

**Vocabulary:** Nitrogen, Phosphorus, Potassium, rhizomes,

### **Background Information:**

There are seventeen chemical elements that plants need to grow and reproduce. The nutrients include: carbon (C), hydrogen (H), oxygen (O), nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), sulfur (S), iron (Fe), manganese (Mn), zinc (Zn), copper (Cu), boron (B), molybdenum (Mo), chlorine (Cl) and nickel (Ni). Of these 17, all except carbon, hydrogen, and oxygen are derived from the soil. When the soil cannot supply the level of nutrient required for adequate growth, supplemental fertilizer applications become necessary. Three of these elements are highly important macronutrients for plants: nitrogen (N), phosphorus (P), and potassium (K). When purchasing chemical fertilizers the three numbers that appear on label represent these elements. There are also natural ways to add these elements to the soil to produce healthy plants. This lesson will focus on the importance of and varying ways to add nitrogen, phosphorus and potassium.

Soil testing can help determine which elements are needed for plants. With organic farming it is a good idea to add compost or manure at the beginning of the growing season and only add more if needed through the season. With chemical fertilizers it is important to know what the plants need so as not to waste time and money adding excess fertilizers. Excess fertilizers do not help plants grow bigger but run off fields and can cause environmental damage to rivers and streams.

### **Nitrogen**

Nitrogen is the most abundant element in the Earth's atmosphere accounting for 78% of the air we breathe. Plants need nitrogen to grow, nitrogen is found in the chlorophyll plants. This is what gives plants their green color and allows plants to make food for them by converting the sun's energy through photosynthesis. However, the nitrogen gas in the atmosphere is not available for use in plants. Often when a plant's leaves start to turn yellow it is due to a lack of available nitrogen.

Nitrogen gas ( $N_2$ ) must be converted into nitrate ( $NO_3$ ) or ammonium ( $NH_4$ ) ions before it can be used by plants. This conversion process called nitrogen fixation can be accomplished in three general ways including nitrogen fixing bacteria, manufactured at a chemical plant, and to a small degree lightning.

Nitrogen fixing bacteria work in two main ways being attached to legumes or breaking down plant or animal waste. Legumes such as beans and alfalfa grow specialized nodules on their roots called rhizomes. Rhizobia, nitrogen fixing bacteria live in these nodules and convert atmospheric nitrogen into nitrates that plants can use. Farmers can take advantage of this natural process by rotating crops. On many farm this involves planting soybeans every two-four years on a field to replenish nitrogen levels while planting corn the other years. Nitrogen fixing bacteria can also convert nitrogen in plant waste or manure from horses or cattle into nitrogen that plants can use.

At large chemical manufacturing plants ammonia is produced by using nitrogen from the air and hydrogen from natural gas. This process requires temperatures of over  $400^\circ C$  and great pressure. This process requires a large amount of energy from fossil fuels and is quite expensive. Most of the nitrogen fertilizer in the world is made in China. The United States no longer produces nitrogen fertilizers. However, U.S. farmers import many tons of chemical nitrogen fertilizer from Trinidad for use on wheat and corn crops.

Farmers have added nitrogen to the soil for hundreds of years. First by using animal manure, plant wastes and fish scraps. Later farmers learned the value of rotating crops with legumes. The first process for chemical production of nitrogen fertilizer was developed in 1884. It was not until after World War II that the production and use of chemical fertilizers were used in great numbers.

The nitrogen cycle is a process in which nitrogen from the atmosphere is converted into useable nitrates or ammonia for plants. Animals eat plants or other animals to obtain nitrogen. Nitrogen is then returned to the atmosphere by denitrifying bacteria.

## **Phosphorus**

While all plants require phosphorus annual plants require large amounts of phosphorus when they begin to grow in the spring. Trees, bushes and other perennials need smaller amounts of phosphorus. Phosphorus in the soil is often found in chemical form that cannot be immediately used by plants. The most common source for phosphorus in fertilizers is rock phosphate that is strip mined and then pulverized. This fertilizer is then added directly to the root zone during planting of seeds or seedlings.

Phosphorus stimulates early growth and root formation. Phosphorus is necessary for cell division and improves the plant's ability to absorb water and other nutrients. It also aids in photosynthesis and improves plant strength.

Organic fertilizers including composted food waste contain phosphorus. Phosphorus is also found in bone meal, ground up animal bones, as well as rock phosphate is considered organic. Bat guano is a good source of phosphorus while other manures contain small amounts of phosphorus. The addition of phosphorus in acidic soils is much faster than alkaline soils as the acid converts the phosphorus to a form more easily used by plants.

Farmers added bone meal to their fields as a way to add phosphorus for many years. However, it was not until 1808 that James Murray of Ireland discovered that soaking bones in acid help release more useable phosphates in later discovered that rock phosphates could be used in the same manner. The first phosphate manufacturing plant was built in New York in 1851 and the United States produced most of the phosphate fertilizer in the world for the next 100 years. Today, China produces more phosphate fertilizers though mines in North Carolina and Florida still produce 30 percent of the world's phosphate fertilizers.

### **Potassium**

Potassium is represented by the letter K on the periodic table this comes from the Latin "Kalium." Potassium is necessary for both plants and animals. While the soil has large amounts of potassium much of this is not readily available for plant use. Plants that are high in carbohydrates like potatoes require more potassium. Potassium has also been shown to increase the size of fruits and enhances the green color of leaves.

Most potassium chloride is mined from underground mine shafts. Potassium salts are also collected from inland salt lakes. This potassium is placed near the roots of plants to increase root growth, build cellulose and aid in photosynthesis. Potassium regulates the opening and closing of stomata or plant pores ample levels of potassium prevent excess water loss and wilting.

The initial use of potassium came from burning wood ashes and other organic matter during the making of soaps. This residue "pot ashes" or potash was placed on fields and was shown to increase crop yields. While potassium chloride comes naturally from ancient seas some organic farms prefer not to use this type of fertilizer. In addition, some plants cannot tolerate the chloride potassium can be added as a sulfate or nitrate.

All plants need these three macronutrients and often the soil is lacking in the amount of nutrients needed to grow healthy plants. By adding fertilizers it is possible to transform soil into productive ground for growing foods.

### **Teacher Instruction:**

1. Discuss with students the value of nutrients to the growth of plants.
2. Discuss from where different nutrients come.
3. Talk about the needs of plants and when to add fertilizers. As well as how to know when a plant needs more fertilizer.

4. Compare organic fertilizers to chemical fertilizers.

**Student Instruction:**

1. Make posters that illustrate one of the three nutrient cycles.
2. Compare different fertilizer labels.
3. Determine the nutrient needs of a specific crop and create a fertilizer label that would meet those needs.

**Make manure or compost tea.**

1. Place two tablespoons of manure/compost into a coffee filter, staple the bag shut and attach a string. The string can have a paper tag attached to the other end. This tag could be decorated with a logo for the tea.
2. For each student have a different container with a different amount of water. Need 16 different containers (1 cup-1 gallon), in one cup increments.
3. Hang the bag in a container with water overnight this allows the tea to steep.
4. Make observations and compare the different concentration of teas that have been made.
5. These different strengths of tea can be added to plant seedlings.
6. The plants can then be compared to determine what concentration of tea promoted the best plant growth. These observations should be taken over a period of several weeks.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. Compare using chemical fertilizers to natural fertilizers.
2. What are some sources of nitrogen, phosphorus, or potassium?
3. What happens when more fertilizers than plants need is added to the soil?
4. What can happen when fertilizers are added directly to the leaves of plants?
5. How can you determine the nutrient needs of a plant?
6. How do plants grow when they have ample fertilizer?
7. How do the nutrients get in compost?
8. Why is manure a valuable resource for farmers?
9. What happens when a farmer produces too much manure?
10. What costs are associated with fertilizers? Think economic, social, and environmental.
11. What do the three numbers on a fertilizer label stand for?

**Extensions:** Research the historical use of fertilizers. Design additional experiments that will determine the optimal level of fertilizers for a specific crop. Visit farms to see different types of fertilizer application.

**Resources:**

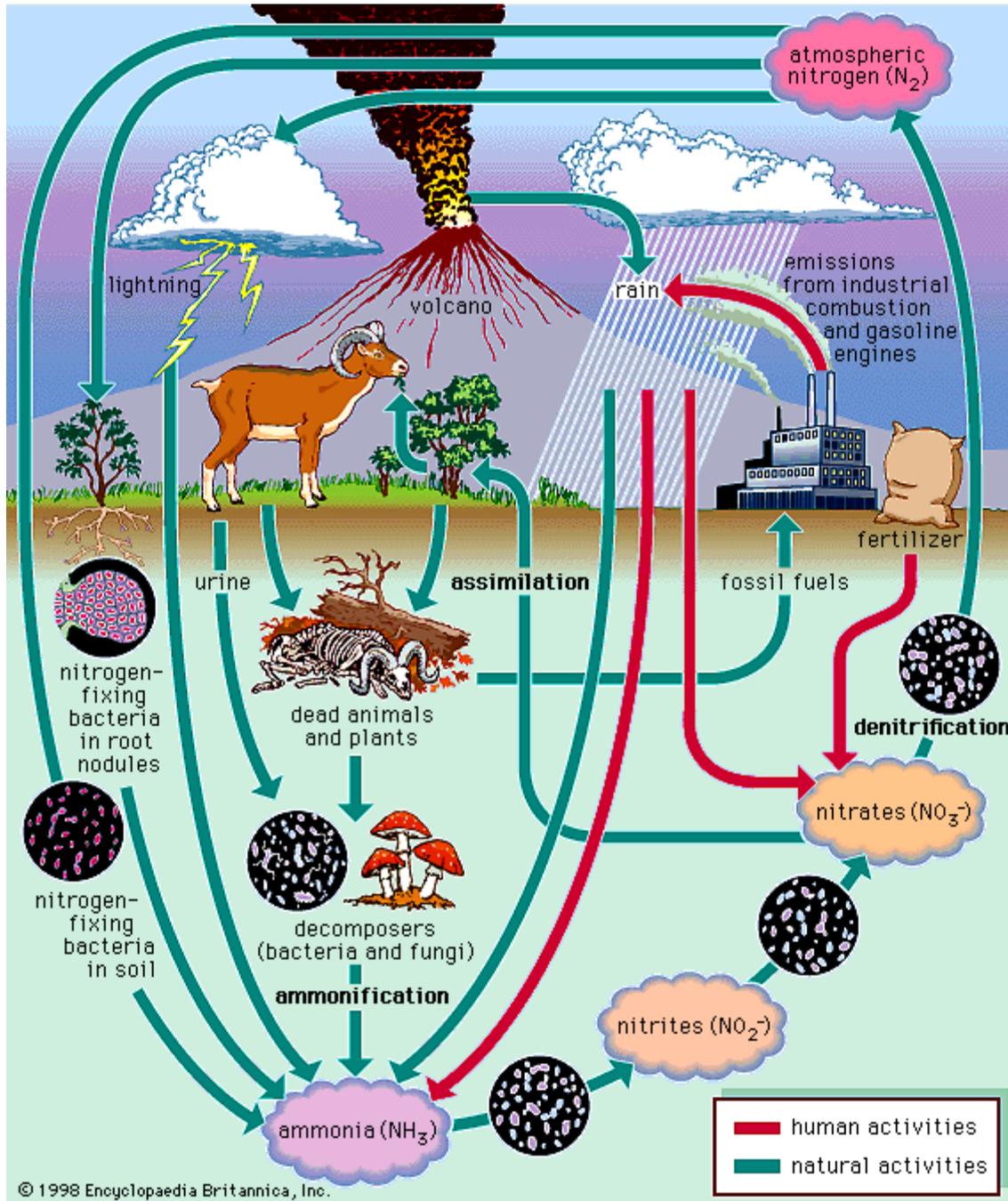
<http://www.vtaide.com/png/nitrogenCycle.htm> Nitrogen Cycle Diagram.

<http://www.tfi.org/factsandstats/fertilizer.cfm> Fertilizer Institute information about chemical fertilizers including videos.

<http://www.extremelygreen.com/fertilizerguide.cfm> List of organic fertilizers.

<http://uwlab.soils.wisc.edu/> Information on soil testing

# Nitrogen Cycle



**Lesson Plan:** Compost Macro Invertebrates**Unit:** Planting and Harvesting**Objectives:**

- Students will learn about the organisms that help to decompose plant matter into rich compost.
- Students will be able to create a food web that exists within the compost pile.
- Students will learn about population dynamics.
- Students will learn what is necessary for a healthy and productive compost pile.

**Materials:** Compost, Gloves, dissection keys**Time:** 60 minutes**Vocabulary:** Compost, Macro invertebrate, Bacteria, Fungi, Aerate, Carbon, Nitrogen, Calcium, Potassium, Phosphorous**Background Information:**

In outdoor compost piles, a wide range of invertebrates take part in the decomposition of organic matter. There are many other organisms; bacteria, fungus and a wide range of microscopic organisms that play a role in the decomposition as well, but these are harder to find and identify.

**Procedures to Find Macro Invertebrates**

One method of collecting invertebrates is to take grab samples of compost from various locations in the heap. Some organisms such as centipedes and sow bugs are more likely to be found near the surface. Others will be found deeper in the pile. Spread each compost sample in a large tray or piece of paper, preferably light in color for maximum contrast. Students can use wooden tongue depressors, plastic spoons, or other instruments that will not hurt the organisms, to sort through the compost. Flashlights and magnifying lenses can be used to enhance the observation. The larger organisms, such as worms, centipedes, millipedes, sow bugs, earwigs, spiders, ants, beetles, snails, slugs, mites, can be observed with the naked eye. To get a closer look, place samples of the compost in Petri dishes or watch glasses and observe them under a dissecting microscope.

An alternative method of separating small invertebrates in compost is by using a "Berlese funnel". This method will provide a higher concentration of invertebrates to view. Place a funnel in a ring stand. Attach a circle of 10 mm wire mesh below the funnel. Just below the funnel, place a vial to collect the specimens. Position a light source (25 watt) 2.0 - 2.5 cm above the funnel, or place the collecting apparatus in a sunny location. The light and heat drive the compost

organisms downward through the funnel and into the collecting jar. Too strong of a light source, will cause the organisms to dry up and die before making it through the funnel.

Place compost in the funnel and then partially fill the vial with water if you want to observe live organisms. Observe the organisms about 2 to 4 days later. They will remain alive and float on top of the water. You can place them in a Petri dish or watch glass and observe them under a dissecting microscope or with a magnifying glass. You should find small arthropods, including many different kinds of mites, a few different insect larvae, springtails, small millipedes, ants, etc.

**Teacher Instruction:**

1. Read the background information that is included in the Compost/Recycling/Trash Lesson Plan.
2. Watch video “It’s Gotten Rotten”
3. Bring in a bucket of composted material. It is good to have this come from the bottom of the pile or to consist of material that was composted last year. If you can visit the compost pile, this activity works well at the composting site.
4. Have a location that is easy to clean up. Outside works well if weather cooperates.

**Student Instruction:**

1. What do you think is in compost? Create a list of what you think you might find.
2. Sift through the compost. Keep track of what you find in your pile.
3. How many different types of macro invertebrates can you find? How many of each type?
4. Determine how many of one type will be in a larger pile.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What do the macro invertebrates do in the compost pile?
2. Create a food web including all the organisms you find.
3. What happens if these macro invertebrates are not present?
4. Do you have to add them to pile? Where do they come from?
5. What other organisms play a role in making compost?

**Extensions:** Visit composting sites; backyard, large garden, municipal. Start a red worm bin. Build two bottle compost bins. Build outdoor compost bins. Experiment by putting different items in the compost pile measuring the time it takes to decompose. Test the compost for nutrient levels.

**Resources:**

<http://cwmi.css.cornell.edu/compostingintheclassroom.pdf> Composting in the Classroom.  
Several weeks' worth of lessons for High School students.

<http://ecommons.library.cornell.edu/handle/1813/11656> It's Gotten Rotten 20 minute video and  
Teacher's Guide.

**Lesson Plan:** Compost, Recycling, & Trash

**Unit:** Planting and Harvesting

**Objectives:**

- Students will learn how to appropriately dispose of waste from the kitchen
- Students will be able to recognize what items can be recycled or composted.
- Students will understand the value of composting and how it relates to food production.
- Students will learn the costs associated with waste management and how to reduce those costs.

**Materials:** Items for relay or collage, Handouts

**Time:** 45 minutes- multiple days depending on extensions.

**Vocabulary:** Compost, Decomposition, Vermicomposting, Bacteria, Aeration, Macro invertebrates, Microorganisms, Retention, Landfill, Incineration, Leachate, Humus, Food Waste Digester

**Background Information:**

This lesson completes the cycle of food waste to compost for growing plants, Students will learn what waste items can be placed in compost and which items can be recycled or need to go to the landfill. These classifications depend on the facilities available in your area.

The art of composting has been part of our global culture since ancient times. The basic principles are quite simple, and adhering to them will result in an efficient and successful outcome. Studies have shown that home composting can divert an average of 700 pounds of material per household per year from the waste stream. Municipal composting carries a greater environmental cost, but not nearly as high as if leaf and yard waste are disposed of by conventional means. Composting is an excellent way to avoid both wasting useful natural resources and creating environmental problems, while at the same time producing a high quality and inexpensive soil amendment.

Composting is the transformation of organic material (plant matter) through decomposition into a soil-like material called compost. Invertebrates (insects and earthworms), and microorganisms (bacteria and fungi) help in transforming the material into compost. Composting is a natural form of recycling, breaking down organic material into soil in natural habitats.

An ancient practice, composting is mentioned in the Bible several times and can be traced to Marcus Cato, a farmer and scientist who lived in Rome 2,000 years ago. Cato viewed compost as the fundamental soil enhancer, essential for maintaining fertile and productive agricultural land. He stated that all food and animal wastes should be composted before being added to the soil. By the 19th century in America, most farmers and agricultural writers knew about composting.

Today there are several different reasons why composting remains a valuable practice. Yard and

food wastes make up approximately 30% of the waste stream in the United States. Composting most of this waste would reduce the amount of municipal solid waste requiring disposal by almost one fourth. Compost added to gardens improves soil structure, texture, aeration, and water retention. When mixed with compost, clay soils are lightened, and sandy soils retain water better. Mixing compost with soil also contributes to erosion control, soil fertility, proper pH balance, and healthy root development in plants.

The standard means of disposal for most yard and food waste include landfilling and incineration. These practices are not as environmentally or economically sound as composting. Plant waste which is placed in the landfill breaks down very slowly due to the lack of oxygen. As it decomposes, it produces methane gas and acidic leachate, which are both environmental problems.

Landfilling organic wastes also takes up landfill space needed for other wastes. Incinerating moist organic waste is inefficient and results in poor combustion, which disrupts the energy generation of the facility and increases the pollutants that need to be removed by the pollution-control devices. Composting these wastes is a more effective and usually less expensive means of managing organic wastes. It can be done successfully on either a large or small scale.

### **Decomposition**

Decomposition occurs naturally anywhere plants grow. When a plant dies, its remains are attacked by microorganisms and invertebrates in the soil, and it is decomposed turning into humus. This is how nutrients are recycled in an ecosystem. Natural decomposition can be encouraged by creating ideal conditions. The microorganisms and invertebrates fundamental to the composting process require oxygen and water to successfully decompose the material. The end products of the process are soil-enriching compost, carbon dioxide, water, and heat.

Composting is a dynamic process which will occur quickly or slowly, depending on the process used and the skill with which it is executed. A neglected pile of organic waste will inevitably decompose, but slowly. This has been referred to as "passive composting," because little maintenance is performed. Fast or "active" composting can be completed in two to six weeks. This method requires three key activities; 1) "aeration," adding oxygen by turning the compost pile, 2) proper moisture, and 3) the proper carbon to nitrogen (C: N) ratio. Attention to these elements will raise the temperature to around 130-140 degrees Fahrenheit, and ensure rapid decomposition.

The success with which the organic substances are composted depends on the organic material and the decomposer organisms involved. Some organic materials are broken down more easily than others. Different decomposers thrive on different materials as well as at different temperature ranges. Some microbes require oxygen, and others do not; those that require oxygen are preferable for composting.

A more diverse microbial community makes for a more efficient composting process. If the environment in the compost pile becomes inhospitable to a particular type of decomposer, it will die, become dormant, or move to a different part of the compost pile. The transforming conditions of the compost pile create a continually evolving ecosystem inside the pile.

## **Factors Affecting the Composting Process**

All organic material will eventually decompose. The speed at which it decomposes depends on these factors:

1. Carbon to nitrogen ratio of the material in the pile
2. Amount of surface area of organic material added to the compost
3. Aeration, amount of oxygen in the pile
4. Moisture, amount of water in the pile
5. Temperatures reached in the compost pile
6. Outside temperatures

### ***Carbon-to-Nitrogen Ratios***

Carbon and nitrogen are the two fundamental elements in composting, and the ratio (C: N) is significant. The bacteria and fungi in compost digest or "oxidize" carbon as an energy source and ingest nitrogen for protein synthesis. Carbon can be considered the "food" and nitrogen the digestive enzymes for these organisms.

The bulk of the organic matter should be carbon with just enough nitrogen to aid the decomposition process. The ratio should be roughly 30 parts carbon to 1 part nitrogen (30:1) by weight. Adding 3-4 pounds of nitrogen material for every 100 pounds of carbon should be satisfactory for efficient and rapid composting. The composting process slows if there is not enough nitrogen, and too much nitrogen may cause the generation of ammonia gas which can create unpleasant odors. Leaves are a good source of carbon; fresh grass, manures and blood meal are sources of nitrogen.

### ***Surface Area***

Decomposition by microorganisms in the compost pile takes place when the particle surfaces are in contact with air. Increasing the surface area of the material to be composted can be done by chopping, shredding, mowing, or breaking up the material. The increased surface area means that the microorganisms are able to digest more material, multiply more quickly, and generate more heat. It is not necessary to increase the surface area when composting, but doing so speeds up the process. Insects and earthworms also break down materials into smaller particles that bacteria and fungi can digest.

### ***Aeration***

The decomposition occurring in the compost pile takes up all the available oxygen. Aeration is the replacement of oxygen to the center of the compost pile where it is lacking. Efficient decomposition can only occur if sufficient oxygen is present. This is called aerobic decomposition. It can happen naturally by wind, or when air warmed by the compost process rises through the pile and causes fresh air to be drawn in from the surroundings. Composting systems or structures should incorporate adequate ventilation.

Turning the compost pile is an effective means of adding oxygen and brings newly added material into contact with microbes. It can be done with a pitchfork or a shovel, or by turning compost in a specifically designed aeration compost bin. If the compost pile is not aerated, it may produce an odor indicating anaerobic decomposition.

### ***Moisture***

Microorganisms can only use organic molecules if they are dissolved in water, so the compost pile should have a moisture content of 40-60 percent. If the moisture content falls below 40 percent the microbial activity will slow down or become dormant. If the moisture content exceeds 60 percent, aeration is hindered, nutrients are leached out, decomposition slows, and the odor from anaerobic decomposition is emitted. The "squeeze test" is a good way to determine the moisture content of the composting materials. Squeezing a handful of material should have the moisture content of a well wrung sponge. A pile that is too wet can be turned or can be corrected by adding dry materials. If the pile is too dry add water.

### ***Temperature***

Microorganisms generate heat as they decompose organic material. A compost pile with temperatures between 90° and 140°F (32°-60°C) is composting efficiently. Temperatures higher than 140°F (60°C) inhibit the activity of many of the most important and active organisms in the pile. Given the high temperatures required for rapid composting, the process will inevitably slow during the winter months in cold climates. Compost piles often steam in cold weather. Some microorganisms like cool temperatures and will continue the decomposition process, though at a slower pace.

### **Backyard vs. Large-Scale Composting**

Backyard composting can be done using a variety of different systems, enclosures, or containers. Composting systems or bins can be constructed at home or purchased commercially. Depending on where you live, you may have a problem with rodents if vegetative food wastes are combined with yard wastes. If so, an enclosed space or bin is advisable. The methods employed will vary somewhat depending on the system you choose, but the principles and purpose remain the same. This is true for large-scale composting projects as well.

Some municipalities collect yard waste at the curbside similar to the way recyclables are collected. It is taken to a central location and formed into windrows, triangular-shaped rows from 5 to 8 feet high and as long as necessary. Turning for aeration is done about once a month using a front-end loader or other type of heavy equipment made specifically for that purpose. The temperature and moisture are checked twice a week. The finished compost may be sold, given away, or used by the municipality in public works projects. Backyard composting eliminates the environmental and economic costs of the heavy equipment used to bring yard waste to a composting site and aerate the compost.

### **Food Wastes: Vermicomposting and Food Digesters**

Vermicomposting or worm composting is the easiest way to recycle food wastes and is ideal for people who do not have an outdoor compost pile. Composting with worms avoids the needless disposal of vegetative food wastes and allows one to enjoy the benefits of high quality compost. It is done with "red worms" (*Eisenia foetida*) who are happiest at temperatures between 50° and 70° F and can be kept indoors at home, school, or the office. As with outdoor composting, it is best to avoid putting bones, meats, fish, or oily fats in the worm box as they emit odors and may attract mice and rats. When cared for properly, worms process food quickly and transform food wastes into nutrient-rich "castings." Worm castings are an excellent fertilizer additive for gardens or potted plants.

The red worms are placed in a box or bin which can be built or purchased, along with "bedding" of shredded cardboard and/or paper moistened to about 75% water content. The container should be wide enough so that food scraps can be buried in a different location each time. The dimensions of the container and the amount of worms required initially will depend on how much organic food waste will need to be composted each week.

The worms will gradually reproduce or die according to the amount of food they receive. A sudden addition of a large amount of food waste may attract fruit flies, so increases should be made gradually. In a healthy box, worms can build large populations and consume four to six pounds of food scraps per week. About four to six months after the box has been started, the worms will have converted all of the bedding and most of the food waste into "castings" which will need to be harvested so the process can begin again.

Food waste digesters are an option for people who want to reduce the amount of food waste they produce but do not have a compost pile. These units resemble commercially produced compost bins, but differ in purpose. They are designed to accept food wastes otherwise inappropriate for composting such as meats, fish, fats, or oily food scraps. In general they are built to prevent odors from being released and prevent rodents from entering the unit. Food waste digesters are fundamentally different from worm boxes and compost piles, because the digesters do not ultimately produce a soil enhancing product. Their purpose is to cut down on the volume of food waste generated. Food waste digesters are not a "magic hole in the ground" however, and the decomposed food residue must periodically be emptied into the trash.

## **Recycling**

Items that can be remade into other items can be recycled. Most communities have facilities that collect metal, glass, plastic and paper for recycling. In general these products are separated into like items crushed and shredded and then put back into the factory to make new bottles, cans, or boxes. Depending on the item some recyclables are valuable and save energy and money. With other items there is less need for the recycled content or it is more difficult to remake the product and so the money savings are less.

Metals including, aluminum, steel, tin, copper and brass are all recyclable. Metals are the most valuable recyclable payments range from 5 cents a pound for steel to \$1000 an ounce for gold. Metals are relatively easy to shred and melt down and reform to make new metal items. It is also labor intensive and environmental damaging to take metal ore from the environment. Metal is a finite resource so it makes sense to reuse the metal already in existence. In the future people will mine old landfills for metal.

Glass is also easy to remake into new glass items. However it is fairly heavy for its value and is often better to reuse glass bottles than to recycle bottles into new. Recycling glass also can have a problem if there are impurities in the glass that is being recycled. There are also issues regarding different colors of glass, when making new bottles. Glass is a silicate requiring a lot of heat and pressure to form.

Plastic lasts for a long time and is lightweight reducing the cost of shipping. Plastics often cannot be reused at the same level. An old plastic bottle cannot be turned into a new plastic bottle, some material and quality is lost. However most plastic bottles made now have a majority of recycled content. Plastics are labeled with numbers 1-7 that tell how to recycle them. It is easier to recycle

lower numbers because there is more uniformity in the production of 1 and 2 plastic. Other bottles will be down cycled into plastic lumber or toys. Plastics are made from petroleum products and no one knows how long it will take to decompose because plastics have not been around long enough.

Paper is also fairly easy to recycle. You can do it yourself with a blender and a screen. With mixed paper recycling most paper is also down cycled into newsprint, cardboard, or paper bags. New paper is made from trees or other plant sources.

Tires, batteries, vegetable oil, clothing, concrete can all be recycled if facilities exist. Sometimes the transportation of recyclables is more expensive than finding new products. However, the cost of landfill space will also continue to get more expensive as space becomes more valuable.

### **Other Waste**

There are some wastes that cannot be composted or recycled. These items are sent to a landfill or incinerator. Landfills are lined pits in which waste is put and then covered with soil. Waste slowly decomposes in the anaerobic, no oxygen, environment. Landfills produce methane gas which can be dangerous but also a valuable resource if captured and used. When a landfill runs out of space the land is not safe for buildings or large trees. Often old landfills have been used as parks.

Incinerators burn the waste. Some incinerators use the energy from this burning to create electricity. However this burning releases carbon monoxide and other chemicals into the atmosphere.

### **Money Costs**

Home composting can be accomplished for a small initial outlay of money. And the end result can be used in your home to reduce the cost of purchasing soil/fertilizer for your garden. Larger city wide composting can be more expensive due to more need of space and transportation of waste to the site. This waste would also have to be transported to a landfill.

Metal recycling can be money maker for a business. For cities often the recycling of metals pays for the transportation and sorting of other recyclables.

Waste pickup is often charged by pound or the amount of times a pickup is required. Any time you can reduce the amount of waste that needs to go to the landfill you can reduce your personal or business costs associated with waste management.

### **Teacher Instruction:**

1. Students should have an understanding of where waste from the kitchen goes. This can vary depending on location and waste collection available.
2. This activity can be done in a variety of ways individually or as a group.
  - a. Students can create a list of items and place in the three categories.
  - b. Student can place pictures of waste items into the three categories. This could be turned into a collage that could be used to show others where items can be placed.
  - c. Students can be in a relay to take actual items out of a pile and place in correct container. For this you may want the students to wear gloves or use pictures of the items.

3. Discuss with students if items are in the correct place. Some items may be considered recyclable or compostable in some facilities while trash in other areas.

**Student Instruction:**

1. Define the terms Recycling, Compost, non-compostable/recyclable waste.
2. Take items from bag place in proper receptacle.
3. Discuss whether items are in the correct receptacle.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What waste items in a kitchen are recyclable? Compostable? Garbage?
2. What are the benefits to recycling? Composting?
3. What are the downsides to recycling? Composting?
4. If you do not have a location on site to compost what can you do?
5. If you work at a kitchen that does not separate their waste do you make suggestions to the management to separate the waste?
6. You notice a fellow employee putting recycling in the trash can or vice versa. What do you say?
7. What can you do at your home to separate waste?
8. What are the costs to a society/environment/individual to not separating waste?
9. Why are there some food products that not recommended for composting?
10. Describe the process the waste food goes through when placed in the compost.
11. What is the value of waste vegetable oil?

**Extensions:** Go to different compost sites compare small (home composting), medium, (business, farm) and large (municipality) composting facilities. Take a tour of a recycling plant. Create a worm composting bin. Create a compost bin at home. Make signs that educate people on where different items can be placed. Visit a vegetable oil recycling center and see a vehicle that runs on vegetable oil. Make your own recycled paper, maintain a compost bin. Make observations and take measurements of compost: temperature, moisture content, amount and type of macro invertebrates.

**Resources:**

<http://www.kidsrecycle.org/index.php> Website that includes information and lesson plans on recycling and composting within schools.

<http://www.ciwmb.ca.gov/Publications/Schools/56001007.pdf> The worm guide--to vermicomposting.

<http://www.dnr.state.wi.us/org/caer/ce/ee/earth/recycle/index.htm> Wisconsin Department of Natural Resources' site for recycling activities.

## Aluminum Recycling Facts

- ♻️ A used aluminum can is recycled and back on the grocery shelf as a new can, in as little as 60 days. That's closed loop recycling at its finest!
- ♻️ Used aluminum beverage cans are the most recycled item in the U.S., but other types of aluminum, such as siding, gutters, car components, storm window frames, and lawn furniture can also be recycled.
- ♻️ Recycling one aluminum can saves enough energy to run a TV for three hours -- or the equivalent of a half a gallon of gasoline.
- ♻️ More aluminum goes into beverage cans than any other product.
- ♻️ Because so many of them are recycled, aluminum cans account for less than 1% of the total U.S. waste stream, according to EPA estimates.
- ♻️ An aluminum can that is thrown away will still be a can 500 years from now!
- ♻️ There is no limit to the amount of times aluminum can be recycled.
- ♻️ We use over 80,000,000,000 aluminum soda cans every year.
- ♻️ At one time, aluminum was more valuable than gold!
- ♻️ A 60-watt light bulb can be run for over a day on the amount of energy saved by recycling 1 pound of steel. In one year in the United States, the recycling of steel saves enough energy to heat and light 18,000,000 homes!



## Paper Recycling Facts

- ♻️ To produce each week's Sunday newspapers, 500,000 trees must be cut down.
- ♻️ Recycling a single run of the Sunday *New York Times* would save 75,000 trees.
- ♻️ If all our newspaper was recycled, we could save about 250,000,000 trees each year!
- ♻️ If every American recycled just one-tenth of their newspapers, we would save about 25,000,000 trees a year.
- ♻️ If you had a 15-year-old tree and made it into paper grocery bags, you'd get about 700 of them. A supermarket could use all of them in under an hour! This means in one year, one supermarket goes through 60,500,000 paper bags! Imagine how many supermarkets there are in the U.S.!!!
- ♻️ The average American uses seven trees a year in paper, wood, and other products made from trees. This amounts to about 2,000,000,000 trees per year!
- ♻️ The amount of wood and paper we throw away each year is enough to heat 50,000,000 homes for 20 years.
- ♻️ Approximately 1 billion trees worth of paper are thrown away every year in the U.S.
- ♻️ Americans use 85,000,000 tons of paper a year; about 680 pounds per person.
- ♻️ The average household throws away 13,000 separate pieces of paper each year. Most is packaging and junk mail.
- ♻️ In 1993, U.S. paper recovery saved more than 90,000,000 cubic yards of landfill space.

- Each ton (2000 pounds) of recycled paper can save 17 trees, 380 gallons of oil, three cubic yards of landfill space, 4000 kilowatts of energy, and 7000 gallons of water. This represents a 64% energy savings, a 58% water savings, and 60 pounds less of air pollution!
- The 17 trees saved (above) can absorb a total of 250 pounds of carbon dioxide from the air each year. Burning that same ton of paper would *create* 1500 pounds of carbon dioxide.
- The construction costs of a paper mill designed to use waste paper is 50 to 80% less than the cost of a mill using new pulp.



## Plastic Recycling Facts

- Americans use 2,500,000 plastic bottles every hour! Most of them are thrown away!
- Plastic bags and other plastic garbage thrown into the ocean kill as many as 1,000,000 sea creatures every year!
- Recycling plastic saves twice as much energy as burning it in an incinerator.
- Americans throw away 25,000,000,000 Styrofoam coffee cups every year.



## Glass Recycling Facts

- Every month, we throw out enough glass bottles and jars to fill up a giant skyscraper. All of these jars are recyclable!
- The energy saved from recycling one glass bottle can run a 100-watt light bulb for four hours. It also causes 20% less air pollution and 50% less water pollution than when a new bottle is made from raw materials.
- A modern glass bottle would take 4000 years or more to decompose -- and even longer if it's in the landfill.
- Mining and transporting raw materials for glass produces about 385 pounds of waste for every ton of glass that is made. If recycled glass is substituted for half of the raw materials, the waste is cut by more than 80%.



## Solid Waste and Landfills

- About one-third of an average dump is made up of packaging material!
- Every year, each American throws out about 1,200 pounds of organic garbage that can be composted.
- The U.S. is the #1 trash-producing country in the world at 1,609 pounds per person per year. This means that 5% of the world's people generate 40% of the world's waste.
- The highest point in Hamilton County, Ohio (near Cincinnati) is "Mount Rumpke." It is actually a mountain of trash at the Rumpke sanitary landfill towering 1045 ft. above sea level.
- The US population discards each year 16,000,000,000 diapers, 1,600,000,000 pens, 2,000,000,000 razor blades, 220,000,000 car tires, and enough aluminum to rebuild the US commercial air fleet four times over.

- ♻️ Out of every \$10 spent buying things; \$1 (10%) goes for packaging that is thrown away. Packaging represents about 65% of household trash.
- ♻️ On average, it costs \$30 per ton to recycle trash, \$50 to send it to the landfill, and \$65 to \$75 to incinerate it.



## Miscellaneous Recycling Facts

- ♻️ An estimated 80,000,000 Hershey's Kisses are wrapped each day, using enough aluminum foil to cover over 50 acres of space -- that's almost 40 football fields. All that foil is recyclable, but not many people realize it.
- ♻️ Rainforests are being cut down at the rate of 100 acres per minute!
- ♻️ A single quart of motor oil, if disposed of improperly, can contaminate up to 2,000,000 gallons of fresh water.
- ♻️ Motor oil never wears out, it just gets dirty. Oil can be recycled, re-refined and used again, reducing our reliance on imported oil.
- ♻️ On average, each one of us produces 4.4 pounds of solid waste each day. This adds up to almost a ton of trash per person, per year.
- ♻️ A typical family consumes 182 gallons of soda, 29 gallons of juice, 104 gallons of milk, and 26 gallons of bottled water a year. That's a lot of containers -- make sure they're recycled!

These recycling facts have been compiled from various sources including the National Recycling Coalition, the Environmental Protection Agency, and Earth911.org.

## **Elements of Good Compost**

Good compost does not smell bad. Change one of the five components to eliminate odor.

Oxygen- Aerate the pile by turning.

Carbon: Nitrogen Ratio—Add browns (Carbon: leaves, straw) to the greens (Nitrogen: food waste, green plants, manure)

Water-Compost should be moist not wet or dry. Add water or more dry material as needed

Surface Area-Items added to the compost should be chopped up in smaller pieces.

Temperature- 90°-140° F

### **What to add to compost:**

Leaves, grass clippings, vines, rotten fruits and vegetables, coffee grounds, tea bags, fruit peels, egg shells, pasta, bread, weeds.

These items will decompose quickly and add valuable nutrients to the compost.

### **What not to add:**

Meat, cheese, oils, dairy, salt, sweets, diseased plants, weed seeds, plastic, metal.

These items can attract rodents, create bad odors, do not decompose or add unwanted elements to the compost pile.

**Debatable items:** Depending on size of compost bin, heat, location and desired end result.

Paper, cardboard, shellfish shells, nut shells, cooked food.

In general small amount of these items are fine to add to the compost. However large amounts are slower to decompose, create odors, and attract vermin.

## Compost

Name: \_\_\_\_\_

Circle items that can go into a compost bin.

Draw a line through items not to go in compost bin.

Put a question mark (?) next to items you are unsure of.

Banana Peel	Carrot peels	Moldy Bread	Peanut Shells
Coffee Grounds	Chicken Bones	Grass Clippings	Oyster Shell
Chocolate Bar	Plastic Wrap	Dead Houseplant	Spaghetti
Apple Core	Moldy Cheese	Dandelions	Tea Bags
Pop Tart	Pizza	Jack-o-lanterns	Potato Plants
Spoon	Pepper Seeds	Cardboard	Cake
Egg Shells	Onion Peels	Sausage	Strawberry Leaves
Newspaper	Rotten Blueberries	Tree Branch	Watermelon Rind

List three things that good compost needs.

List three reasons to compost.

## **Unit 6: Saving Food**

In this section, students learn about a variety of ways to preserve the harvest. This allows for students to be able to enjoy the food they grew in the winter months.

Food Preservation

Growing Garlic

**Lesson Plan:** Food Preservation**Unit:** Preservation of Food**Objectives:**

- Students will learn why there is a need to preserve food.
- Students will learn how to preserve foods including canning freezing, dehydrating, and salting.
- Students will learn the historical and modern methods to preserve food.

**Materials:** Two types of vegetables that are available fresh, frozen and canned. Equipment and ingredients necessary for different preservation activities.

**Time:** 45 minutes discussing different preservation options. 30 minutes-2 hours for different preservation techniques.

**Vocabulary:** Preservation, Canning, Freezing, Dehydrating, salting, pickling, brine

**Background Information:**

Food is often best both in taste and nutritional content when eaten fresh. However, there are times when it is not possible to keep food before it spoils. Depending on the food it may only last for 3 days to a month.

There are several different ways to slow down the decomposition process so that foods will last longer. This is important as a way to have local foods in the winter when fresh foods are not available. By preserving your own foods you can grow more food than you can eat during the season and have your own food available later. Food preservation can reduce the costs of food while ensuring you know from where the food came.

Food that you are planning to preserve should be processed as soon as possible after picking to allow it to keep longer. Some foods will only keep for several months while other preservation methods will allow you to store food for longer. It is good to make a plan for how much of each food you will need during the non growing season so that your stores will last through the winter. However, you do not want to put away too much food because you do not want to be eating canned or frozen food when fresh food is available.

Several methods of food preservation include canning, dehydrating, freezing, and salting. Each method works well for different foods and different applications. Canning works well with most foods but requires a complete seal. Dehydrating food takes the water out of food preventing a suitable habitat for bacteria. Freezing works well for many fruits, vegetables, and meats however, you have to have a freezer big enough and the electricity to run the freezer. Salting adds a lot of sodium to the food and works primarily with meat.

Canning involves placing food into special glass jars and then putting on sealing lids in boiling water. For most foods a pressure cooker is used to raise the temperature above 240°F to kill all of the bacteria. For some foods including acidic fruits and tomatoes, a water bath of 212°F can be used for canning. Ball or Mason Jars with sealing rings are most commonly used in home canning. The jars and rings can be reused. However, a new sealing lid must be purchased each time. Care must be taken during canning as improper canning can allow the growth of *Clostridium botulinum*, the bacterium that causes botulism.

Dehydration is the process of removing the liquid from foods. This prevents bacteria from growing that need a moist environment. Dehydration can be accomplished with a special dehydrator, a solar oven or an oven on low setting. Fruits can be dried to make snacks including fruit leather. Vegetables can be dried for adding to soups especially useful when camping and you want to save on the space and weight that food with water contains. Meats can also be dried to make jerky. Dehydration is one of the oldest food preservation methods.

Freezing places the food below 32°F which enables food to be kept for long periods of time in an environment inhospitable to bacteria. Some fruits and meats can be frozen directly with little preparation though care should be taken to ensure that you do not freeze in larger quantities than you want to prepare and eat. Food should not be thawed and refrozen. Most vegetables are blanched before freezing.

Using salt to cure meats or vegetables is another method to preserve food. Adding a concentration of 20 percent salt prevents bacteria from being able to grow. Salting is commonly used to cure meats and fish. Pickling of vegetables including cucumbers, beets, ginger, or cabbage can be done with salt and/or vinegar.

**Teacher Instruction:**

1. Discuss with students the reasons for having different ways to preserve the harvest.
2. Compare foods that have been preserved different ways. See worksheet.
3. There are several options for recipes included in this lesson plan. There are also many more options available in the books and websites listed in the resource section.

**Student Instruction:**

1. Compare the four different methods of preserving the harvest. Canning, freezing, drying and pickling, list the benefits and detractors of each.
2. Compare foods that have been preserved different ways.
3. Prepare food for canning. Options include applesauce, fruit jams/preserves, tomatoes, salsa, marinara sauce, etc.
4. Prepare food for freezing. Options include corn, beans, berries, broccoli, pesto, meats, etc

5. Prepare food for drying. Options include apples, tomatoes, fruit leather, beef jerky, etc.
6. Prepare food for pickling. Options include cucumbers, beets, cabbage.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What are some reasons to preserve food?
2. What is lost when food is preserved?
3. Determine how many cans of tomatoes you would use over the winter.
4. Compare the different methods of food preservation.
5. Compare food that is fresh, frozen and canned.
6. What methods of food preservation have been used the longest which ones are newer?
7. Create a list of all the foods that can be preserved.

**Extensions:** Visit a commercial freezing or canning operation. Try different ways to preserve different foods.

**Resources:**

[The Big Book of Preserving the Harvest: 150 Recipes for Freezing, Canning, Drying and Pickling Fruits and Vegetables](#) by Carol W. Costenbader (2002)

[Preserving Summer's Bounty: A Quick and Easy Guide to Freezing, Canning, and Preserving, and Drying What You Grow](#) by Rodale Food Center and Susan McClure (1998)

<http://www.canning-food-recipes.com/canning.htm> Canning directions and recipes

<http://www.canningpantry.com/dehydration-of-food.html> Dehydration recipes and tips

<http://www.extension.umn.edu/distribution/nutrition/DJ0555.html> Guide to freezing fruits and vegetables.

<http://www.gardenguides.com/416-freezing-vegetables.html> Directions on how to freeze a variety of vegetables

**Fresh, Frozen or Canned**

Name: \_\_\_\_\_

For each vegetable write down observations of look, feel, smell and taste of fresh, frozen, and canned.

Vegetable \_\_\_\_\_

	<b>Look</b>	<b>Feel</b>	<b>Smell</b>	<b>Taste</b>
<b>Fresh</b>				
<b>Frozen</b>				
<b>Canned</b>				

Vegetable \_\_\_\_\_

	<b>Look</b>	<b>Feel</b>	<b>Smell</b>	<b>Taste</b>
<b>Fresh</b>				
<b>Frozen</b>				
<b>Canned</b>				

## **Directions for Freezing Four Types of Vegetables**

### **Peppers (Sweet)**

1. Choose crisp, well developed peppers of deep green color.
2. Wash, cut out stem and remove seeds.
3. Halve, slice or dice.
4. Blanch halved peppers-3 minutes, sliced or diced- 2 minutes.
5. Chill in ice water.
6. You can freeze chopped peppers without blanching them.

### **Potatoes**

1. Any good quality potato, for French fries, a russet type preferred.
2. Wash, peel, and remove deep eyes, bruises and green surface coloring.
3. Cut in ¼- to ½-inch cubes. For French fries, peel and cut in thin strips. For hash browns, grate and freeze in desired shapes.
4. Blanch 5 minutes.
5. Freeze.

### **Pumpkin**

1. Select any good pie pumpkin of good color.
2. Cut or break into fairly uniform pieces.
3. Remove seeds.
4. Bake at 350° F, or steam until tender.
5. Cool, scoop pulp from rind, and mash.
6. Freeze in useable amounts.

### **Spinach and other Greens**

1. Select young, tender leaves.
2. Sort and remove tough stems.
3. Wash.
4. Blanch most leafy greens 2 minutes. Blanch collards and stem portions of Swiss chard 3 to 4 minutes. Blanch very tender spinach 1½ minutes.
5. Chill in ice water.

## Raspberry Jam

### Ingredients

4 cups mashed raspberries

4 cups sugar

Optional apples (The apples can be cut into small pieces this allows for a limited number raspberries to make more jam.)

### Directions

Use a very large pot. When the jam reaches a full rolling boil it will double in volume.

Heat mashed berries until they reach a full rolling boil.

Boil 2 minutes.

Add sugar. Stir well.

Bring to a boil, stirring constantly, boil for 2 minutes.

Remove from heat.

Pour in sterilized jars and seal. Jars can be sealed with lids or paraffin.

## Canning Tomatoes-Crushed

Ideal for use in soups, stews and casseroles.

### Approximate Yields:

22 pounds whole tomatoes for canner load of 7 quarts.

14 pounds whole tomatoes for canner load of 9 pints.

### Prepare

To remove skins, wash tomatoes and dip in boiling water for 30 to 60 seconds or until the skins begin to split. Then dip in cold water, slip off skins, core and remove any blemished or discolored parts. Cut into quarters.



Heat about 1 pound of the quarters quickly in a large pot. As they are added, crush cut pieces using a large wooden spoon. Stir to prevent burning. Bring to a boil and gradually add the remaining quarters while stirring continually. These will soften with stirring and heating and will not need to be crushed. Continue until all tomatoes are added. Then boil gently 5 minutes.

### Packing Jars

Fill jars immediately with hot tomatoes, leaving ½-inch head space. Remove air bubbles. Wipe rim and screw threads and adjust lids and screw bands.

### **Processing Methods**

Boiling Water Bath Canner

- Pints 35 minutes
- Quarts 45 minutes

Pressure Canner

Dial Gauge Type @ 11 pounds pressure or Weighted Gauge Type @ 10 pounds pressure.

- Pints 15 minutes
- Quarts 15 minutes

After processing, remove jars immediately, place on a rack to cool.

After jars have cooled, test for a seal and the screw bands may be removed if desired. Be sure to label canned jars with content and processing date. Store jars in a cool dark, dry place.

### **Leathers from Fresh Fruit**

Select ripe or slightly overripe fruit. Pick one kind or mix and match a variety of fruits.

Wash fresh fruit in cool water. If necessary remove peel, seeds, and stem.

Cut fruit into chunks. Puree fruit until smooth.

Use 2 cups of fruit for each, 13" x 15" fruit leather.

Add 2 teaspoons of lemon juice for each 2 cups of light colored fruit to prevent darkening.

### **Preparing the Trays**

To dry in the oven use a 13" x 15" cookie pan with edges. Line pan with plastic wrap being careful to smooth out wrinkles. Do not use waxed paper or aluminum foil.

To dry in a dehydrator, specially designed plastic sheets can be purchased or plastic trays can be lined with plastic wrap.

### **Pouring the Leather**

Fruit leathers can be poured into a single large sheet (13 "x 15 ") or into several smaller sizes. Spread puree evenly about 1/8-inch thick, onto drying tray. Avoid pouring puree too close to the edge of the cookie sheet. The larger fruit leathers take longer to dry.

Approximate drying times are 6 to 8 hours in a dehydrator, up to 18 hours in an oven and 1 to 2 days in the sun.

### **Drying the Leather**

Turn oven on to 140°F, on many ovens this is below the temperature range, turn oven on as low as possible. Leather dries from the outside edge toward the center. Test for dryness by touching center of leather; no indentation should be evident. While warm, peel from plastic and roll, allow cooling, and then rewrapping in plastic.

Fruit Leather will keep up to 1 month at room temperature. For storage up to 1 year, place tightly wrapped rolls in the freezer.

### **Optional:**

To sweeten, use ¼ to ½ cup honey for each 2 cups of fruit.

Applesauce can be dried alone or added to any fresh fruit puree as an extender. It decreases tartness and makes the leather smoother and more pliable.

Experiment by adding 1/8 teaspoon of flavorings or spices to each 2 cups of fruit.

## FERMENTED DILL PICKLES

Old-fashioned style pickles.

Use the following quantities for each gallon capacity of your container.

4 lbs of 4-inch pickling cucumbers

2 tbsp dill seed or 4 to 5 heads fresh or dry dill weed

1/2 cup salt

1/4 cup vinegar (5%)

8 cups water

2 cloves garlic (optional)

2 dried red peppers (optional)

2 tsp whole mixed pickling spices (optional)

### ***Procedure:***

Wash cucumbers. Cut 1/16-inch slice off blossom end and discard. Leave 1/4-inch of stem attached.

Place half of dill and spices on bottom of a clean, container. Add cucumbers, remaining dill, and spices.

Dissolve salt in vinegar and water and pour over cucumbers. Add cover and wait.

Store between 70°F and 75°F for about 3 to 4 weeks while fermenting.

Temperatures of 55- 65°F are acceptable, but the fermentation will take 5 to 6 weeks. Avoid temperatures above 80°F, or pickles will become too soft during fermentation. Check the container several times a week and promptly remove surface scum or mold.

Caution: If the pickles become soft, slimy, or develop a disagreeable odor, discard them. Fully fermented pickles may be stored in the original container for about 4 to 6 months, provided they are refrigerated and surface scum and molds are removed regularly.

Canning fully fermented pickles is a better way to store them. To can them, pour the brine into a pan, heat slowly to a boil, and simmer 5 minutes. Filter brine through paper coffee filters to reduce cloudiness. Fill jar with pickles and hot brine, leaving 1/2-inch headspace. Adjust lids and process pint jars for 10 minutes and quart jars for 15 minutes in a boiling water bath.

Source: Adapted from USDA

**Lesson Plan:** Growing Garlic

**Unit:** Preservation of Food

**Objectives:**

Students will:

- Learn how to prepare garlic for planting
- Learn how to plant garlic by two methods
- Learn how to prepare planted garlic for winter

Modified Curriculum Expectations:

Students will

- Learn how to prepare garlic for planting
- Learn how to plant garlic by two methods
- Learn how to prepare planted garlic for winter

**Materials Needed:**

Heads of garlic: Various types

Garlic bulbils: Produced on the garlic scape if the scape is left on for the season

Straw mulch: One bale will cover about 100 plants depending on your planting

Measuring tape or ruler

Compost

Prepared beds: tilled and leveled beds of soil

Planting tool: Sticks/objects that are 1 in inch diameter and 6 inches long

**Time:** at least two 45-min periods

**Key Vocabulary:**

Bulbils: A small bulb or bulblike structure in the place of a flower; a bulblet

**Background Information:**

Garlic is a member of the onion family (*Allium*). There are three main parts to the garlic plant: scape, leaves, and bulb. The garlic scape is the immature flower stem which grows from the middle of the plant and produces the garlic bulbils (miniature cloves). The bulb is the garlic head

made up of individual cloves. The origin of garlic is not known but is thought to be from Asia. Garlic is cultivated worldwide with the most production in China.

Garlic is extremely easy to plant, grow, and harvest. There are a few key steps in growing garlic that will help produce an optimal crop. Garlic planting should take place in the fall so that the garlic cloves can experience a cold treatment during the winter. The bulbs must experience a cold treatment of at least 2 months to induce bulbing of the plants.

If you plant garlic in the spring it is recommended to give the garlic a short cold treatment prior to planting. One to two days before planting garlic cloves should be separated keeping the skin on each clove. Garlic cloves are planted with the pointed side up, the base of the clove should be about 4 inches deep and the tip of the clove about 1 inch below the surface. Shortly after planting, the garlic should be covered with a layer of mulch to help maintain temperatures during the winter. Mulch can be removed in the spring or left on to help with weeds and soil moisture.

Garlic may also be planted from bulbils; however, it may take 2-3 years to have average size bulbs. Bulbils are planted similarly as cloves. The part of the bulbil that connects to the center of the bulbil should be planted as the bottom. Bulbils can be planted 2-4 inches apart and covered with about ½ inch of dirt. Bulbil planting also requires a layer of mulch to help with fluctuating temperatures. It is a good idea to remove the mulch in the spring. Bulbils must be watered on a daily basis as they grow.

### **Teacher Instruction:**

The first period of this lesson should be used to separate the garlic cloves, identify the top and the bottom of the cloves. While students work together to separate the cloves from the head, a class discussion of the background information can occur. Ask students which family they think garlic belongs to, why should garlic be planted in the fall, is it an economical crop to plant, what are some of the advantages and disadvantages of planting garlic from the bulbils compared to cloves, and why does the garlic need to be mulched?

### **Student Instruction:**

Students should separate into two groups. One group will be responsible for planting garlic from cloves and the other group will plant garlic from bulbils.

### **Garlic Clove Group**

Students move to the prepared beds. Using a measuring tape the students should figure out how many rows of garlic they can plant in each bed and how many garlic cloves in each row. The rows should be staggered and about 6 inches apart. Students should lay-out the measuring tape and mark every 6 inches by pouring about ¼ cup of compost at each spot. A planting tool such as a stick or marker (1 inch diameter and 6 inches long) should poke holes every 6 inches to a depth of about 5 inches. After the holes are made a student can place one clove in each hole (the

pointed side sticking up). The bottom of the clove should be down about 5 inches from the surface and the top of the clove about 1 inch from the surface. Another student can come behind and push the soil over the hole. The final step in garlic planting is covering the beds with mulch. The mulch should be about 2-4 inches thick.

### **Garlic Bulbils Group**

Students move to the prepared beds. Using a measuring tape the students should figure out how many rows of garlic they can plant in each bed and how many garlic bulbils in each row. The rows should be staggered and about 3-4 inches apart. Students should lay-out the measuring tape and mark every 3-4 inches by pouring about  $\frac{1}{4}$  cup of compost at each spot. A planting tool such as a stick or marker (1 inch diameter and 2 inches long) should poke holes every 3-4 inches to a depth of about  $1\frac{1}{2}$  inches. After the holes are made a student can place one bulbil in each hole (the pointed side sticking up). The bottom of the bulbil should be down about  $1\frac{1}{2}$  inches from the surface and the top of the clove about a  $\frac{1}{2}$  inch from the surface. Another student can come behind and push the soil over the hole. The final step in garlic planting is covering the beds with mulch. The mulch should be about 2-4 inches thick.

After planting, the class should have a closing discussion about the possible differences that will exist for the two planting groups, ask each group to share their numbers of garlic used and garlic anticipated and compare. Discuss the advantages/disadvantages of planting garlic in the fall.

### **Accommodations:**

This is a great hands-on activity for all students. Mixed-ability partners are recommended and size of garlic worked with should be matched appropriately to each student's fine motor skill level. Students with limited fine motor skills can be part of dropping the clove in the hole, covering the holes, or mulching the bed.

## **Unit 7: Veggie of the Month**

The vegetable of the month section includes samples of an interactive examination of a specific vegetable. Also included is a template for students to conduct their own research.

Veggie of the Month: Beet

Veggie of the Month: Carrot

Veggie of the Month: Potato

Veggie of the Month: Rhubarb

Veggie of the Month: Pepper

Veggie of the Month: Winter Squash

Veggie of the Month: Template



## Vegetable of the Month

**VEGETABLE NAME:** Beet

**OTHER NAMES:** Beetroot, garden beet

**SCIENTIFIC NAME:** *Beta vulgaris*

**BIOLOGY:** The beet is in the Amaranth family. The tap root of the vegetable is consumed as well as the stem and leaf. Beets are spherical or cylindrical based on the variety. The leaves are heart-shaped. Most well-known beets are bright red/purple and sweet.

**POLLINATION:** Beets are wind-pollinated.

**SOWING:** Select a sunny location (will tolerate light shade) and plant in late spring when soil is warm and danger of frost is past. Cultivate and enrich with vegetable food and organic matter. Firm soil over seed. Plants should be thinned when they are about 6 inches tall to at least 1 inch diameter to allow for adequate growing space. Beet thinning are great cleaned and added in salads!

Planting Depth	Seeds/Ft	Seed Spacing in a 2-3 inch band	Thinning	Sun/Shade	Days to Germination	Days To Maturity
1/4-1/2 in.	15/1ft	Less than an inch apart	Thin to allow at least 1 in. Diameter per plant	Full Sun	5-14	40-60

**HARVESTING:** Harvesting can be done when the beet or leaf has reached the desired size. Use a digging fork to loosen the soil near the plant then pull the beets out by the base of stems. To store, cut leaves and stems off the beet root then store the beets in a plastic bag in the refrigerator's vegetable drawer. For long term storage it is optimum to store beets without the greens at 32 degrees fahrenheit and 95 percent humidity.

**EDIBLE PARTS:** Root, Stem, Leaf

**COOKING:** To prepare wash the root and leaves then cut the beet greens just above the root. You can eat the greens and roots raw or cooked depending on the maturity of the plant. Young beet greens are best eaten raw in a salad or on a sandwich. If beet greens are large and tough they can be sauteed with olive oil, steamed, or used as a substitute for spinach in recipes. The beet root can be grated and used in a raw salad with carrots or apples with a simple olive oil/vinegar dressing. Beets can be cubed and steamed or baked with a drizzle of olive oil.

**HISTORICAL FACTS:** The beet originated in the Middle East and eastern Mediterranean. Originally the leaves of the beet were the edible part while the root was used for medicinal reasons. Betalain pigments are extracted from the root and used in red coloring for processed food products.

<b>Nutritional value per 100 g (3.5 oz)</b>	
Energy	43 kJ (10 kcal)
Carbohydrates	9.56 g
Sugars	6.76 g
Dietary fiber	2.8 g
Fat	0.17 g
Protein	1.61 g
Water	87.58g
Vitamin A equiv.	2 µg (0%)
- beta-carotene	20 µg (0%)
- lutein and zeaxanthin	0 µg
Thiamine (Vit. B1)	0.031 mg (2%)
Riboflavin (Vit. B2)	0.040 mg (3%)
Niacin (Vit. B3)	0.334 mg (2%)
Pantothenic acid (B5)	0.155 mg (3%)
Vitamin B6	0.067 mg (5%)
Folate (Vit. B9)	109 µg (27%)
Vitamin C	4.9 mg (8%)
Calcium	16 mg (2%)
Iron	0.80 mg (6%)
Magnesium	23 mg (6%)
Phosphorus	40 mg (6%)
Potassium	325 mg (7%)



## Vegetable of the Month

**VEGETABLE NAME:** Carrot

**SCIENTIFIC NAME:** *Daucus carota*

**BIOLOGY:** The carrot is the tap root, or main root, of the plant. It can grow in many shapes and sizes depending on the variety and the conditions under which it is grown. Carrots are most commonly orange in color; however, they can also be red, purple, white and yellow. They have a crisp, juicy texture and sweet flavor.

**POLLINATION:** Bees pollinate carrot flowers for seed production.

**SOWING:** Plant seeds in the late spring for summer carrots and again in mid-summer for sweet fall carrots. Since they are a root crop, they require soil that is light and that drains well. Carrots grow the best in full sun, and they can tolerate frost and light freezes.

Planting Depth	Seeds Per Group (Hill)	Seed Spacing	Thin To Plants Per Group (Hill)	Sun/Shade	Days to Germination	Days To Maturity
¼ in.	18 – 20 seeds per foot	3-4 seeds per inch	2-3	Sun	10+ days	60-80

**HARVESTING:** Carrots are usually harvested between 60 and 80 days after they are planted, however, they can be harvested at any stage in their development. Smaller carrots are more sweet and juicy, but they cannot be stored for as long of a period of time as more mature carrots can be stored.

**EDIBLE PARTS:** Root, stems and leaves.

**COOKING:** Carrots may be eaten cooked or raw. They are a popular snack by themselves or shredded, sliced and diced in your favorite salad, soup, stew and stir-fry. Carrot cakes, cookies and muffins are other delicious treats that bring out their sweetness using various spices such as cinnamon and nutmeg. Glaze carrots in brown sugar, honey or maple syrup for a sweet side dish. Carrots are rich in Vitamin A, and beta-carotene as well as fiber, calcium, and potassium. Most of the nutrients are found close to the carrot's skin surface, so it is better if they are left unpeeled.

**HISTORICAL FACTS:** Carrots were first cultivated in middle Asia, the area that is now Afghanistan, in the 10<sup>th</sup> century. The first varieties were purple and yellow in color. Carrots were first used for medicinal purposes and for the aromatic leaves and seeds. It was not until the 17<sup>th</sup> century that the Dutch cultivated the first orange variety in honor of the House of Orange, a powerful political party that fought for Dutch independence.

Nutrition Facts

Serving Size 1 cup chopped

Amount Per Serving

Calories 52

Calories from Fat 3g

% Daily Value\*

Total Fat .3g 0%

Saturated Fat 0.0g

Polyunsaturated Fat 0.1g

Monounsaturated Fat 0.0g

Cholesterol 0mg 0%

Sodium 88mg 4%

Total Carbohydrates 12.3g 4%

Sugars 6.1g

Dietary Fiber 3.6g 14%

Protein 1.2g

Vitamin A 428%

•

Vitamin C 13%

Calcium 4%

•

Iron 2%



# Vegetable of the Month

**VEGETABLE NAME:** Potato

**SCIENTIFIC NAME:** *Solanum tuberosum*

**BIOLOGY:** The potato is a part of the plant that grows underground called a tuber.

There are over 5,000 varieties of potatoes worldwide that differ in color, shape and size.

The most common potato in the United States is the Russet potato, which is brown on the outside and white on the inside. Potatoes can be purple, red, yellow and cream as well.

**POLLINATION:** Potato flowers are cross-pollinated by insects, such as honeybees and bumblebees. Potato flowers produce small green berries and contain up to 300 seeds per berry. These seeds are called “true seeds” and can be used to plant the next potato crop. Potatoes can also be propagated vegetatively, which means that you can cut the tuber into pieces and plant them individually to produce another plant.

**SOWING:** Potato seeds or pieces of tuber should be planted four inches deep and 8-12 inches apart. The spacing is necessary because tubers need a significant amount of space to grow underground.

Planting Depth	Seeds Per Group (Hill)	Seed Spacing	Thin To Plants Per Group (Hill)	Sun/Shade	Days to Germination	Days To Maturity
4 in.	1	8-12 in.	1	Full Sun		80-90

**HARVESTING:** Potatoes are ready to be harvested when the stems and leaves die and have turned brown, about 80-90 days after they are planted. The best way to store a potato is to leave it in the ground until just before it is eaten, but to dig them out of the ground, it is best to use a pitchfork or a trowel to loosen the soil surrounding the potatoes. Dig at least 8 inches around the plant so that you do not destroy the potatoes.

**EDIBLE PARTS:** Tuber. The fruit and stem contain poisonous compounds that should not be eaten.

**COOKING:** A person in the United States eats an average of 75 pounds of potatoes annually. Potatoes are rarely eaten raw, and they are eaten cooked in countless forms. Most of the nutrients are found in or near the skin, so it is unnecessary to peel them before cooking. They can be boiled, fried, roasted, and grilled into favorite dishes such as French fries, hash browns, mashed potatoes, potato chips, and potato salad. Potatoes are used in many different cuisines around the world such as Indian curry dishes, Spanish tortilla, Jewish latkes, Norwegian lefse, and Italian gnocchi.

**HISTORICAL FACTS:** The potato is the leading vegetable grown worldwide, with varieties that have been adapted to survive in a large range of elevations and weather conditions. Potatoes are native to the Andean region of South America, and have been cultivated there since 3000 B.C. Spanish explorers brought the potato back to Europe in the 16<sup>th</sup> century, and it later spread to Asia. The potato has historically been an essential crop in many cultures around the world, especially in areas such as Europe where they rely on storage crops for food in the winter.

Nutrition Facts

Serving Size 1 large potato baked, with skin

Amount Per Serving

Calories 278

Calories from Fat 3

% Daily Value\*

Total Fat 0g 1%

Saturated Fat 0g 1%

Polyunsaturated Fat 0g

Monounsaturated Fat 0g

Cholesterol 0mg 0%

Sodium 30mg 1%

Total Carbohydrates 63g 21%

Sugars 4g

Dietary Fiber 7g 26%

Protein 7g

Vitamin A 1%

•

Vitamin C 48%

Calcium 4%

•

Iron 18%



## Vegetable of the Month

**VEGETABLE NAME:** Rhubarb

**SCIENTIFIC NAME:** *Rheum rhabarbarum*

**BIOLOGY:** Rhubarb is a perennial plant that grows from thick, fleshy rhizomes. It has large, toxic leaves that are connected to a tart and tasty petiole (or leaf stem). The leaves contain oxalic acid, which can be corrosive to tissue, so it is important to remove them before cooking with the stalk.

**POLLINATION:** Rhubarb is typically reproduced through vegetative propagation; however it can be grown from seed. Rhubarb flowers are pollinated by insects.

**SOWING:**

Planting Depth	Seeds Per Group (Hill)	Seed Spacing	Thin To Plants Per Group (Hill)	Sun/Shade	Days to Germination	Days To Maturity
2 in.	1	36 in.	1	Sun	10	2 years

**HARVESTING:** Rhubarb is one of the first vegetables to be harvested in the spring in May and early June. Harvesting should not occur until after the second year it was planted so that the plant can build up a strong root system. Cut up to 2/3 of the largest leaves of the plant right at the soil. Leaves should be removed before cooking.

**EDIBLE PARTS:** The leaf petiole.

**COOKING:** The most important part about cooking with rhubarb is to remember to remove the toxic leaves. Uncooked rhubarb has a very tart taste that many people find unpleasant. However, when rhubarb is boiled with sugar, it tastes delicious in pies, tarts, breads, and salad dressings. It is often complimented by strawberries, which add an additional sweetness. Rhubarb is a good source of magnesium, Vitamin C, Vitamin K, and Dietary Fiber.

**HISTORICAL FACTS:** Rhubarb is native to Asia, in particular, the Konsu province of China. It was originally cultivated for its laxative and astringent properties, which made it very popular and expensive in medieval Europe. It was not until late 18<sup>th</sup> century that it was grown as a food plant to be used as a filling for tarts and pies.

Nutrition Facts

Serving Size 1 cup diced



Amount Per Serving

Calories 26

Calories from Fat

% Daily Value\*

Total Fat 0%

Saturated Fat 0%

Polyunsaturated Fat 0g

Monounsaturated Fat 0g

Cholesterol 0%

Sodium 5mg 0%

Total Carbohydrates 4g 1%

Dietary Fiber 2g

Sugars 1g

Protein 1g



Vitamin A 2% •

Vitamin C 16%

Calcium 10% •

Iron 1%



**Vegetable of the Month:** Pepper

**VEGETABLE NAME:** Pepper

**SCIENTIFIC NAME:** *Capsicum sp.*

**BIOLOGY:** The pepper is the fruit of the plant. It can vary in color, shape, and size depending on the variety. In addition, peppers can vary in spiciness depending on how much of the compound “capsaicin” is present. In the United States, the most popular variety of pepper is the bell pepper, which does not produce any capsaicin making it sweet. On the other hand, the habanero pepper is one of the spiciest pepper varieties because it produces the most capsaicin. The flesh of the pepper is crisp and juicy.

**POLLINATION:** Insects pollinate pepper flowers for seed and fruit production. There is also a high rate of self-pollination because each flower has male and female parts.

**SOWING:** Seeds should be planted indoors 7-10 weeks before they will be transplanted outdoors. Peppers are very sensitive to temperature and light, so it is important that they are planted when night temperatures do not dip below 64°F and that there is partial shade in the hottest months of summer.

Planting Depth	Seeds Per Group (Hill)	Seed Spacing	Thin To Plants Per Group (Hill)	Sun/Shade	Days to Germination	Days To Maturity
¼ in.	3-4	18 in.	1	Full sun	7-10 days	75-90 days

**HARVESTING:** Peppers can be harvested at any stage in their growth, but they are most flavorful when they are mature. Each variety of pepper varies in size and color, so refer to the information found on the back of the seed packet. For example, green bell peppers are red bell peppers that are harvested before they have completely ripened. Hot peppers are initially green in color, but quickly turn to colors such as red, orange, yellow or purple.

**EDIBLE PARTS:** The fruit.

**COOKING:** Peppers are used cooked, dried, roasted, and raw in a variety of different dishes from around the world. After removing the seeds and pith, it can be stuffed with Spanish rice and roasted, or sliced to eat raw dipped in hummus, blended in salsa or tossed into a salad. Hot peppers are also used in curry

dishes, salads, salsas and as a seasoning to give your meal a kick! Peppers are very rich in Vitamin C, Vitamin A, Vitamin K, and Dietary Fiber.

**HISTORICAL FACTS:** Peppers are native to Central and northern South America. A variety that contains capsaicin was one of the first plants to be domesticated in Central America and was used as a spice as well as medicinally for digestive health and increased blood circulation. Peppers were brought to Spain in 1493 and from there spread to other European, African and Asian countries. In Asia, particularly in India and South East Asia, many new varieties have been developed and used as a staple ingredient in cultural dishes. The pepper is now one of the most universally used vegetables in the world.

Nutrition Facts

Serving Size 1 cup chopped (149 g)

Amount Per Serving

Calories 30

Calories from Fat 0

% Daily Value\*

Total Fat 0g 0%

Saturated Fat 0%

Polyunsaturated Fat 0g

Monounsaturated Fat 0g

Cholesterol 0g 0%

Sodium 4mg 0%

Total Carbohydrates 7g 4%

Sugars 4g

Protein 1g

Vitamin A 11% • Vitamin C 200%  
Calcium 1% • Iron 3%



## Vegetable of the Month

**VEGETABLE NAME:** Butternut squash

**OTHER NAMES:** Butternut pumpkin

**SCIENTIFIC NAME:** *Cucurbita moschata*

**BIOLOGY:** The butternut squash is the fruit of the plant containing the plants seeds. Both male and female flowers are found on the vine of the plant with large leaves. Butternuts are a smooth long-necked bowling pin- or bell-shaped squash encased with a pinkish-tan hard rind. Having a relatively small seed cavity in its bulbous end, its tender flesh offers a superb creamy flavor.

**POLLINATION:** Both male and female native squash bees visit the flowers in the early morning hours.

**SOWING:** Select a sunny location (will tolerate light shade) and plant in late spring when soil is warm and danger of frost is past. Cultivate and enrich with vegetable food and organic matter. Firm soil over seed.

Planting Depth	Seeds Per Group (Hill)	Seed Spacing	Thin To Plants Per Group (Hill)	Sun/Shade	Days to Germination	Days To Maturity
1 inch	6-8	3 inches apart in hills 48-72 inches apart	2-3	Full Sun	10-14	95-110

**HARVESTING:** Harvesting: Allow fruit to remain on vine until mature. Pick before frost, leaving part of stem attached. Store in a warm, dry place.

**EDIBLE PARTS:** Flowers, seeds, tendrils and fruit.

**COOKING:** To prepare, cut rinsed squash in half lengthwise; remove seeds. Bake; top with butter; sprinkle with favorite seasonings. Experiment with different spices to enhance its naturally good flavor. Cardamom, anise seed, thyme, mace, sage, cumin, ginger, turmeric, paprika, tarragon, allspice and savory complement its dependable sweet goodness. Braise, sauté, steam or microwave. Sweeten with brown sugar; add a kiss of nutmeg, cinnamon or cloves to enhance flavor. This squash is ideal for soups and stews. Ravioli and risotto love its flavor and texture contributions. Make a squash soufflé. To store, keep whole squash at room temperature. Butternut squash is an excellent keeper. Wrap cut pieces in plastic; refrigerate up to five days. It is a good source of fiber, vitamin C, manganese, magnesium, and potassium. It is also an excellent source of vitamin A.

**HISTORICAL FACTS:** The exceptional butternut is the most widely grown winter squash. Versatile and diverse, squash has no rival in the kitchen when it comes to its culinary flexibility. Butternut and related species of squash originate from around Mexico

Nutrition Facts Butternut Squash  
Serving Size 1 cup, cubes (205.0 g)

Amount Per Serving

Calories 82

Calories from Fat 2

% Daily Value\*

Total Fat 0.2g 0%

Saturated Fat 0.0g 0%

Polyunsaturated Fat 0.1g

Monounsaturated Fat 0.0g

Cholesterol 0mg 0%

Sodium 8mg 0%

Total Carbohydrates 21.5g 7%

Sugars 4.0g

Protein 1.8g

Vitamin A 457%

•

Vitamin C 52%

Calcium 8%

•

Iron 7%

**Lesson Plan:** Vegetable of the Month

**Unit:** Veggie of the Month

**Objectives:**

- Students will learn about a specific fruit or vegetable.
- Students will learn how about how to grow the plant, including planting season, row spacing, germination time, pollination, and when to harvest.
- Students will learn different ways to prepare the food for eating.
- Students will learn some historical facts about the plants.

**Materials:** Vegetable of Month handout or worksheet. Vegetable of Month, planting/cooking equipment as required.

**Time:** 15 minutes to one week depending on how many and which activities you chose to do surrounding the vegetable of the month.

**Vocabulary:** vegetable, fruit, germination, pollination

**Background Information:**

There are a wide range of foods that can be grown and eaten in Wisconsin. The purpose of this lesson is to give students an opportunity to discover as much as they can about a food. This is also a way to have students connect the growing of food directly with eating. While this lesson is called vegetable of the month it works easily with fruits as many “vegetables” in the cooking world are really fruits in science terminology.

The item that is picked for the month should have some connection with the seasonality of the food. This can be when the food is planted, harvest, growing, or taken out of storage. You may also choose a food that is not able to grow local to discuss the concept that some foods require different climates.

The information gathered about each food should include information about how to grow the plant, ways to eat and historical facts. Seed catalogs often contain information on when to plant, needs for nutrients, water and sunlight, how much space the plant needs and when to harvest. Looking through cookbooks for recipes that include the specific food is a useful way to find information on how the food can be eaten. Remember some foods can be eaten raw and many times there are additional less common uses of a plant. Think about what part of the plant can be eaten and how that part needs to be prepared.

Students will make observations about the food and then have an opportunity to prepare and eat the food. Depending on the food this may require cooking. How long you spend on the vegetable of the month depends on your time and facilities constraints. Depending on the season you may also be planting, transplanting, weeding or harvesting the vegetable of the month.

See the sample list of vegetable of the month ideas. Notice that some vegetables can be picked over multiple months you can also choose to do the same vegetable twice to show the vegetable at different points of its life cycle.

### **Teacher Instruction:**

5. You can prepare sheets with information about the vegetable of the month (This curriculum contains 12 examples) or students can research and find the necessary information (see worksheet). If you want this lesson could be changed to vegetable of the week or day.
6. Students can work individually, or in groups. This lesson could also be where one group has a vegetable one month and prepares the presentation to the rest of the class. With each month a different group preparing the lesson.
7. Depending on the vegetable chosen and the amount of time available you can prepare the food during class or beforehand.
8. It is good to have a sample of the food in class so that students can see, smell, feel, and taste the item. If food was cooked beforehand bring in a raw sample as well.
9. The vegetable of the month could take as long as an entire week or as short as 15 minutes depending on what food is chosen and how much time you spend with cooking or researching during class.
10. Depending on the season you can plant, weed, or harvest the vegetable. If possible have representations of the plant in different stages of its life for comparison.

### **Student Instruction:**

- Make observations about the vegetable.
- Draw a picture, smell and feel the vegetable record your observations.
- Taste the vegetable. This may require you to cook.

When in the correct season:

- Plant the seeds as directed.
- Transplant, weed, water, thin as needed
- Harvest when ready

### **Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. Have you ever eaten this food before?
2. How was it prepared?
3. Did you like how it tasted?

4. What does the plant that this food comes from look like?
5. List other foods that are related to this food.
6. List foods that looks similar to the vegetable of the month.
7. List foods that taste similar to vegetable of the month.
8. Create a different recipe to use with this food.
9. Replace this food with a different food in a recipe.
10. Why was this food chosen a vegetable of the month?
11. List other times of year when this vegetable could be chosen.
12. Compare different types of the vegetable.
13. Describe how you would grow this food.

**Extensions:** Use additional recipes to prepare the vegetable in different ways, visit different operations that grow the vegetable.

**Accommodations:**

**Resources:**

Seed catalogs, cookbooks

<http://www.specialtyproduce.com/> List of over one thousand produce items with information on nutrition and recipes.

<http://caloriecount.about.com/> Lists nutritional values for variety of foods.

<http://www.melissas.com/> Give descriptions, seasonality, recipes and nutritional information on produce.

**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

*(pictures inside and out)*

## Vegetable of the Month

**VEGETABLE NAME:**

**OTHER NAMES:**

**SCIENTIFIC NAME:**

**BIOLOGY:**

**POLLINATION:**

**SOWING:**

Planting Depth	Seeds Per Group (Hill)	Seed Spacing	Thin To Plants Per Group (Hill)	Sun/Shade	Days to Germination	Days To Maturity

**HARVESTING:**

**EDIBLE PARTS:**

**COOKING:**

**HISTORICAL FACTS:**

Nutrition Facts

Serving Size

---

Amount Per Serving

Calories

Calories from Fat

% Daily Value\*

Total Fat %

Saturated Fat %

Polyunsaturated Fat g

Monounsaturated Fat g

Cholesterol %

Sodium %

Total Carbohydrates %

Sugars g

Protein g

---

Vitamin A %

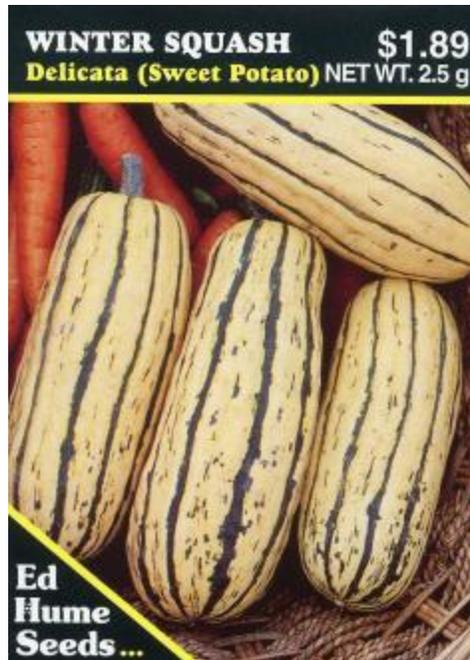
•

Vitamin C %

Calcium %

•

Iron %



**NAME: SQUASH DELICATA**

**DESCRIPTION:** A long oblong-shaped squash with a cream colored, green striped thick outer skin and a golden fine-textured inner flesh. Its size may range from 5 to 10 inches in length with an average weight of 1 to 2 pounds.

**OTHER NAMES:** It is also known as potato squash, a sweet potato squash, a Bohemian squash, winter keeper or peanut squash because of its shape.

**BIOLOGY:** Winter squash belong to the Genus *Curcubita*. While in cooking the squash is considered a vegetable botanically it is a fruit being a receptacle of the plants seeds. Winter squashes annual vines. They have large leaves, and separate male and female flowers grow on the same plant.

**POLLINATION:** Squashes need to be pollinated by insects. Historically this was the North American squash bee *Peponapis pruinosa*, but this bee has declined, probably due to pesticide sensitivity, and most commercial plantings are pollinated by European honey bees today. If there are no bees it may be necessary to pollinate by hand.

**SOWING:** Sow seeds directly in garden in late spring after weather has warmed and all danger of frost has passed. Seeds can also be started in individual peat pots indoors or in the greenhouse 2 to 3 weeks before setting out. Cover seeds with 1/2 to 3/4 inch fine soil well firmed down.

**SPACING:** Plant 6 to 8 seeds per hill spaced 3 to 4 feet apart. Space rows 3 feet apart. Delicata's medium length semi-bush vines do not take over the whole garden. Grow in a sunny location with rich, somewhat moist, well drained soil.

**THINNING & TRANSPLANTING:** Thin or transplant to 3 healthiest plants per hill. Leave 18 to 24 inches between plants in rows.

**GERMINATION:** One to two weeks depending upon weather and soil warmth. Keep soil moderately moist during germination. Approximately 100 days to maturity.

**HARVESTING:** Harvest and enjoy earliest fruit, save later maturing fruit for winter storage. Harvest when leaves have begun to die back. Leave winter squashes on the vine until the skin is so hard it cannot be dented with your thumbnail. Break or cut it off the vine, gather before frost leaving part of stem attached.

Delicata is very productive and stores well throughout the winter and into spring. Store in a cool dry place can be kept for 7-8 months. Cure squashes in a dark, humid place for 10 days at 80 to 85 degrees Fahrenheit; then store them at 50 to 60 degrees Fahrenheit in a moderately dry, dark place.

**EDIBLE PARTS:** In addition to the squash fruit, flowers can also be eaten. Seeds can be eaten, ground into flower or pressed to make oil. Tendrils, leaves and stems may also be eaten. Available year round, delicata squash are best during August to October.

**COOKING:** This squash can be baked or steamed and served as a side dish seasoned with butter and herbs, providing a sweet nutty flavor with a creamy smooth texture. When preparing in an oven, cut the squash in half by cutting down the length of the oblong shape. Place the squash with the skin side down in a dish with 1/2 inch of water. Cover the dish and bake for 1/2 to 3/4 hour at 375 degrees. In a microwave, cook for approximately 20 minutes in a dish with a loose cover of plastic wrap. Enjoy its fine grained, light orange flesh steamed or baked.

Though all varieties of squash are good nutrition choices, winter varieties tend to be more nutrient-dense. They generally contain much more beta-carotene and more of several B vitamins than summer squash. Winter squash's beta-carotene content even rivals that of mangoes and cantaloupe which helps to fight against cancer, heart disease, and cataracts. Beta-carotene may also play a role in reducing lung inflammation and emphysema. Winter squash also contain beneficial amounts of vitamin C, potassium, and fiber.

**HISTORICAL FACTS:** Archaeological evidence suggests that squash may have been first cultivated in Mesoamerica some 8,000 to 10,000 years ago. Squash was one of the three sisters' plants used by Native Americans. The Three Sisters were the three main indigenous plants used for agriculture: maize (corn), beans, and squash. These were usually planted together, with the cornstalk providing support for the climbing beans, and shade for the squash. The squash vines provided ground cover to limit weeds and the beans provided nitrogen for the soil.

Nutrition Facts: Delicata Squash  
Serving Size 3/4 cup (85.0 g)

---

Amount Per Serving

Calories 30

% Daily Value\*

Total Carbohydrates 7.0g 2%

    Dietary Fiber 1.0g 4%

    Sugars 3.0g

Protein 1.0g

---

Vitamin A 70%

•

Vitamin C 15%

Calcium 2%

•

Iron 2 %

Name of Vegetable: \_\_\_\_\_

Name: \_\_\_\_\_

Draw a picture of the vegetable inside and out.

What does it feel like inside/out?

What does it smell like?

What does it taste like?

# Seed to Table

## Part Two: In the Kitchen

### Objectives:

- Students will learn safe food handling skills and appropriate use of culinary equipment.
- Students will understand the connection between the agriculture and food preparation.
- Students will learn the skills necessary to work in a food service environment.
- Students will understand concepts of local and seasonal cooking.
- Students will learn how to preserve food for storage.
- Students will learn technical skills enabling them opportunities for skilled employment and access to higher education.
- Students will learn about social issues surrounding food.
- Students will experiment with different ingredients to make new foods.
- Students will learn the science behind different food options and reactions that take place when cooking.
- Students will learn the math skills necessary to prepare food and operate a food business.

### Modified Curriculum Objectives:

This curriculum can be modified to fit the needs of learners of all ages and ability levels.

**Time:** One semester.

### Background Information:

The purpose of the culinary arts curriculum within the Seed to Table program is to prepare students to find skilled employment within the culinary trade. In addition this program serves as a starting point to pursue further training and education at an institution of higher education. While every student may not pursue a career in culinary arts the background provided in this curriculum will be useful for cooking and eating in the home as well.

Students will learn proper sanitation techniques including hand washing and equipment cleaning. Students will also learn the safe method for using kitchen equipment including cook tops, ovens, dishwashers, knives, food processors, etc.

Students will become knowledgeable about all aspects of food service. This includes but is not limited to menu planning, purchasing, food preparation, customer service, money management, and sanitation. Students will learn how to use the tools required to accomplish each of these tasks.

In addition, students within the culinary arts program will understand the interconnectedness between agricultural food production and food preparation. This includes the value of finding local sources of fresh food and preparing foods that are ready seasonally. Students will also be able to see the circle complete with the recycling of food scraps into the compost pile to be reused as fertilized soil for plant production.

Students will also have the opportunity to learn proper food preservation techniques and to be able to produce products for market.

The concepts covered in this curriculum contain aspects of English, science, math and social studies. The lessons contain reading, writing, and discussions. Chemistry of cooking and the biology of different foods we eat are also explored through observation and experimentation. Using real world applications students will practice fractions, percentages, multiplication, division and estimation. Students will also explore social issues surrounding food including food security issues and different cultures food choices.

## **Unit 1: Introduction to “In the Kitchen”**

In this section students explore different issues surrounding food. Lessons examine different ways to find food and how food is produced. Students also are exposed to different cultures and different traditions surrounding food.

*Food Rules—Ideas to promote healthy eating.*

*Where to Find Food? —Explore different ways that people can procure food.*

*Omnivore's Dilemma—Taking a closer look at Michael Pollan's book on exploring how food is produced.*

*Food Security—Students learn about issues surrounding food insecurity and ways to increase food security locally and nationally.*

*Fair Trade—Students learn about how food can be produced in ways that promote fair social and economic trade.*

*Cultural Cooking—Students examine different cultural food traditions.*

*Food Entertainment—Learn a variety of ways to create community using food.*

*Food Allergies—Learn about common food allergies and how to prevent cross contamination.*

*Vegetarianism—Explore reasons for vegetarian diet and ways to make a nutritious vegetarian meal.*

*Restaurant Review—Learn the value of restaurant reviews and how to write your own review.*

## Seed To Table

**Lesson Plan:** Food Rules

**Unit:** Introduction to “In the Kitchen”

**Objectives:**

- Students will learn concepts behind healthy eating using a series of food based adages.
- Students will learn simple changes they can make to improve eating habits.
- Students will come up with their own food rules.

**Modified Curriculum Objectives:**

**Materials:** Copy of “Food Rules: an eater’s manual” by Michael Pollan, Handouts

**Time:** 5 minute warm up activity, 1 hour discussion of a variety of rules and developing additional rules.

**Vocabulary:** Processed Foods, Organic Foods, Natural Foods, Nutrients.

**Background Information:**

Many people have questions about how to have a healthy diet and get appropriate nutrition. Food author Michael Pollan developed 64 rules based on the answers to three simple questions. What should I eat? *Food*. What kind of food should I eat? *Mostly Plants*. How should I eat? *Not too much*.

Pollan’s book Food Rules is an easily readable and fun way to have people start thinking about healthy eating. These rules are not required to be adapted in full and should probably be referred to as guidelines to follow. These rules were created after scientific research and requesting opinions from the general public. These include some sage advice from past civilizations. While others contradict things some parents have taught their children. Pollan narrowed down over 10,000 ideas to 64 simple rules some with explanatory paragraphs others that he considers self explanatory.

The purpose of this lesson is to have students think about what they eat. The rules in this book can spark discussion and disagreements. This is about creating a healthy discourse, thinking about what food is, and what healthy eating looks like. The book does suggest ways to change

eating habits and students can have this information to make informed choices if they want to reevaluate how they eat.

**Teacher Instruction:**

1. Familiarize yourself with the “Food Rules.”
2. You do not need to agree with all of these rules and you may have rules of your own.
3. Make sure students understand that these are guidelines developed by one person and while using scientific background and consulting with others the rules are not laws that everyone has to follow.
4. You could introduce one rule during a class to generate discussion.
5. An entire class period could be based on the discussion of several of the rules.
6. Students could then develop their own rules.
7. Student developed rules can then be explained with explanatory paragraphs.

**Student Instruction:**

1. There are three basic food rules.
  - a. Eat Food. Not to be confused with edible food like substances which are found in many grocery stores and vending machines.
  - b. Eat Mainly Plants. This does not mean never eat meat. It does mean that in tradition US cooking meat is the centerpiece of a meal and this does not necessarily led to a healthy diet.
  - c. Eat in Moderation. Too much of anything is probably unhealthy.
2. Create your own food rule that falls under one of these general headings. Write an explanatory paragraph that details your thoughts for why you created this rule.
3. Share your rules with the class and discuss if these rules should be included in a new book.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What types of products does Pollan call edible food like substances?
2. What types of foods are found on the edges of the typical grocery store?
3. Why does Pollan have a dislike of processed food?
4. Create a menu using natural food.
5. Create a menu using processed food.
6. What nutrients are found in eating plants?
7. Why does Pollan recommend eating a naturally colorful plate of food?
8. Is eating healthy more expensive? Why? Why Not?
9. Why is planting a garden a part of healthy eating?
10. What is the value of cooking your own food?

11. Why does rule 64 encourage people to break the rules once in a while?

**Extensions:**

Create a map of a grocery store labeling where to find natural food and where to find processed food. Develop a book on food rules talking with friends, parents, relatives and others. Send the rule's students create to [pollanfoodrules@gmail.com](mailto:pollanfoodrules@gmail.com) Read Pollan's other books "In Defense of Food" and "Omnivore's Dilemma"

**Accommodations:**

**Resources:**

Food Rules: An Eater's Manual, Michael Pollan 2009 Penguin Books

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## Food Rules

Name: \_\_\_\_\_

### **Eat Food. Eat Mainly Plants. Not too Much.**

Create your own food rule that falls under one of these general headings. Write an explanatory paragraph that details your thoughts for why you created this rule.

1.

**Food Rules**

Name: \_\_\_\_\_

Circle the foods that are natural foods.

Chicken	Yam	French Fries	Capri sun
Twinkie	Fritos	Froot Loops	Pepsi
Ragu	Salmon	Apple	Grapefruit
Pop Tart	Mushroom	Snickers	Butter
Tomato	Margarine	Broccoli	Corn Bread
Olive	Potato	Cabbage	Fruit Roll-ups

Eliminate an item in the following menus to make the meal healthier.

1. Tossed Salad, Ranch Dressing, 4 Ounces Chicken, Fettuccine, Peas
2. Steamed Carrots, 16 Ounce Steak, Baked Potato
3. Peanut Butter and Jelly Sandwich, Celery Stick, Cheetoes, Apple
4. Blueberry Pancakes, Applesauce, Bacon, Orange Juice
5. Quarter Pounder, French Fries, Tossed Salad, Milk
6. Corn on the cob, Grilled Tuna, Green Beans, Soda

List three strategies you can use to eat less processed foods.

1.

2.

3.

## **"Food Rules": A Completely Different Way to Fix the Health Care Crisis**

*Michael Pollan*

The idea for this book came from a doctor--a couple of them, as a matter of fact. They had read my last book, "In Defense of Food", which ended with a handful of tips for eating well: simple ways to navigate the treacherous landscape of modern food and the often-confusing science of nutrition. "What I would love is a pamphlet I could hand to my patients with some rules for eating wisely," they would say. "I don't have time for the big nutrition lecture and, anyway, they really don't need to know what an antioxidant is in order to eat wisely." Another doctor, a transplant cardiologist, wrote to say "you can't imagine what I see on the insides of people these days wrecked by eating food products instead of food." So rather than leaving his heart patients with yet another prescription or lecture on cholesterol, he gives them a simple recipe for roasting a chicken, and getting three wholesome meals out of it -- a very different way of thinking about health.

Make no mistake: our health care crisis is in large part a crisis of the American diet -- roughly three quarters of the two-trillion plus we spend on health care in this country goes to treat chronic diseases, most of which can be prevented by a change in lifestyle, especially diet. And a healthy diet is a whole lot simpler than the food industry and many nutritional scientists -- what I call the Nutritional Industrial Complex -- would have us believe. After spending several years trying to answer the supposedly incredibly complicated question of how we should eat in order to be maximally healthy, I discovered the answer was shockingly simple: eat real food, not too much of it, and more plants than meat. Or, put another way; get off the modern western diet, with its abundance of processed food, refined grains and sugars, and its sore lack of vegetables, whole grains and fruit.

So I decided to take the doctors up on the challenge. I set out to collect and formulate some straightforward, memorable, everyday rules for eating, a set of personal policies that would, taken together or even separately, nudge people onto a healthier and happier path. I solicited rules from doctors, scientist, chefs, and readers, and then wrote a bunch myself, trying to boil down into everyday language what we really know about healthy eating. And while most of the rules are backed by science, they are not framed in the vocabulary of science but rather culture -- a source of wisdom about eating that turns out to have as much, if not more, to teach us than nutritional science does.

"Food Rules" is a most unconventional diet book. You can read it in an hour and it just might change your eating life. I hope you'll take away something you can put to good use, and maybe get a chuckle or two along the way. And do let me know if you have any food rules I should know about. I'm still collecting them, at [pollanfoodrules@gmail.com](mailto:pollanfoodrules@gmail.com).

## Seed To Table

**Lesson Plan:** Where to Find Food?

**Unit:** Introduction to “In the Kitchen”

**Objectives:**

- Students will learn where they can grow or purchase food.
- Students will compare the different options for purchasing food including price, taste, quality, availability and environmental or social concerns.

**Modified Curriculum Objectives:**

**Materials:** Access to internet to research food options, ability to visit different stores, or printed materials on different buying options.

**Time:** 45 minutes overview -2-3 class periods to research different options

**Vocabulary:** Community Supported Agriculture (CSA), Farmer’s Market, Co-Operative, Community Garden, Food Distributor, Food Pantry

**Background Information:**

The food that we eat comes from a variety of sources. While the origins of all food comes from the soil grown in a range of locations from backyard gardens to large industrial farms. When procuring food for your home or restaurant kitchen there are many options available.

**The garden:**

This type of garden can range from small to large. The initial costs are relatively small but there is a labor input that a gardener has to be willing to make. Gardeners in apartments could have a small inside herb garden or containers of tomatoes, peppers or other plants growing on window ledges or small decks or patios. Gardeners who have land can grow any food that will grow in their climate region and with enough sunlight. Depending on space and personal preferences gardeners can plant vegetables of all types, as well as fruit bushes/trees. In some locations home owners can also raise their own chicken for eggs/meat.

In many communities there are places available for gardeners to rent land. These community gardens often provide some shared tools, water, compost, mulch, and flat land that is fairly sunny. Established community gardens often have soil that is high in nutrients as previous gardeners have added compost to the soil to improve its viability. Depending on the rules of the individual garden you may or may not be able to plant perennials, build structures, and/or use chemical pesticides/fertilizers. Community gardens typically charge a minimal fee for the space and require gardeners to spend some time providing labor to the community garden.

**Local Farms:**

There are several different ways to purchase food from local farms. Some grocery stores and restaurants will have agreements to purchase food directly from the farm. Often these businesses will advertise where the local food comes from because this is a premium product and some people are willing to pay more for local foods. Many communities have farmer's markets where local farmers can set up stalls in one location and people can buy directly from the farmer who grew the food. Different farmer's markets have different requirements on how far from the market the food can be grown and for processed foods how many of the ingredients can be non-local. Every market is different so if local is concerns to you read the rules of the farmer's market and ask the farmer directly if you have questions. Roadside or farm stands are another way to purchase local foods. However sometimes roadside stand purchase food from a distributor and the food is then not local. One hint is if there are bananas at the stand then it is not all local produce. There are restaurants that focus on using local ingredients that only create a menu after their food purchaser has gone to the farmer's market.

Community Supported Agriculture or CSA's is another way to purchase local foods. In this model a buyer gives money to the farmer before planting season to purchase a share of the farmer's produce. This allows the farmer to have money to purchase seeds and other supplies before there is anything to sell. The customer then receives a box of produce usually weekly during the growing season. What comes in the box depends on what is in season and how well that crop is doing at that farm that year. The farmers usually try to provide lots of produce and good variety to keep their customers coming back. Often in CSA boxes there are items that are new to the individual consumer.

**Industrial farms and Processed Foods:**

Most farms in the US are industrial farms that use large acreage of land to typically grow one type of food. The food is then sold to food processors. While some of these large farms are organic most are conventional farms using chemical fertilizers and pesticides to increase yield. Most of the corn and soybeans grown in the US is shipped to feedlots to feed cattle, pigs or chicken or converted into high fructose corn syrup for making processed foods in factories.

To buy these foods you can go to any grocery or convenience store. Businesses receive this food from nationwide food distributors. It is also possible for a group of people to create a buying club that can buy directly from a food distributor. Food distributors allow for business to order how many of a wide range of products these items can be delivered daily or monthly depending on the needs of the organization. Most restaurants and food service companies receive food from one or two distributors.

**Stores:**

There are several different types of stores that sell food. Some are large regional or national chains that focus on carrying food. Others are a mix of items for one stop shopping where you can buy food, clothing and household items all in one place. Smaller convenience stores often connected to gas stations often sell a limit number of food items. Small local grocery stores often call Mom and Pop Grocery stores used to be the main food source for communities but while some are still in existence many have closed down due to completion from larger stores. There are also specialty grocery stores that often sell food for a specific style of cuisine i.e. Asian food stores, Mexican, Indian, etc. There are also co-operative grocery stores, these stores are owned by customer who pay a joining fee and run by rules set by a board elected by the members of the co-op.

Any type of store can carry local and or organic food. However these choices are often based on consumer demand. Currently many larger grocery stores have begun to carry organic foods and some have developed relationships with local food producers. There are also several nationwide changes that focus on providing organic and naturally food. Grocery Co-ops are typically started with the focus of providing healthy and local food choices to their customers.

### **Food Pantries:**

Food Pantries or Food Banks supply food for free or reduced prices to individuals in need or organizations that provide food to people in need of food assistance. There are many area food pantries and meal sites that can provide food if you need it or have volunteer opportunities if you want to help out. The food is often donated by grocery stores, farmers, or individuals as a way to provide food for the hungry and to stop food that would have been thrown out to be eaten.

### **Teacher Instruction:**

1. In this lesson students will explore and compare the different places to purchase food either for home or a restaurant.
2. Have students create a list of places where you can buy food. Place these in different categories and fill in with additional options as necessary.
3. Students can work individually or in groups to create a presentation to illustrate the positives and negatives of different types of food providers.
4. To do this research you may need to use online resources or visits to the actual location.

### **Student Instruction:**

1. Research one type of place that you can purchase food.  
(Garden, Farmer's Market, Co-op Grocery, Large Grocery, Convenience Store, CSA, Food Distributor, Food Pantry)
2. Prepare a poster to present to the class the benefits and concerns with each type of food provider.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. List locations where you can buy local foods.
2. What are the benefits to a farmer to have customers join a CSA?
3. What are the benefits to a customer to participating in a CSA?
4. What issues could arise from buying food through a CSA?
5. What are the benefits of a Farmer’s Market?
6. What are the benefits to buying food a superstore?
7. What are the benefits to belonging to a grocery co-op?
8. Compare costs of different food items at different types of stores.
9. Which types of food providers have limited availability?
10. When do these periods of limited availability occur?
11. As a restaurant owner your customers ask for local food. How can you provide this option and what changes have to be made to your menu to reflect this change?

**Extensions:**

Take a trip to different types of grocery stores, visit local farmers markets, visit with a CSA farmer, create a co-op plan, or volunteer at a food pantry.

**Accommodations:**

**Resources:**

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

**Where did you get that Food?**

**Name:** \_\_\_\_\_

Name of place where the food came from?

Did you meet the person who produced your food? If so ask them question about the food they sell.

What types of locally grown foods are available? List 5 options if available.

What types of organic foods are available? List 5 options if available.

What types of processed foods are available? List 5 options if available.

What are the prices for the food? (Pick 10 items write down price and quantity)

How far did the food have to travel to arrive to where you purchased it? (Some foods travel different distances write down how many different states/countries you see represented by the food) How close is this food to your house?

What costs to the environment are there to the way the food was grown, transported or sold? Think about what went into growing the food, transporting the food, and electricity and space use at the store.

How does the food taste? Try several different foods.

## Seed To Table

**Lesson Plan:** Omnivore's Dilemma

**Unit:** Introduction to "In the Kitchen"

**Objectives:**

- Students will learn about how food is grown in the United States.
- Students will compare different sources of food.
- Students will be able to make an informed decision about their food choices.

**Modified Curriculum Objectives:**

**Materials:** Omnivore's Dilemma by Michael Pollan (Regular or Young Reader's Edition)

**Time:** Enough time for your students to read the book. Spend at least 4 days discussing the four different sections of the book and then a day talking about your conclusions. The regular version has 464 pages the young reader's edition is slimmed down to 298.

**Vocabulary:** Industrial Farming, Industrial Organic, Local Sustainable, Hunter/Gatherer

**Background Information:**

Michael Pollan sets out to prove a point about food and in Omnivore's Dilemma he uses four different meals to illustrate his ideas. In general, the book focuses on how Americans have become disconnected from the food we eat.

The book is divided into four main chapters each focusing on a meal made from food coming from different farming practices. These include the industrial meal, the industrial organic meal, the local sustainable meal and the do-it-yourself meal. Pollan conducts research on how each of these meals goes from seed to table and writes the facts for the reader to devour.

The industrial meal is how most people in the US eat. These meals can be found at the fast food restaurant or made from the wide range of processed foods that are available in the modern grocery store. The industrial meal is food based from corn. This corn is used in a wide range of products to make soda, candy, breads, and frozen dinners. In addition, the majority of beef, pork and chicken are fed a steady diet of corn before they go to the slaughter house. These farms use lots of petroleum products and chemical fertilizers and pesticides. Much of the land throughout the Midwest is used to grow food for this industrial system. The corn and soybeans that are planted in large fields throughout Wisconsin go to feed the cows and pigs that are being raised on factory farms.

The industrial farms feed a nation and with subsidies from the government provide cheap food to the public. This type of farming creates disconnect between the consumer and the producer. Not even the farmers in this system grow their own food. The food may be inexpensive but also is fattening and has negative environmental costs associated with it.

The industrial organic meal is meeting the needs of consumers who want to move away from the chemicals that are used in the traditional industrial farming methods. This method of growing plants and animals eliminates several of the negative environmental aspects of farming. However, in addition to being more expensive this food is typically grown in monocultures in one area of the country. This still requires a heavy use of petroleum to ship the food across the country.

The local sustainable meal is also built on organic farming practices. However, in this model farmers grow a wide variety of fruits and vegetables. In addition, they may have a small number of animals to produce milk, eggs, or meat. Consumers can buy food directly from the farm, or meet the farmer at a market. Some farms also sell to grocery stores but in general all of the food is being sold and consumed within 150 miles from where it was produced.

The Do-it-yourself meal is a meal prepared from foods that were grown, collected or hunted by the person eating the food. This is the most local way to consume food. This could be as simple as growing tomatoes in containers on your deck to having a larger garden. In addition, wild plants, nuts, and fungi could be collected. Hunting and fishing are also included as ways to collect food for a do-it yourself meal. This meal may require the most work but could be done relatively inexpensively and the consumer knows from where all the food came.

After reading this book you may not change how you eat. However, you will have a better understanding of how your food reaches your plate. This may induce lifestyle changes or cause you to think about growing healthy food.

### **Teacher Instruction:**

1. After students have read each section have a discussion with the class.
2. Create a chart that compares the four types of meals including economic, social, environmental costs. Include examples of each meal and where these meals are produced.
3. Plan and prepare local sustainable and do-it-yourself meals.

### **Student Instruction:**

1. Read Omnivore's Dilemma.
2. Compare the four meals in the book.
3. Develop a question that is raised in the book to do more research.

4. Create a list of all types of food that have corn as a main ingredient. Go to the grocery store and look at ingredient labels to see what food products have a corn based ingredient.
5. Prepare your own local sustainable meal.
6. Prepare your own do-it-yourself meal.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

(These page numbers are from the Young Reader's Edition)

**Part 1: The Industrial Meal (pp7-107)**

1. Why is this called food from corn?
2. What is a genetically modified organism (GMO)?
3. What are the benefits and concerns with GMO's?
4. What types of chemicals are placed on industrial food crops?
5. How has the size of farms changed in the last 100 years?
6. How has the number of farms changed in the last 100 years?
7. How has the diversity of plants and animals that are grown on a farm change in the last 100 years?
8. What is a government subsidy?
9. How do subsidies help or hurt farmers?
10. How does corn become meat?
11. What are the benefits and issues with animals eating a consistent diet of corn?
12. Should corn be used to produce ethanol for fuel?
13. What types of products are made from corn?
14. When processed food is purchased how is the money divided between the people that made the food?
15. How does the industrial meal contribute to obesity?
16. Is food produced in the industrial farms really food or something else?
17. Why does the fast food industry lend itself well to the industrial food model?

**Part 2: The Industrial Organic Meal (pp108-139)**

1. How is organic grown differently from conventional food?
2. Why do large companies own both conventional and organic food producers?
3. What are the benefits to economies of scale?
4. What environmental costs are associated with industrial organic farming?
5. How are the rules for organic foods devised?

6. What does an organic sticker mean?
7. What are the concerns with organic foods being shipped around the country/globe?

### **Part 3: The Local Sustainable Meal (pp141-202)**

1. Why is the local sustainable meal called food from grass?
2. Why did the farmer refuse to send his chicken from Virginia to California?
3. What are the differences between Industrial and Organic farming?
4. What are the cows and chickens fed on the local farms?
5. Why do consumers buy food from local farms?
6. What does seasonal eating have to do with local eating?
7. Why is this type of farming called going back in time?
8. Why does Pollan feel the need to kill his own chicken?

### **Part 4: The Do-it-Yourself Meal (pp204-283)**

1. What types of foods can be gathered in the woods around your home?
2. What types of foods can be grown near where you live?
3. What types of foods can be hunted near your home?
4. What equipment/permission do you need to collect food for a do-it yourself meal?
5. How much time is needed to prepare a do-it-yourself meal?
6. Why does Pollan feel he has to kill his meat himself?
7. What foods cannot be collected in a do-it-yourself manner?

### **Overview**

1. What type of meal do you usually eat?
2. Could these different methods of finding food be combined?
3. Which type of meal do you think would taste best?
4. How does the information in this book change how you think about food?

**Extensions:** Do additional research about how food is produced around the world. Determine how to grow, gather, or hunt your own food.

**Accommodations:**

**Resources:**

[http://www.teachervision.fen.com/tv/printables/penguin/omnivores\\_dilemma\\_tg.pdf](http://www.teachervision.fen.com/tv/printables/penguin/omnivores_dilemma_tg.pdf) A 32 page teacher's guide with introduction and questions for each of the 20 chapters in Omnivore's Dilemma.

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## Seed To Table

**Lesson Plan:** Food Security

**Unit:** Introduction to “In the Kitchen”

**Objectives:**

- Students will learn about food security, poverty, hunger, food insecurity and their differences
- Students will learn about food banks, food pantries, and meal programs.
- Students will learn ways that they can assist people in need of food.
- Students will learn how they can access food assistance programs if needed.

**Modified Curriculum Objectives:**

**Materials:** List of topics to research

**Time:** 45 minutes overview of food security, 1 week to research a topic, 1 week+ to plan dinner, 4 hours to prepare dinner.

**Vocabulary:** Food Security, Food Insecurity, Food Bank, Food Pantries, Food Stamps, Hunger, Famine

**Background Information:**

While many students talk about being hungry or starving for their next meal there are many people around the world and in the United States who are food insecure. This term refers to people who do not know from where their next meal is coming. While hunger is a type of food insecurity, the main difference between hunger and food insecurity is that hunger deals with the physical need of food and the pain associated with a lack of food while food insecurity is concerned more with the thought of being without food and from where your next meal is coming. Hunger is generally a more permanent situation and sustained hunger can lead to starvation or death from lack of food. Food insecurity can be a temporary situation precipitated by unpredicted events including loss of employment or needing to pay for housing or a medical emergency. While food security is a worldwide problem there are many organizations and individuals working to deal with this issue.

In 2008, there were close to 50 million people living in the US who were considered to be food insecure. This includes people who are involuntarily cutting back on the food they eat, skipping meals, and not knowing if they will have enough money to purchase food at the end of the week. This type of food insecurity is not as severe as famine that is seen in parts of the developing world. However, it can lead to malnutrition over time. Famine is caused when there is a complete lack of food in a location. In the United States in addition to people dealing with food security

issues there are people who are battling hunger when they cannot get access to the food they need to provide needed sustenance.

There are several government and non-profit organizations that are working to improve food security for people in the United States. Low income people can receive food stamps which is a government program where food can be purchased using a Quest card like a debit card to purchase food at a grocery store. There are a variety of program names for government food programs including: FoodShare, Quest, EBT, food stamps, and SNAP. The government also provides funding for the 20 million school children who are facing food insecurity through the free and reduced lunch program.

Many non-profit organizations collect food from businesses, farmers, and individuals to distribute to people in need. A food bank is one type of distribution center for food. Food banks often collect large donations from grocery stores or manufacturers of food that will not be sold. They also rescue and purchase food that would have going straight to landfills, over 2 billion pounds of food each year. The food banks then distribute this food to organizations that will help fight food insecurity. Food Pantries provide access to donated food to needy individuals. There are often limits on the number of times one can go to a food pantry and how much food an individual can take. Though rules about this are starting to be less rigid in many areas and/or service areas are expanding to meet the demand. Meal food sites or soup kitchens prepare cooked meals for people who are in need of a healthy meal.

In the Madison area, nearly 1 in 8 residents are dealing with food insecurity. Nearly 50,000 of these individuals are children under the age of 18. To help these local residents find food requires the time effort and resources of many organizations and individuals. The Second Harvest Food Bank collects donations from stores and other businesses to distribute to food pantries and meal sites throughout the county. One such location is the Goodman Community Center located on eastside of Madison.

The Fritz Food Pantry at Goodman allows for residents in need of food to visit the pantry once per week. The pantry is open 3 days a week for two hours at a time. After an individual registers to receive food at the pantry they are allowed to “shop” the pantry shelves, picking the items that their families will enjoy to eat that week. Donations of food and money can be made at anytime by any individual. The food on the shelves are supplied by donations from local families, local farmers and gardeners, collaborations with organizations like Troy Community Groundworks and MACSAC, and food purchased from our area’s food bank, Second Harvest Food Bank of Southern Wisconsin.

In addition, to the food pantry Goodman provides a community meal for seniors each weekday. This healthy, well balanced meal is prepared by high school students in a work and learn program. Senior community members in need of a cooked meal and companionship can come for a free lunch and activities, Monday through Friday.

Food pantries and meal sites run with very few paid staff yet have room for many volunteers throughout the year. Volunteers can perform many functions including picking up donated food, organizing shelves and assisting clients with their food selection. While many food pantries receive a rush of donations and volunteer help between Thanksgiving and Christmas, people are dealing with food security issues year round. Anyone can contact a local food bank or food pantry to volunteer time or to make a donation of food or money.

For 2010, in the Madison area over 20 gardens have been planted and are being tended by local volunteers to provide fresh produce to local food pantries. In addition, many farmers donate surplus produce from their vegetable farms. Hunters also donate meat that has been processed to food pantries. Many stores and food manufactures donate excess products to help battle food insecurity. In addition, individuals may clear out their own pantries or buy food especially for a food drive run by scouts, religious, or business groups. There are also local challenges for donating surplus food and gardening programming including – Grow Good Challenge and Plant-A-Row for the Hungry. Every one of these donations, large and small helps to increase the food security of individuals within your community.

It is important to learn what resources are available in your community. Both in case you are ever in need of help attaining food and so that you can help others obtain food security. When there are fewer people in your community dealing with hunger it increases the health and prosperity of the entire community.

**Teacher Instruction:**

1. Discuss with students the issues surrounding food security in the world, nation and community.
2. Assist students with selecting and researching a topic surrounding food security.

**Student Instruction:**

1. Research and prepare a presentation (poster, paper, or PowerPoint) about an issue surrounding food security.
2. Research and prepare a meal for your class or the community that demonstrates the need to fight hunger. See Oxfam Hungry4Change Banquet information.
3. Volunteer at a local food bank, food pantry or meal site.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What parts of the world have people who are facing food insecurity?
2. Why do more people donate to food pantries in November and December?
3. What types of food are needed in food pantries?
4. What health problems arise when people are dealing with food insecurity?

5. Describe several government programs that help people find food.
6. Where would you go to find food if you had limited resources?
7. List ways that you can help to fight food insecurity?

**Extensions:**

Grow food for a food pantry, organize a food drive, and cook at a community meal site. Visit a variety of different locations working to provide food security.

**Accommodations:**

**Resources:**

<http://www.cacscw.org/food/dcfpn.htm> Dane County Food Pantry Network

<http://www.secondharvestmadison.org/about hunger.html> Second Harvest Food Bank in Madison, WI.

<http://www.secondharvestmadison.org/partneragencies.html> Food Pantries in Southwestern WI.

<http://www.oxfam.ca/what-you-can-do/fundraise-for-oxfam/hungry-for-change/hungry4change-hunger-banquet> Oxfam website explaining a Hungry 4 Change Dinner.

<http://www.ers.usda.gov/Briefing/FoodSecurity/measurement.htm> USDA information on measuring food security in the United States.

<http://www.goodmancenter.org/programs/food-meals> Goodman Community Center food programs.

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## Seed To Table

**Lesson Plan:** Fair Trade

**Unit:** Introduction to “In the Kitchen”

**Objectives:**

- Students will learn about fair trade products.
- Students will learn about how what they purchase can affect the world.
- Students will discuss the pros and cons of the fair trade movement.

**Modified Curriculum Objectives:**

**Materials:** TransFair Curriculum, (Banana Bonanza, or Coffee Connections) Banana Split Film

**Time:** 50 minutes to 10 class periods

**Vocabulary:** Fair Trade, sustainability, developing countries, import, export, developed countries, middlemen, producers, and environment.

**Background Information:**

Fair Trade is an organized social movement and market-based approach that aims to help producers in developing countries and promote sustainability. The movement advocates the payment of a higher price to producers as well as social and environmental standards. It focuses in particular on exports from developing countries to developed countries, most notably handicrafts, coffee, cocoa, sugar, tea, bananas, honey, cotton, wine, fresh fruit, chocolate and flowers.

Although no universally accepted definition of Fair Trade exists, Fair Trade labeling organizations often use this definition. “Fair Trade is a trading partnership, based on dialogue, transparency and respect, which seek greater equity in international trade. It contributes to sustainable development by offering better trading conditions to, and securing the rights of, marginalized producers and workers – especially in the South.”

Fair Trade Organizations, backed by consumers, are engaged actively in supporting producers, awareness raising and in campaigning for changes in the rules and practice of conventional international trade. Fair Trade's strategic intent is to work with marginalized producers and workers in order to help them move towards economic self-sufficiency and stability. It also aims to allow them to become greater stakeholders in their own organizations, as well as play a wider role in international trade.

There are some questions regarding whether fair trade is effective. In some instances fair trade farmers have been able to rise out of poverty and to find better access to health care and housing. Yet in other areas the additional money paid to fair trade workers is low, leading to some critics to claim that fair trade is a marketing ploy as opposed to real change in the economic system.

The ideas behind fair trade food are to directly support the farmers who produce the food and to encourage safe growing practices for the health of the workers and the environment. With the elimination of “middlemen” or companies that buy and combine large amounts of produce for distribution to stores allows for more money to go directly to the producers. This is similar to farmer’s markets or craft fairs in the United States that allow producers to sell directly to their customers. There is currently a push to include a local version of the fair trade label.

In 2008, Fair Trade certified sales amounted to approximately US \$4.08 billion worldwide. While this represents a tiny fraction of world trade in physical merchandise some fair trade products account for 20-50% of all sales in their product categories. In June 2008, Fair Trade Labeling Organizations International estimated that over 7.5 million producers and their families were benefiting from fair trade. However, only 3.3 percent of coffee sold in the United States in 2006 was certified fair trade.

### **Teacher Instruction:**

Listed below are two curriculums produced by TransFair USA. Both are well written and provide lots of background information. It would be possible to spend weeks discussing fair trade issues. Yet you could choose to only do one lesson in one class period.

**TransFair USA Focus on Fair Trade Curriculum by Elisa Around November 2007**

**3-6 Unit: Banana Bonanza** *Following the Journey of the Banana from Farm to Supermarket.*

*This curriculum is for at least a week worth of classes.*

*Lesson 3, Part 2. Provides a good lesson for whom gets how much of the cost of a banana in the grocery store.*

*Lesson 5. Provides good information about what fair trade is and follows a producer’s story.*

**TransFair USA Focus on Fair Trade Curriculum by Elisa Around November 2007**

**7-12 Unit: Coffee Connections** *Tracking the Path of Coffee from Farm to Supermarket with an Eye on Economics and Justice.*

This curriculum contains 8 lessons focusing on coffee trade. Several are similar to the lessons in the Banana unit.

**Student Instruction:**

1. Follow the instructions provided in the TransFair curriculums.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What is fair trade?
2. Why do fair trade items often cost more than non-fair trade items?
3. List items that can be produced other fair trade label.
4. How is fair trade production better for the environment?
5. Should there be a fair trade program that deals with local goods? How would they work?
6. Should there be fair trade programs? Explain.
7. What can an individual do to increase fair trade?
8. Create a list of requirements for developing a fair trade program.

**Extensions:** Follow other products, research fair trade products, visit a fair trade producer.

**Accommodations:**

**Resources:**

<http://www.fairtradefederation.org/>

<http://www.transfairusa.org/>

[http://www.shebafilms.com/films/banana\\_split.html](http://www.shebafilms.com/films/banana_split.html) Banana Split film about the production of bananas.

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**



### **A fair price**

The Fair Trade Certified label guarantees that farmers and workers received a fair price for their product. The Fair Trade price means that farmers can feed their families and that their children can go to school instead of working in the fields.

### **Quality products**

By receiving a fair price, Fair Trade producers can avoid cost-cutting practices that sacrifice quality. The Fair Trade producers' traditional artisanal farming methods result in exceptional products.

### **Care for the environment**

Most Fair Trade Certified coffee, tea and chocolate in the US is certified organic and shade grown. This means that the products you buy maintain biodiversity, provide shelter for migratory birds and help reduce global warming.

### **Community impact**

Empowered by the economic stability provided by Fair Trade, members of the COSURCA coffee cooperative in Colombia successfully prevented the cultivation of more than 1,600 acres of coca and poppy, used for the production of illicit drugs. In Papua New Guinea, the AGOGA cooperative, is investing in a medical team to meet the healthcare needs of its isolated rural community. In the highlands of Guatemala, indigenous Tzutuhil Mayans in the La Voz cooperative are sending local kids to college for the first time. Near Lake Titicaca, in Peru, the CECOVASA cooperative is assisting members from Quechua and Aymara indigenous groups in raising coffee quality and transitioning to certified organic production.

## Seed To Table

**Lesson Plan:** Cultural Cooking

**Unit:** Introduction to “In the Kitchen”

**Objectives:**

- Students will learn about different cultures and their food traditions.
- Students will create and taste foods from different regions of the country and the world.
- Students will share their own cultural traditions surrounding food

**Modified Curriculum Objectives:**

**Materials:** Ingredients and equipment for meals

**Time:** 1 hour for overview, 3 days to write “Food Rituals of the Nacirema” or prepare research presentation. Time varies on cooking different meals.

**Vocabulary:**

**Background Information:**

Every culture has different traditions surrounding food. In some cases these are based on geographically differences. People near oceans often have more fish and seafood included in their diets, while people in northern climates use more red meats. Other times religions play a role in what types of foods people eat including restrictions on eating pork or mixing dairy with meat. Sometimes there are economic factors that influence different cultural foods; this could include using meat sparingly or preparing larger quantities of rice or pasta.

In addition to different styles of food different cultures have different ways of serving and eating food. In some cultures food is served on communal plates in the center of the table other cultures have a different plate for each course. Other times food is eaten seated on the floor, reclining on couches, seated at tables, or eaten in a car. In some cultures food is eaten with silverware, other cultures use chopsticks or their hands.

All around the world people share food as a way to celebrate important events and to build community. Even holidays that are focused on fasting typically have a feast before or after the fasting period to mark the fasting period. Food can also serve as a way to welcome people into a community even if there is no common language.

By exploring foods of different cultures you can learn a lot about the area and people from where those foods come.

**Teacher Instruction:**

1. Discuss with students the different cultural traditions surrounding food.

**Student Instruction:**

1. Create a list of your family's traditions surrounding food. This includes recipes that your family uses as well as how your family prepares and serves food.
2. Prepare a dish that represents your culture. Discuss why this dish is important to your culture.
3. Research a different culture's food traditions. Prepare a presentation.
4. Create a new culture. Determine where this group lives. Using this information develop cultural traditions for this group; include what types of food they eat, how they eat their food, and important event surround food.
5. Read "Body Rituals of the Nacirema" <https://www.msu.edu/~jdowell/miner.html> (Then write a document on "Food Rituals of the Nacirema")

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What influences a culture's food choices?
2. Create a list of restaurants in your community that represent different cultures?
3. Why is food an important part of religions?
4. What is fusion cooking? Can you create a fusion between two cultures?

**Extensions:**

Eat a variety of different restaurants representing different cultures. Cook a variety of foods from different cultures. This could be either by preparing a meal specific to one culture or having festival of foods representing different cultures

**Accommodations:****Resources:**

The following are a sampling of the thousands of cookbooks that are available containing recipes and information about a variety of cultures.

[Sundays at Moosewood Restaurant: Ethnic and Regional Recipes from the Cooks at the Legendary Restaurant](#) by Moosewood Collective

[Exotic Ethiopian Cooking: Society, Culture, Hospitality, and Traditions](#) by Daniel J. Mesfin

[Quick & Easy Japanese Cookbook](#) by Katsuyo Kobayashi

[From Mom with Love: A Complete Guide to Indian Cooking and Entertaining](#) by Pushpa Bhargava

[Chinese Cuisine \(Wei-Chuan's Cookbook\)](#) by Huang Su-Huei

[Everyday Italian: 125 Simple and Delicious Recipes](#) by Giada De Laurentiis

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## Seed To Table

**Lesson Plan:** Food Entertainment

**Unit:** Introduction to “In the Kitchen”

**Objectives:**

- Students will learn about a variety of ways to host a dinner party.
- Students will be able to compare the costs of time and money for different types of events.
- Students will plan all aspects of an event.

**Modified Curriculum Objectives:**

**Materials:**

**Time:** 45 minutes

**Vocabulary:** Entrée, hors d'oeuvres, progressive, potluck, catered, formal dining, Full course meal

**Background Information:**

Having food as the basis of a party or gathering of people can be positive way to bring people together. There are multiple ways to host a party and depending on cost and time considerations you can decide which is best for you.

Full Course—When planning for a multi course meal there are several considerations. First is the time involved in both meal and setting preparation often a multicourse chef will not be able to sit and enjoy all the meal unless preparations and planning is done in advance. Secondly the expense of a multi course meal is greater due in large part to the need for more ingredients. However, a multi course meal can be very enjoyable and showcase a variety of foods and the talents necessary to prepare them. In addition a multi course meal could be limited to two courses or include many more. Some examples of courses include: salad, soup, pasta, fish, meat, and dessert.

In formal dining a full course dinner typically consists of five or more courses, in its extreme form, twenty-one courses. In these more formalized dining events, the courses are carefully planned to complement each other gastronomically. The courses are smaller and spread out over a long evening, up five hours, and follow certain prescribed conventions of menu planning.

Entrée—A meal of a main entrée with appropriate sides is fairly common consisting of a protein (meat, fish, poultry, and beans), carbohydrate (potatoes, pasta, rice, bread) and vegetable (corn, tomatoes, broccoli, and salad).

Appetizers—Also known as hors d’oeuvres, starters, or finger foods are typically served before a larger meal or as a snack. These can be extravagant or basic. This type of gathering is often planned during a non-traditional meal time during the afternoon or late evening.

Dessert—Also should be planned outside of traditional meal times. Examples include a birthday cake, ice cream social or a cookie plate.

Any of these choices could be prepared and planned in any of the following methods.

Home Prepared—This type of meal preparation is often the most time consuming. In addition, to needing to purchase the ingredients, prepare all the food, you will need to clean the house.

Catered—Often more expensive. Does not have to be full course meal prepared by a chef but could be ordering out for pizza or take out.

Pot Luck—Each individual prepares or purchases a food item to share with the group. This method shares the cost and time associated with preparation amongst all participants. A potluck could be planned where individuals sign up for or are assigned to bring specific items or can be left up to the creative choices of each person. Potlucks could be only a dessert, appetizers or a full meal.

Progressive—Similar to a potluck where multiple people prepare food. However instead of each person bring the food to one location the partygoers move from one location to another as they share food. This often is done for a multi-course meal where each house is responsible for a specific course. This can take much longer as participants have to travel between locations.

Depending on the meal as the event host you may want to decide on decorations, place settings, dress code, and invitations as well. Each of these decisions can change the atmosphere of the gathering and can be as important as your food choices.

**Teacher Instruction:**

1. Have students share what their experiences are with different food based gatherings.
2. Familiarize students with different types of parties.
3. Instruct students to develop a plan for their party.

**Student Instruction:**

1. Plan a party.
2. Decide what type of gathering you are going to have and what general type of food will be at the party.
3. Prepare a specific menu.

4. Create a list of ingredients.
5. Determine how long it will take you to prepare the food.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What are the reasons to include food at a party?
2. How can the host of control costs associated with a party?
3. In addition to food what else do you need to consider when having a party?
4. Compare and contrast potlucks and progressives.

**Extensions:**

Plan a party and make it happen.

**Accommodations:**

**Resources:**

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


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**Readings/Worksheets/Quizzes/Other Materials:**

## Party Types

Name: \_\_\_\_\_

Label each of the following party examples, use one option from each list.

List A: Full Course, Entrée, Hors d'oeuvres, Dessert

List B: Home Prepared, Catered, Pot Luck, Progressive

1. A group of friends decides to order pizza, salad, and breadsticks.
2. You are watching the Super Bowl at your house you put out a bowl of chips. Friends bring pretzels, chicken wings, carrot sticks, hummus, salsa, and guacamole.
3. In December a group of neighbors meet at a house for cookies, they then move to each other's house sharing holiday cookies at each house.
4. At your graduation you contact a restaurant to bring salads, pasta, meat, vegetables and a cake to a park.
5. Your friend has a new fondue pot that she fills with melted chocolate she invites people over to bring their favorite fruit or cookie to dip in the melted chocolate.
6. You invite a few people over to your house to have a dinner you cook your favorite lasagna recipe.
7. Before your reservations at a fancy restaurant, you meet two friends at a different restaurant for appetizers, after dinner you go to a movie. After the show is over you stop by an ice cream parlor for dessert.
8. Create an example of a Full Course/Potluck Meal.
9. Create an example of Home Prepared/Dessert Party.
10. Create an example of Progressive/Hors d'oeuvres Party.

## Seed To Table

**Lesson Plan:** Food Allergies

**Unit:** Introduction to “In the Kitchen”

**Objectives:**

- Students will learn about common food allergies.
- Students will learn the importance of knowing all the ingredients in a meal so to properly inform people who may have allergies.
- Students will learn basic first aid to care for a person having an allergic reaction.

**Modified Curriculum Objectives:**

**Materials:** What Happened? Situations sheet, Common allergies sheet

**Time:** 50 minutes

**Vocabulary:** Anaphylaxis or anaphylactic shock, Shell Fish, Tree nuts, epinephrine soy, gluten, allergy, allergens

**Background Information:**

Allergies to specific foods or food types can cause sickness or death. It is important for food service employees to have a good understanding of food allergies so they can help their customers have a safe and enjoyable dining experience. There are many types of food allergens and they are more prevalent now than before. Allergies to food are more common in children under the age of 5. While many children will outgrow certain allergies other allergies may not take effect until adulthood.

Anaphylaxis or anaphylactic shock is a severe, potentially life-threatening allergic reaction. It can occur quickly after exposure to something you are allergic to including foods.

The flood of chemicals released by the immune system during anaphylaxis can cause a person to go into shock; blood pressure drops suddenly and the airway narrows, blocking normal breathing. Signs and symptoms of anaphylaxis include a rapid, weak pulse, skin rash, and nausea and vomiting. Common triggers of anaphylaxis include certain foods, peanuts, tree nuts, eggs, milk, shellfish, etc.

Anaphylaxis requires an immediate trip to the emergency room and an injection of epinephrine. Call 911 if someone is experiencing anaphylactic shock. If anaphylaxis is not treated right away, it can lead to unconsciousness or death. Some people with allergies will carry and “epipen” or other epinephrine injector with them. This shot can often be given by the person having an

allergic reaction into their own thigh. A person in severe anaphylaxis may ask or need help administering the epinephrine injection. Epinephrine injectors are prescription medicine and should not be given to people for whom they are not prescribed. Anyone who has received an epinephrine shot should go to the hospital to be evaluated. Someone having an allergic reaction may have trouble breathing this block airway is due swelling of throat or tongue so abdominal thrusts, back blows or rescue breathing will not help a person in this situation.

An anaphylactic reaction is most likely to occur in susceptible people who have eaten something they are allergic to. Even if you have only had a mild allergic reaction in the past, you may be at risk of anaphylaxis. Anaphylaxis symptoms usually occur within minutes of exposure to an allergen. In rare cases, anaphylaxis occurs more than half an hour after exposure. Anaphylaxis symptoms include:

- Skin reactions including hives, itchy, flushed, or pale skin
- Constriction of the airway or a swollen tongue, which can cause wheezing and trouble breathing
- A weak and rapid pulse
- Nausea, vomiting, or diarrhea
- Dizziness or fainting

A food allergy is caused by the body's reaction to a protein found in the food. All foods have some traces of protein so it is possible for any food to cause an allergic reaction. Food allergies often develop in childhood and can dissipate with age but can occur at anytime.

Having an allergy to egg, milk, soy, wheat, peanut and tree nuts represents 90% of all food allergies in children. Fish and shellfish are two other commonly seen food allergies, usually more common in adults. Each of these individual foods is discussed, including the prevalence, and severity of the food allergy.

## **1. Milk**

Allergy to cow's milk is common in children, affecting about 2.5 percent of all infants. These children tend to also react to other milks, such as goat and sheep milk. The allergy is usually directed against one or both major milk proteins, casein and whey. The sugar in milk, lactose, does not cause allergy, but can cause food intolerance. Many adults will develop lactose intolerance which is not as severe of an allergic reaction but can be bothersome and a person may want to eliminate or reduce milk from their diet.

While 85% of children will outgrow milk allergy by age 5, being allergic to milk is a risk factor for developing other food allergies. Some cow's milk allergic children will also be allergic to beef.

## **2. Egg**

Allergy to egg is the most common food allergy in children, affecting about 2.5 percent of young children. Children may be allergic to the white, yolk, or both. Many will outgrow the egg allergy by age 5; however these children are at increased risk of developing nasal allergies and asthma.

## **3. Soy**

Soy is a legume, and related to peanut, although cross-reactivity rarely exists between the two. Allergy to soy affects approximately 0.3 percent of children, is usually outgrown at a young age, and rarely causes life-threatening reactions. Because soy is a common food allergy, and can occur in children also allergic to milk, infant formulas using hydrolyzed proteins are preferred in infants allergic to cow's milk.

## **4. Wheat**

Children and adults can experience a variety of immunologic reactions to wheat protein, only some of which are allergic. Wheat allergy is commonly outgrown at an early age, and it is rare for children with wheat allergy to be clinically allergic to other cereal grains (such as rice, oat and barley), although skin testing to these other grains may be positive.

## **5. Peanut**

Allergy to peanut occurs in approximately 0.6 percent of all people, and tends to cause a severe form of food allergy. Peanut allergy can be associated with life-threatening allergic reactions, particularly in children with asthma. Only about 20 percent of children outgrow peanut allergy, making it the most common food allergy seen in adults.

Accidental exposure to peanut containing foods is a common problem, so it is important for peanut allergic children to follow a strict peanut-free diet, wear a medical alert bracelet and always have injectable epinephrine available. In some cases, an allergic reaction to peanuts can happen without the person actually ingesting the peanut. This has led to the institution of peanut and nut free classrooms, as well as labels on processed foods that say that a food item was produced in a factory where peanuts and /or tree nuts are used.

## **6. Tree Nut**

Tree nut allergy occurs in approximately 0.5 percent of all people, tends to be severe and is less likely to be outgrown. Tree nuts include cashews, almonds, walnuts, and pecans. There is a high likelihood that if a child is allergic to one type of tree nut, he or she will be allergic to another type of tree nut. While tree nuts and peanuts are unrelated foods, cross-contamination is a concern, so some experts recommend a complete "nut free" diet in children with either peanut or tree nut allergy.

## **7. Seafood**

Allergy to seafood includes both fish and shellfish. While fish and shellfish are not related foods, these foods are usually found in the same place (restaurants). Reactions to seafood can be severe and potentially life-threatening. Allergy to either of these foods is less likely to be outgrown, and therefore is commonly seen in adults.

Since patients with allergy to one shellfish are at a high risk of being allergic to other shellfish, complete avoidance of this category of foods is advised. Shellfish include shrimp, lobsters, crabs, mollusks, oysters and clams. The same is true for allergy to fish; however, exceptions exist for both.

As a food service worker it is important to recognize that some of your customers may have allergies to these or other foods. If a customer states that they are allergic to a specific food it is important to prepare food free of that ingredient or inform the patron that the food cannot be prepared without the ingredient.

If as a chef you change the ingredients in a recipe you need to be sure your servers know about the change so they can accurately inform the customers.

**Teacher Instruction:**

1. Students need to understand that food allergies are real and can have real consequences.
2. Students need to learn common food allergies, way to prevent contact with allergens, responsibilities of food service professional in terms of allergies.

**Student Instruction:**

1. Ask if anyone has a food allergy or knows someone who does.
2. Discuss how common certain allergies are and ways to avoid having people come into contact with allergens.
3. Discuss the role of food service professionals in addressing food allergies.
4. Re-enforce: If someone is having an allergic reaction call 911.
5. Discuss different food allergy situations and ways to prevent them.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What should you do if you see someone having an allergic reaction?
2. Why do some people have stronger allergies than others?
3. What can happen if a cutting board is used to cut almonds and then strawberries?

**Extensions:**

Talk with a doctor or dietician about food allergies, Prepare a meal that is gluten free.

**Accommodations:**

**Resources:**

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written by:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## Common Food Allergies

1. **Milk** (Including Goat's or Sheep Milk, Cheese, Yogurt, Sour Cream, Ice Cream, Butter)
2. **Eggs** (Yolk and/or White)
3. **Soy** (soybeans, tofu, tempeh, edamame, miso, soy flour, soy sauce)
4. **Wheat** (Wheat flour for leavened, flat and steamed breads, biscuits, cookies, cakes, breakfast cereal, pasta, noodles, couscous, and seitan) People will also say Gluten Free. There are other types of flour available to make into gluten free breads, pastas, and baked goods.
5. **Peanuts** (Including peanut butter and foods cooked in peanut oil)
6. **Tree Nuts** (cashews, walnuts, almonds, pecans, nut butters, nut flours).
7. **Fish**(including bony fish – salmon, trout, halibut, cod, etc and fish oils)
8. **Shellfish**(mollusks (including oysters, mussels, clams, and squid) and crustaceans (including crab, lobster, and shrimp))

There are other less common allergies to fruits including apples, pears, pineapples, stone fruits (peaches, plums nectarines), vegetables including avocados, peppers, tomatoes and/or mushrooms. Other people have allergic reaction to different types of meat including pork, beef, or poultry.

If a person says they are allergic to a food you need to believe them. If you are not sure what is in a specific dish or if the food is prepared in the same pan as other foods without washing in between customers need to know.

Do not assume a person is just saying there are allergic to avoid a food they do not like and slip the allergen into a dish. This “joke” could cause death.

**Chefs** need to be aware that customers may have food allergies and alert servers to changes in ingredients. Chefs also need to wash hands, clean work areas and wash pans to avoid cross contamination between foods.

**Servers** need to know exactly what items are in foods and to communicate to the kitchen if a customer has a concern.

**Restaurant owners** need to train their staffs to be aware of possible food allergies and to include common allergy notification on menus.

**Customers** need to understand their specific allergies and be able to clearly advocate their needs.

## **Food Allergy Situations**

### **What Happened?**

1. George is allergic to Macadam Nuts so he ordered the strawberry cheesecake avoiding the chocolate cake with Macadam Nuts. However, he broke out in hives after he ate his dessert. What happened?

The chef prepared the macadam nut dessert first and before washing his hands prepared the strawberries for the cheesecake.

2. Samantha has a severe allergic reaction to peanuts and made sure that no peanuts would be included in the stir fry. After she ate the meal her neck started to itch. What happened?

The chef ran out of vegetable oil so used peanut oil to fry the vegetables.

3. Joyce told the server she is allergic to soy. The server said there was no soy in the soup. After eating the soup she started to have trouble breathing. What happened?

The server did not realize that tempeh was a soy based food.

4. Roger went to some friends' house for dinner he said he was allergic to green peppers. After eating his taco his lips started to tingle. What happened?

His friend thought Roger just didn't like green peppers so to "prove" he wasn't allergic his friend cut up some peppers to put in the meal.

5. Jen was allergic to pork so ordered the pancakes without the side of bacon. It made her sick to her stomach. What happened?

The pancakes were cooked on the same griddle as the bacon and sausage.

## Seed To Table

**Lesson Plan:** Vegetarianism

**Unit:** Introduction to “In the Kitchen”

**Objectives:**

- Students will learn about different eating choices people can make.
- Students will learn about how to prepare a nutritious vegetarian meal.
- Students will learn about different types of vegetarian diets.

**Modified Curriculum Objectives:**

**Materials:** Vegetarian Cookbooks, Restaurant menus, Materials and Ingredients necessary for preparing vegetarian food options.

**Time:** 45 minutes for overview, 45-60 minutes for individual recipes.

**Vocabulary:** Lacto-ovo vegetarianism, Lacto vegetarianism, Ovo vegetarianism, Veganism, Fruitarians, Pescetarianism, Flexitarianism

**Background Information:**

This lesson provides students with an overview of different types of vegetarian diets. This serves two main purposes to encourage persons on or considering vegetarian diets to make sure they are maintaining a healthy diet and to prepare culinary workers to be prepared to cook healthy vegetarian options for their customers.

Simply put vegetarianism is the practice of not eating meat. There are many reasons for individuals to eat a vegetarian diet. In addition there are different levels of vegetarianism from fruitarians to flexitarians. While individuals have the right to choose what diet they want to follow people should be aware of the nutritional benefits and concerns with different diets.

Some people choose to not eat meat to follow the teaching of specific religions including Hinduism and Buddhism. Other people choose to not eat meat for ethical reasons such as not wanting to hurt other animals. Certain people choose vegetarianism for environmental reasons. It takes more land, fertilizers and fuel to produce meat. This is often referred to eating low on the food chain. Other vegetarians are eliminating meat intake for health reasons including heart disease, diabetes or obesity. Economics can also play a role in determining a person’s diet, meat is often more expensive to purchase.

While most vegetarians eat some animal products including eggs, cheese, and honey, there are people who choose not to eat one or the other or neither. Vegans eschew the eating of all animal products and typically include not using animal products in their clothing as well.

If one chooses to eat one of the many types of vegetarian diets he/she should consider how to obtain all the necessary nutrients needed for a healthy diet. Meat provides protein in many diets. Non-meats that are high in protein include beans (Lentils, black, garbanzos, kidney, pinto, mung etc.), peanut butter, or soy bean products (tempeh, tofu, seitan, textured vegetable protein (TVP), etc.).

It is often difficult for a strict vegetarian to eat at a restaurant. This can be due to less menu options, no protein in the menu options or even if the vegetarian meal is cooked on the same grill as the meat options. While there are some strictly vegetarian restaurants most restaurants so try to include at least one vegetarian option for their customers. This is also a consideration for food service at schools, prisons or company cafeterias. Any time there is a large group of people there will be at least some vegetarians and a chef/catering business may be asked to provide a meal for them.

As a restaurant owner, chef or server it is important to know what ingredients are in each meal as some vegetarians are concerned about different items in the food. These can include butter, honey, white sugar, lard, gelatin, fish sauce, chicken or beef broth. If someone asks what is in the food it is important to be honest and knowledgeable if as a server you do not know find out from the chef. Mistruths will come back to hurt the restaurant.

### **Teacher Instruction:**

1. Introduce the concept of vegetarian diets. Depending on your class some students may be vegetarians themselves or know a lot about vegetarianism, other students may have never hear of vegetarianism or have misconceptions about the diet.
2. Discuss different ways to replace protein in recipes to make them appropriate for different diets.
3. Have students plan vegetarian menus.
4. Have materials available for students to prepare and taste a variety of vegetarian options.

### **Student Instruction:**

1. Plan a vegetarian menu. Be sure to include a source of protein.
2. Examine vegetarian recipes. Look for ingredient substitutions.
3. Compare recipes for vegetarians, vegans and non-vegetarians.

4. Examine vegetarian menu items from local restaurants. How many options are available? Do these options contain a protein source?
5. Cook and taste vegetarian foods.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What ingredient substitutions are common in vegetarian cooking?
2. Create a list of protein sources available for vegetarians.
3. What items surprised you that some vegetarians will not eat?
4. What value is it to a restaurant to provide vegetarian options?
5. How can you easily change some foods to easily be vegan friendly?

**Extensions:** Eat at a Vegetarian restaurant. Prepare vegetarian/vegan options.

**Accommodations:**

**Resources:**

[How to Cook Everything Vegetarian: Simple Meatless Recipes for Great Food](#) by Mark Bittman and Alan Witschonke

[Moosewood Restaurant Cooks at Home: Fast and Easy Recipes for Any Day](#) by Moosewood Collective

[The New Becoming Vegetarian: The Essential Guide to a Healthy Vegetarian Diet](#) by Vesanto Melina and Brenda Davis

[Quick-Fix Vegetarian: Healthy Home-Cooked Meals in 30 Minutes or Less](#) by Robin Robertson

[Vegetarian Cooking for Everyone](#) by Deborah Madison

<http://www.vegmadison.com/restaurants.html> List of vegetarian restaurants and option in Madison area.

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**



**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other**

<b>Diet name</b>	<b>Meat</b>	<b>Poultry</b>	<b>Fish</b>	<b>Eggs</b>	<b>Dairy products</b>	<b>Honey</b>
<b>Lacto-ovo vegetarianism</b>	No	No	No	Yes	Yes	Yes
<b>Lacto vegetarianism</b>	No	No	No	No	Yes	Yes
<b>Ovo vegetarianism</b>	No	No	No	Yes	No	Yes
<b>Veganism</b>	No	No	No	No	No	No
<b>Fruitarianism</b>	No	No	No	No	No	No
<b>Pescetarianism</b>	No	No	Yes	Yes	Yes	Yes
<b>Flexitarianism</b>	Yes	Yes	Yes	Yes	Yes	Yes

## **Vegetarianism**

Name: \_\_\_\_\_

List protein sources for vegans.

Find a vegetarian replacement ingredient for each of the following.

Beef

Chicken

Eggs

Butter

Meat based stock

Honey

Gelatin

Crab

Milk

Yogurt

Sour Cream

Mayonnaise

## Seed To Table

**Lesson Plan:** Restaurant Review

**Unit:** Introduction to “In the Kitchen”

**Objectives:**

- Students will learn the value of restaurant reviews to customers and restaurateurs.
- Students will learn how to critically read a review.
- Students will write a thorough review.

**Modified Curriculum Objectives:**

**Materials:** Copies of restaurant reviews from different reviewers

**Time:** 45 minutes reviewing others restaurant review. 45 minutes writing own review.

Vocabulary: décor, esthetics, critique,

**Background Information:**

Writing restaurant reviews can be a fun and challenging way to express your love of quality cuisine. To write a restaurant review, you must have a keen eye for detail, sound knowledge of food and an understanding of restaurant esthetics.

1. Choose the restaurant you want to review. Make reservations if needed. Do not say that you will be reviewing the restaurant. You may want to visit the restaurant more than once at different times. You can also bring other people to be able to try more food options.
2. Dine at the restaurant. Make mental notes on the menu and wine list, cleanliness, décor, atmosphere, other patrons, staff including kitchen staff and host, location, parking, restrooms, cuisine, presentation and creativity. Do not take notes during the meal
3. Compose the review as soon as possible after dining. Use detail when describing the food and atmosphere of the restaurant.
4. Describe the exterior and interior of the restaurant in your introduction. Next, discuss the staff and typical patrons who might enjoy this restaurant. Then describe the food, taste, plating and presentation. Conclude with your recommendation.
5. Query your local newspaper or other publication to sell you review. Or publish it on your own restaurant review blog.

Writing a restaurant review is relatively easy as long as you know the right points to hit for all of your readers. Include the basic "service, food, price" elements, but there is so much more to at least touch upon when writing a restaurant review. This lesson will help you write

a more in-depth restaurant review that will help you understand what goes into critiquing a restaurant. Answer the questions in detail, using full and complete sentences. Be as descriptive as possible. Your review should include both the positive and negative aspects of your dining experience. Reviews can be part advertisement for the restaurant, a warning to consumers, or suggestions for improvement to the owner.

1. Give the details of the restaurant you are reviewing.

Where is it located? Is it hard to find? Do you have to make reservations in advance? How long is the wait on a weeknight? On a weekend? What hours is the restaurant open? Do they accept credit cards/checks? Is there a dress code?

You do not have to answer all of these questions. But it serves as a guide. You could develop some other questions that you might want to answer here.

2. Describe the atmosphere.

Is it kid-friendly or for adults only? Is it dark or bright? Is it fancy or low key? What is the decor like, the color of the walls? Is it loud or quiet? The atmosphere of a restaurant can be important to your readers. People prefer different types of restaurants for different occasions and a review should include this information. This does not need to be in a positive or negative sense but just informing your readers. A lot of your readers care about whether or not it is kid-friendly. People want to know if they can feel comfortable bringing their children to a restaurant or to find a place for a quiet evening without kids.

3. Describe the menu.

Do not list everything on the menu. However, you want to mention the different courses that they have. Do they serve appetizers? Do they serve desserts? What is the selection like? Are there any specialties? Is there a kids or a seniors menu? Are they vegetarian friendly? Is there an "early bird special" or a special "complete dinner" menu? What is included with the meal?

4. What did you order?

This paragraph can be included with the previous one, or you can separate it for a more thorough and organized review. This is to show the experience that you had with your own food. What did you order? Was it served at the appropriate temperature? Be sure to be descriptive here. How did the food taste? What was the quality of the food? It can be helpful if you go with multiple people to try a variety of foods or return multiple times.

5. Describe the service.

From beginning to end, describe the service that you encountered during your visit. If you called, you should mention the details of the phone call. Were the servers and hosts polite and helpful? Did they go out of their way to ensure a good visit? Were they friendly? Was the service efficient? If there is a specific server that was excellent, feel free to mention his/her name. However when mentioning someone negatively you should not use his/her name. Did you have to wait a long time for anything? If you think that things should have been done that were not done, mention them. What would you have done to make things better? If you had a complaint how was it resolved?

6. Price

How much did you spend on your bill? What is the average price per person? Include prices for appetizers, entrees, desserts. What does the price include?

#### 7. Overall / Conclusion

How were your overall experiences with the restaurant you visited? Would you ever go back? Why or why not? Whom would you recommend this restaurant to?

#### **Teacher Instruction:**

1. Read through several reviews of different types of restaurants.
2. Discuss what goes into making a thorough review.
3. Talk about the value to restaurant owners to having good reviews and how the staff at restaurants can influence reviewers.

#### **Student Instruction:**

1. Critique the reviews of restaurants. Not if you agree or disagree but if you feel the reviewer has given enough information for you to make an informed decision of if you want to go to that restaurant or not.
2. Write a review of the last meal you had at a restaurant.
3. Go to a restaurant that you have never been to with the idea of writing a review.
4. Write that review.

#### **Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What is valuable information can you learn from a restaurant review?
2. Why should a reviewer not say they are reviewing the restaurant?
3. Why should you not take notes during your review?
4. What are the benefits of visiting the restaurant multiple times?
5. If you have a bad experience at a restaurant should you publish your review?
6. Explain why a restaurant owner would want or not want people to review his restaurant?
7. What can a restaurant owner do if they get a bad review?
8. How do people decide if they will try a new restaurant?

#### **Extensions:**

Write more restaurant reviews. Publish your reviews on-line/newspaper. Create a book of reviews that are done in the class. Compare reviews for the same restaurant from different reviewers.

#### **Accommodations:**

**Resources:**

Restaurant reviews from print or online sources.

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

**Name of Restaurant:** \_\_\_\_\_ **Name of Reviewer:** \_\_\_\_\_

**1. Give the details of the restaurant you are reviewing.**

Where is it located?  
Is it hard to find?  
Do you have to make reservations in advance?  
How long is the wait on a weeknight/weekend?  
What hours is the restaurant open?  
Do they accept credit cards/checks?  
Is there a dress code?

**2. Describe the atmosphere.**

Is it kid-friendly or for adults only?  
Is it dark or bright?  
Is it fancy or low key?  
What is the decor like, the color of the walls?  
Is it loud or quiet?

**3. Describe the menu.**

Do they serve appetizers?  
Do they serve desserts?  
What is the selection like?  
Are there any specialties?  
Is there a kids or a seniors menu?  
Are they vegetarian friendly?  
Is there an "early bird special" or a special "complete dinner" menu?  
What is included with the meal?

**4. What did you order?**

Was it served at the appropriate temperature?  
How did the food taste?  
What was the quality of the food?

**5. Describe the service.**

Were the servers and hosts polite and helpful?  
Did they go out of their way to ensure a good visit?  
Were they friendly?  
Was the service efficient?  
Did you have to wait a long time for anything?  
What would you have done to make things better?  
If you had a complaint how was it resolved?

**6. Price**

How much did you spend on your bill?  
What is the average price per person?  
Include prices for appetizers, entrees, desserts.  
What does the price include?

**7. Overall Conclusion**

How was your overall experience?  
Would you ever go back?  
Whom would you recommend this restaurant to?

## Unit 2: The Ins and Outs of Preparing Meals

In this section students will learn how to prepare a balanced healthy meal. Students will learn how to read a recipe and use a knife safely. In addition students will learn about the different parts of meal from soups and salads through desserts. To end this unit, students will have the opportunity to showcase their skills with a cooking competition.

Balanced Meal (protein, carbohydrate, & vegetable)—*Learn how to create a healthy and nutritious meal.*

Recipe (Read, Adapt, Create)—*Practice using and changing recipes.*

Recipe Conversion—*Convert recipes for different yields.*

Reading Ingredient Labels—*Learn what is in the food we eat.*

Safe Knife Handling Skills—*Learn how to use a knife safely.*

Salads—*Learn how to make a variety of different salads.*

Soups—*How to prepare different types of soup.*

Entree--*How to make a variety of entrees.*

Sides—*How to make a variety of side dishes and make a balanced meal.*

Rice—*Learn all about rice.*

Pasta—*Learn all about pasta.*

Desserts—*How to prepare different types of desserts.*

Iron Works Chef: *Cooking Competition*

## Seed To Table

**Lesson Plan:** Balance Meal: Protein, Carbohydrate, and Vegetable

**Unit:** The Ins and Outs of Preparing Meals

**Objectives:**

- Students will learn the difference between proteins, carbohydrates, and vegetables.
- Students will learn how to plan a balanced meal including each of these on the menu.

**Modified Curriculum Objectives:**

**Materials:** Access to My Pyramid website

**Time:** 1-2 hours to determine a balance diet

**Vocabulary:** Protein, Carbohydrate, Vegetable

**Background Information:**

A healthy and nutritious meal consists of a protein, carbohydrates, and a vegetable. Knowing what foods fall into each category is an important piece of being able to plan a menu that is well-balanced.

Protein is generally thought of as the meat group. While many people get a large portion of their protein from meat there are also several vegetable sources of protein. Beef, pork, chicken and fish are all valuable sources of protein. Animal products including eggs, milk, and cheese are high in protein. In addition, many nuts, dried beans, and peanuts have high levels of protein. Also there are several types of meat alternatives such as tofu, tempeh, and seitan that are excellent sources of protein.

Carbohydrates come from a variety of grains. People can eat these grains either whole or refined. Bread, rice, pasta and potatoes are all excellent sources for carbohydrates. Whole grains are better for your health and should constitute at least half of the grains eaten in a day. Whole grains include brown rice, whole wheat, and rye while refined grains include white rice and white flour. Many breads, cereals, and pastas are made from grains that are whole, refined, or a mixture.

Vegetables include a wide variety of plant parts. Most vegetables are the fruit of the plant including tomatoes, peppers, eggplants, summer and winter squashes, cucumbers, peas and beans. In addition vegetables include the leaves of lettuce, spinach, and kale, the flowers of broccoli and cauliflower, the stems of celery and asparagus and the roots of carrots, beets, and turnips. Fruits can be included into the vegetable category but are typically sweeter and should be consumed less than vegetables

When planning a meal it is important to include sources for each of the three main components of a balanced meal. Depending on a person's age, sex, size and activity level depends on how many calories a person needs and how much of each type of food. In general, a person needs more vegetables and fruits, a good supply of carbohydrates, and a smaller portion of protein.

When planning a meal you also want to consider how foods look and taste together. It is wise to have different colors of food on the plate to avoid the meal from looking bland. There are also different foods that complement each other better. A plate with a variety of colors, appropriate amounts of vegetables, carbohydrates, and protein will both taste better and be healthier for you.

**Teacher Instruction:**

1. Discuss the importance of including carbohydrates, vegetables and protein in a balanced diet.
2. Have students peruse the My Pyramid website.

**Student Instruction:**

1. Using My Pyramid website determine how much carbohydrates, vegetables and protein should be included in your diet.
2. Create a list of sources of protein, carbohydrates, and vegetables.
3. Plan a week's worth of menus for breakfast, lunch, and dinner.
4. Label the carbohydrate, vegetable, and protein in each meal.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. How can people who do not want to eat animal product get protein?
2. Compare whole grains to processed grains.
3. What is the importance of eating different colored fruits and vegetables?
4. What products contain whole grains?
5. What are ways to include protein in your diet?
6. What foods complement grilled chicken?
7. What foods go well with green beans?

**Extensions:**

Cook and eat the balanced menu you have prepared.

**Accommodations:**

**Resources:**

<http://www.mypyramid.gov/> Food Pyramid information website

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## **Carbohydrates**

### **Whole grains:**

brown rice  
buckwheat  
bulgur (cracked wheat)  
oatmeal  
popcorn

### *Ready-to-eat breakfast cereals:*

whole wheat cereal flakes  
muesli

whole grain barley  
whole grain cornmeal  
whole rye  
whole wheat bread  
whole wheat crackers  
whole wheat pasta  
whole wheat sandwich buns and rolls  
whole wheat tortillas  
wild rice

### *Less common whole grains:*

amaranth  
millet  
quinoa  
sorghum  
triticale

## **Vegetables**

### **Dark green vegetables**

bok choy  
broccoli  
collard greens  
dark green leafy lettuce  
kale  
mesclun  
mustard greens  
romaine lettuce  
spinach  
turnip greens  
watercress

### **Orange vegetables**

acorn squash  
butternut squash  
carrots  
Hubbard squash  
pumpkin  
sweet potatoes

### **Dry beans and peas**

### **Refined grains:**

cornbread  
corn tortillas  
couscous  
crackers  
flour tortillas  
grits  
noodles

### *Pasta*

spaghetti  
macaroni

pitas  
pretzels

### *Ready-to-eat breakfast cereals*

corn flakes

white bread  
white sandwich buns and rolls  
white rice.

### **Starchy vegetables**

corn  
green peas  
lima beans (green)  
potatoes

### **Other vegetables**

artichokes  
asparagus  
bean sprouts  
beets  
Brussels sprouts  
cabbage  
cauliflower  
celery  
cucumbers  
eggplant  
green beans  
green or red peppers  
iceberg (head) lettuce  
mushrooms  
okra

black beans  
black-eyed peas  
garbanzo beans (chickpeas)  
kidney beans  
lentils  
lima beans (mature)  
navy beans  
pinto beans  
soy beans  
split peas  
tofu (bean curd made from soybeans)  
white beans

**Protein**

**Meats\***

*Lean cuts of:*

beef  
ham  
lamb  
pork  
veal

*Game meats:*

bison  
rabbit  
venison

*Lean ground meats:*

beef  
pork  
lamb

*Organ meats:*

liver  
giblets

**Poultry\***

chicken  
duck  
goose  
turkey  
ground chicken and turkey

**Eggs\***

chicken eggs  
duck eggs

**Fish\***

*Finfish such as:*

catfish  
cod  
flounder  
haddock  
halibut

onions  
parsnips  
tomatoes  
tomato juice  
vegetable juice  
turnips  
wax beans  
zucchini

**Dry beans and peas:**

black beans  
black-eyed peas  
chickpeas (garbanzo beans)  
falafel  
kidney beans  
lentils  
lima beans (mature)  
navy beans  
pinto beans  
soy beans  
split peas  
tofu (bean curd made from soy beans)  
white beans

garden burgers  
veggie burgers  
tempeh  
textured vegetable protein (TVP)

**Nuts & seeds\***

almonds  
cashews  
hazelnuts (filberts)  
mixed nuts  
peanuts  
peanut butter  
pecans  
pistachios  
pumpkin seeds  
sesame seeds  
sunflower seeds  
walnuts

*Shellfish such as:*

clams  
crab  
crayfish  
lobster

herring  
mackerel  
pollock  
salmon  
sea bass  
snapper  
swordfish  
trout  
tuna

mussels  
octopus  
oysters  
scallops  
squid (calamari)  
shrimp

## Seed To Table

**Lesson Plan:** Recipes (Following, Adapting, & Creating)

**Unit:** The Ins and Outs of Preparing Meals

**Objectives:**

- Students will learn the value of having a recipe.
- Students will learn how to follow a recipe.
- Students will learn how to adapt recipes to better fit their needs and wants.
- Students will develop their own recipes.

**Modified Curriculum Objectives:**

**Materials:** Recipes, ingredients, copies of worksheets

**Time:** Follow a recipe part 1--15 minutes, Follow a recipe part 2—30-60 minutes (depending on recipe), Adapt a recipe part 1—20 minutes, Adapt a recipe part 2—1-4 hours (depending on how many changes are made), Adapt a recipe part 3—Ongoing, Create a recipe Part 1—30 minutes, Create a recipe Part 2—60 minutes

**Vocabulary:** Recipe, yield, ingredients

**Background Information:**

Recipes are the basic outlines that cooks use to make a meal just as a builder follows a blueprint to build a house. Cookbooks are filled with recipes that the authors have developed to make a variety of different foods. Two cookbooks may both have recipes for lasagna but more than likely each will have different ingredients, and directions for preparing the dish.

Most recipes have a name, yield, time, list of ingredients and detailed list of instructions. The name can be descriptive or creative but at least lets you tell someone what you are cooking. The yield is sometimes listed for persons or servings you may want to adapt depending if you are feeding people with larger or smaller appetites. You may also need to convert the amount of ingredients to prepare a dish for a larger or smaller number of servings than the recipe was originally intended. The time to prepare can include both preparation and cooking time. The list of ingredients contains the amount of ingredient and often how the item should be cut (slice, minced, chopped) or purchased (fresh, frozen, canned). Some recipes will include substitution items and optional items. The ingredient list is often written in order of how it should be added to the dish, However, this does not mean you can just drop all the ingredients into a bowl and expect the dish to turn out well.

The detailed directions can be in a step by step list or written in paragraph form. These directions include when to do certain steps what equipment should be used

The value of having recipes is so that the food turns out the same every time. This is important as you want returning customers to know what to expect. You should practice and adapt new recipes before serving them to a paying customer. Having a defined recipe with specific yields also allows you to determine serving size and cost in producing a specific meal.

**Teacher Instruction:**

1. Students should understand about the basics of following, adapting and creating recipes.
2. This lesson is divided into several different parts that can be done independently of each other.
3. **Follow a Recipe Part 1**—Handout the following recipe worksheet. Have students work independently and silently. If students follow step one of “Read all directions before completing any of the following tasks.” They will only follow step 14 “You do not need to complete any of the above tasks. Turn this sheet of paper over and sit quietly waiting for the rest of the students to complete the exercise.” Some/Most students will probably complete some or all of the tasks before turning their papers over. This is the purpose of the activity to reinforce the concept of reading through the entire recipe before starting. (Answers: (9. All would work to replace an egg.) (10. C.) (11. Multiply by 2) (12. All answers are correct) (13. C. 150 minutes))
4. **Follow a Recipe Part 2**--This can be done with any recipe and is a necessary skill for students to master before they can continue with the cooking portions of the program. Have students begin with a simpler recipe with fewer ingredients and minimal steps. You can also have students follow a “recipe” for another activity than cooking. I.e. follow instructions for putting together a Lego kit, follow the rules to play a game or other activity that requires students to follow directions.
5. **Adapt a Recipe Part 1**—The recipes given for cookies are the same except each recipe is missing one ingredient. This allows students to see what happens when one ingredient is left out of the recipe. Students can bake the cookies and some may be edible. The attached chocolate chip cookie recipes have been adapted to yield 1 dozen cookies each with one ingredient missing.
6. **Adapt a Recipe Part 2**—Start with a recipe that students know well. Have them prepare the recipe according to the directions at least once. Then have students change one ingredient at a time. Amount of ingredients could be reduce or increased. Sugar could be replaced by honey, molasses, or syrup. Eggs can also be replaced to produce a vegan recipe. Flour can be change from wheat to white or other types of flour could be uses in whole or in part.
7. **Adapt a recipe Part 3**—For any recipe at any time during the course students should be encourage to make helpful notes in the margins of a recipe, that remind them to do a step or makes a something clearer.

8. **Create a recipe Part 1**—Start by having each student create a recipe for a simple task. For example: “Making a Sandwich.” Then read through student example demonstrating place where the recipe is not clear. Have students rewrite and adapt recipes until the recipes are free of confusion.
9. **Create a recipe Part 2**—Have students create their own recipe for a dish that is more involved this could be something they have made before or something that they have eaten and they are trying to recreate. Allow students to prepare their own recipes adapting as necessary. Have students trade recipes to see if another student can follow the recipe.

### **Student Instruction:**

1. **Follow a recipe part 1**
  - a. Complete the worksheet independently. Please work silently and do not share you answers. We will discuss as a class when everyone is finished.
2. **Follow a recipe part 2**
  - a. Read through the entire recipe.
  - b. Determine what ingredients and equipment you need to complete the recipe.
  - c. Lay out all ingredients and equipment to insure that you have all of the necessary items.
  - d. Following the directions in the recipe create the dish.
3. **Adapt a recipe Part 1**
  - a. Follow the recipe as given
  - b. Compare your results with those of other students in you class
  - c. Discuss why each recipe was different
4. **Adapt a recipe Part 2**
  - a. Only change one ingredient at a time. This allows you to pinpoint what works well and what does not.
  - b. The changes you make can be reductions or increases in the amount of an ingredient, the addition or elimination of an ingredient, substituting one ingredient for another, or changing the cooking temperature or time.
  - c. Be sure to record the changes you make so that you can remember both the changes you enjoyed and those that did not turn out as well.
5. **Adapt a recipe Part 3**
  - a. When you use any recipe make notes on the recipe to make steps clearer or to make changes that you enjoy.
6. **Create a recipe Part 1**
  - a. Write a recipe so that someone who has never made or seen a sandwich can make a sandwich.
  - b. Make the ingredient list and instructions as detailed as possible.
  - c. If your recipe is not complete make the necessary adaptations.
7. **Create a recipe Part 2**

- a. Create a recipe for something you enjoy to cook or try to recreate a recipe for something that you like to eat.
- b. Prepare the recipe, make changes as needed.
- c. When you are cooking someone else's recipe, make notes about directions that are unclear or changes that you would make to the recipe.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

- 1. Why is it important to follow a recipe?
- 2. What happens when you change one part of a recipe?
- 3. Why can it be difficult to write a recipe for a simple task?
- 4. What can happen if you do not read all the way through a recipe before you begin cooking?
- 5. How can you change a recipe to make it better?
- 6. In a restaurant who does the chef need to tell if he/she changes a recipe?
- 7. What benefit in food service/restaurants is following a recipe?

**Extensions:** Create a cookbook of recipes that are written or used in the program.

**Accommodations:**

**Resources:**

<http://www.foodsubs.com/Sweeten.html> Cook's Thesaurus page on different sweeteners

<http://www.foodsubs.com/Eggs.html> Cook's Thesaurus page on eggs

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## Follow a Recipe

1. Read all directions before completing any of the following tasks.
2. Write your name on the top of the paper.
3. Put the date under your name
4. What did you have for breakfast this morning?
5. What types of food do you like to cook?
6. When you follow a recipe do you read the entire recipe before you begin to add any ingredients?
7. Is it okay to substitute margarine to replace butter in a recipe?
8. What is an appropriate substitute for eggs?
  - A. 2 tbsp cornstarch = 1 egg
  - B. 2 tbsp potato starch = 1 egg
  - C. 1 tbsp soy milk powder + 1 tbsp cornstarch + 2 tbsp water = 1 egg
  - D. 1 banana = 1 egg
9. When should you preheat the oven?
  - A. Before you finish reading the entire recipe.
  - B. After you have mixed all the ingredients.
  - C. After you have finished reading the recipe and making sure you have the necessary ingredients.
  - D. After you have cooked the meal. In order for the oven to cool before you serve the food.
10. If a recipe makes enough food for 10 servings and you need 20 servings. What should you multiple all the ingredients by?
11. What is the boiling point of water?
  - A. 212 Fahrenheit
  - B. 100 Celsius
  - C. 373 Kelvin
  - D. In depends on the elevation
12. How many minutes does a recipe require if the stated time is 2 ½ hours
  - A. 100 minutes
  - B. 60 minutes
  - C. 150 minutes
  - D. 250 minutes
13. You do not need to complete any of the above tasks. Turn this sheet of paper over and sit quietly waiting for the rest of the students to complete the exercise.

## **Sugar Substitutes in Baking**

- Powdered milk (Substitute up to 1/4 of the granulated sugar in the recipe with powdered milk.) OR
- Maple syrup (Substitute 3/4 cup maple syrup plus 1/4 teaspoon baking soda for each cup of granulated sugar, and reduce another liquid in the recipe by 3 tablespoons.) OR  
maple sugar OR
- Barley malt syrup (Substitute 3/4 cup barley malt syrup for each cup of granulated syrup called for in recipe, then reduce another liquid in the recipe by 1/4 cup.) OR
- Powdered sugar (Substitute 1 3/4 cup packed powdered sugar for each cup of granulated sugar called for in recipe. This substitution tends to make cookies less crispy.) OR
- Corn syrup (Don't replace more than half of sugar in any recipe with corn syrup. Substitute 1 1/2 cups corn syrup for each cup granulated sugar, since corn syrup isn't as sweet as sugar, and then reduce a liquid in the recipe by 1/4 cup. Will affect appearance and flavor slightly.) OR
- Rice syrup (Substitute 1 3/4 cup rice syrup for each cup of granulated syrup called for in recipe, and then reduce another liquid in the recipe by 1/4 cup.) OR
- molasses (Substitute 1 1/3 cup molasses plus 1 teaspoon baking soda for one cup of granulated sugar, then reduce another liquid in the recipe by 1/3 cup and reduce the oven temperature by 25 degrees. This substitution will impart a strong molasses flavor to the product. Replace no more than half of the sugar in the recipe with molasses.)

## **For Replacing Eggs**

### *For scrambling and making omelets*

- Silken tofu (This works best with crumbled firm or extra firm tofu. It helps to add lots of seasonings like onions, mushrooms, nutritional yeast or cheese, and herbs. One egg = 1/4 cup tofu.)
- OR egg substitute (Substitute 1/4 cup egg substitute for each egg.)
- OR egg whites (A good combination is two egg whites for every egg yolk.)

### *For baking*

- 1 egg = 2 tablespoons liquid + 2 tablespoons flour + 1/2 tablespoon shortening + 1/2 teaspoon baking powder
- OR egg substitute (Substitute 1/4 cup egg substitute for each egg. Using egg substitute in place of eggs tends to make baked goods rubbery, because egg substitute has no fat. To improve the product's texture, add one teaspoon of canola oil for each egg replaced. Egg substitute can't be whipped and is much more expensive than regular eggs.)

- OR egg whites (Substitute 2 egg whites for each whole egg. This substitution may make baked goods less tender. To compensate, try adding 1 teaspoon of oil per egg called for in recipe.)
- OR flax meal Use two tablespoons flax meal plus 1/8 teaspoon baking powder plus 3 tablespoons water for each egg called for in recipe.
- OR egg yolks (Higher in fat, but increasing the egg yolks in a baked good often makes it moister and more flavorful.)
- OR gelatin (To replace each egg: Dissolve 1 tablespoon unflavored gelatin in 1 tablespoon cold water, then add 2 tablespoons boiling water. Beat vigorously until frothy.)
- OR cornstarch (Substitute 1 tablespoon cornstarch plus 3 tablespoons water for each egg called for in recipe.)
- OR mayonnaise (Substitute 3 tablespoons mayonnaise for each egg called for in recipe.)
- OR bananas (Substitute 1/2 of a mashed ripe banana plus 1/4 teaspoon baking powder for each egg.)
- OR silken tofu (Substitute 1/4 cup tofu for each egg.)
- OR fruit-based fat substitutes (Substitute 2 tablespoons fat substitute for each egg in recipe.)

## **Chocolate Chip Cookies**

**Cook Time: 10 minutes**

### **Ingredients:**

- 1/4 cup butter
- 1/4 cup brown sugar
- 1/4 cup granulated sugar
- 1 egg
- 1/4 teaspoon vanilla
- 1/2 cup plus 2 tablespoons sifted all-purpose flour
- 1/4 teaspoon salt
- 1/4 teaspoon soda
- 1/4 cup semisweet chocolate chips

### **Preparation:**

Preheat oven to 375°.

Cream butter; add sugars and beat until light and fluffy. Beat in egg and vanilla. Sift together flour, salt, and soda; add to creamed mixture. Stir until well blended. Stir in chocolate chips. Drop the batter from a teaspoon, well apart, on a greased cookie sheet. Bake for about 10 minutes.

Recipe makes about 1 dozen chocolate chip cookies.

## **Chocolate Chip Cookies**

**Cook Time: 10 minutes**

### **Ingredients:**

- 1/4 cup brown sugar
- 1/4 cup granulated sugar
- 1 egg
- 1/4 teaspoon vanilla
- 1/2 cup plus 2 tablespoons sifted all-purpose flour
- 1/4 teaspoon salt
- 1/4 teaspoon soda
- 1/4 cup semisweet chocolate chips

### **Preparation:**

Preheat oven to 375°.

Add sugars and beat until light and fluffy. Beat in egg and vanilla. Sift together flour, salt, and soda; add to creamed mixture. Stir until well blended. Stir in chocolate chips. Drop the batter from a teaspoon, well apart, on a greased cookie sheet. Bake for about 10 minutes.

Recipe makes about 1 dozen chocolate chip cookies.

## **Chocolate Chip Cookies**

**Cook Time: 10 minutes**

### **Ingredients:**

- 1/4 cup butter
- 1/4 cup brown sugar
- 1/4 cup granulated sugar
- 1/4 teaspoon vanilla
- 1/2 cup plus 2 tablespoons sifted all-purpose flour
- 1/4 teaspoon salt
- 1/4 teaspoon soda
- 1/4 cup semisweet chocolate chips

### **Preparation:**

Preheat oven to 375°.

Cream butter; add sugars and beat until light and fluffy. Add vanilla. Sift together flour, salt, and soda; add to creamed mixture. Stir until well blended. Stir in chocolate chips. Drop the batter from a teaspoon, well apart, on a greased cookie sheet. Bake for about 10 minutes.

Recipe makes about 1 dozen chocolate chip cookies.

## **Chocolate Chip Cookies**

**Cook Time: 10 minutes**

### **Ingredients:**

- 1/4 cup butter
- 1/4 cup brown sugar
- 1/4 cup granulated sugar
- 1 egg
- 1/4 teaspoon vanilla
- 1/4 teaspoon salt
- 1/4 teaspoon soda
- 1/4 cup semisweet chocolate chips

### **Preparation:**

Preheat oven to 375°.

Cream butter; add sugars and beat until light and fluffy. Beat in egg and vanilla. Add salt, and soda to creamed mixture. Stir until well blended. Stir in chocolate chips. Drop the batter from a teaspoon, well apart, on a greased cookie sheet. Bake for about 10 minutes.

Recipe makes about 1 dozen chocolate chip cookies.

## **Chocolate Chip Cookies**

**Cook Time: 10 minutes**

### **Ingredients:**

- 1/4 cup butter
- 1/4 cup brown sugar
- 1/4 cup granulated sugar
- 1 egg
- 1/4 teaspoon vanilla
- 1/2 cup plus 2 tablespoons sifted all-purpose flour
- 1/4 teaspoon salt
- 1/4 cup semisweet chocolate chips

### **Preparation:**

Preheat oven to 375°.

Cream butter; add sugars and beat until light and fluffy. Beat in egg and vanilla. Sift together flour, and salt; add to creamed mixture. Stir until well blended. Stir in chocolate chips. Drop the batter from a teaspoon, well apart, on a greased cookie sheet. Bake for about 10 minutes.

Recipe makes about 1 dozen chocolate chip cookies.

## **Cookies**

**Cook Time: 10 minutes**

### **Ingredients:**

- 1/4 cup butter
- 1/4 cup brown sugar
- 1/4 cup granulated sugar
- 1 egg
- 1/4 teaspoon vanilla
- 1/2 cup plus 2 tablespoons sifted all-purpose flour
- 1/4 teaspoon salt
- 1/4 teaspoon soda

### **Preparation:**

Preheat oven to 375°.

Cream butter; add sugars and beat until light and fluffy. Beat in egg and vanilla. Sift together flour, salt, and soda; add to creamed mixture. Stir until well blended. Drop the batter from a teaspoon, well apart, on a greased cookie sheet. Bake for about 10 minutes.

Recipe makes about 1 dozen cookies.

## **Chocolate Chip Cookies**

**Cook Time: 10 minutes**

### **Ingredients:**

- 1/4 cup butter
- 1 egg
- 1/4 teaspoon vanilla
- 1/2 cup plus 2 tablespoons sifted all-purpose flour
- 1/4 teaspoon salt
- 1/4 teaspoon soda
- 1/4 cup semisweet chocolate chips

### **Preparation:**

Preheat oven to 375°.

Cream butter. Beat in egg and vanilla. Sift together flour, salt, and soda; add to creamed mixture. Stir until well blended. Stir in chocolate chips. Drop the batter from a teaspoon, well apart, on a greased cookie sheet. Bake for about 10 minutes.

Recipe makes about 1 dozen chocolate chip cookies.

## **Make your own recipe**

Title:

Yield:

Time:

Ingredients

Directions

1.

2.

3.

4.

5.

6.

## Seed To Table

**Lesson Plan:** Recipe Conversions: Increasing and Decreasing

**Unit:** The Ins and Outs of Preparing Meals

**Objectives:**

- Students will learn how to adjust a recipe to meet the requirements for how many people they are serving.
- Students will learn the common measurements and how to convert.

**Modified Curriculum Objectives:**

**Materials:** Recipes, Measuring cups and spoons.

**Time:** 60 minutes to convert several basic recipes

**Vocabulary:** Tablespoon (Tbsp, T), teaspoon (tsp, t), Gallon (gal), Quart (qt), Pint (pt), Cup (c), fluid ounce (fl oz)

**Background Information:**

Often recipes include information about how many people the meal is for, or the number of servings. When you cook the meal, you need to adjust the recipe to accommodate the number of people being served, which requires an understanding of basic mathematics.

One way to adjust a recipe is to calculate a conversion multiple. For example, if the recipe is for 4 servings, and we need to serve 8, then the conversion multiple can be determined by taking the number of servings needed (8) and dividing by the number of serving in the recipe (4), the answer is 2. Then multiply all the ingredients in the recipe by the conversion multiple, in this case 2.

$$\text{Conversion Multiple} = \frac{\text{Number of servings needed}}{\text{Number of servings in the recipe}}$$

This also works if you only need 2 servings from the recipe that makes 4 servings. When the conversion multiple is determined it is  $\frac{1}{2}$ . Multiplying by  $\frac{1}{2}$  is equivalent to dividing by 2. In addition, to multiplication and division of whole numbers students will need to be able to convert between different units of measurement (teaspoon to tablespoon).

It is also important for students to learn common abbreviations for measurements. Adding  $\frac{1}{2}$  cup of salt to a cookie recipe is a disaster when you only want  $\frac{1}{2}$  teaspoon. Sometimes when adapting a recipe it is difficult to use an exact measurement, if needed amounts can be rounded to nearest

standard measurement or estimation can be used. For example if you determine a recipe needs  $\frac{7}{8}$  cup of water you could add 1 cup of water or use the cup measure to estimate an amount that is a little less than a cup. This can also be useful when using eggs and you need half of an egg.

Sticks of butter have measurement lines on them.

**Teacher Instruction:**

1. Start with all students working with one recipe so the class can determine the conversion multiple and then multiply each ingredient.
2. Using one recipe students can figure out the amount of ingredients needed for a variety of different yield sizes.
3. Using a variety of recipes (including recipes of student choice) students can then determine the conversion multiple and ingredients needed for each recipe.
4. Depending on students base line knowledge students may have to spend more time practicing multiplication, division, and/or adding fractions.
5. Then students can prepare the recipe for the desired yield.
6. If you want you can allow a student to make a mistake with the math and let them taste the results.

**Student Instruction:**

1. First determine the conversion multiple.
2. Check that the conversion multiple is correct.
3. Then multiply all the ingredients in the recipe.
4. Make recipe using the correct amount for the desired recipe.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What is the benefit of adjusting the ingredients in a recipe to meet the desired number of servings?
2. You want to halve a recipe that requires 3 eggs. How do you add  $1\frac{1}{2}$  eggs?
3. Why is it important to multiply all the ingredients in a recipe?
4. When a recipe call for a dash of pepper and you want to multiply that by 2. How much pepper do you add?
5. What is the difference between a fluid ounce and an ounce?
6. What would you need to do if the recipe uses weights or metric units?
7. What types of recipes would you not want to multiply?

8. When does a recipe get to big?

**Extensions:** Use a variety of different recipes including recipes student bring from home. Continue to use the skills gained in this lesson when students are presented with recipes later in the course.

**Accommodations:**

Additional instruction and practice on multiplying fractions and/or division.

**Resources:**

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

### Measurement Conversions

1 tablespoon (tbsp) =	3 teaspoons (tsp)
$\frac{1}{16}$ cup =	1 tablespoon
$\frac{1}{8}$ cup =	2 tablespoons
$\frac{1}{6}$ cup =	2 tablespoons + 2 teaspoons
$\frac{1}{4}$ cup =	4 tablespoons
$\frac{1}{3}$ cup =	5 tablespoons + 1 teaspoon
$\frac{3}{8}$ cup =	6 tablespoons
$\frac{1}{2}$ cup =	8 tablespoons
$\frac{2}{3}$ cup =	10 tablespoons + 2 teaspoons
$\frac{3}{4}$ cup =	12 tablespoons
1 cup =	48 teaspoons
1 cup =	16 tablespoons
8 fluid ounces (fl oz) =	1 cup
1 pint (pt) =	2 cups
1 quart (qt) =	2 pints
4 cups =	1 quart
1 gallon (gal) =	4 quarts
16 ounces (oz) =	1 pound (lb)

Recipe Conversion

Name: \_\_\_\_\_

For the following recipe determine the conversion multiple. Recipe makes 2 dozen cookies.

$$\text{Conversion Multiple} = \frac{\text{Number of servings needed}}{\text{Number of servings in the recipe}}$$

You want to make 4 dozen cookies.

Ingredients	Conversion Multiple	New Amount
1 cup flour		
1/2 tsp. baking soda		
1/2 tsp. salt		
1/2 cup butter		
1/3 cup brown sugar		
1/3 cup sugar		
1 egg		
1/2 tsp. vanilla		
1 cup chocolate chips		

1 dozen cookies

Ingredients	Conversion Multiple	New Amount
1 cup flour		
1/2 tsp. baking soda		
1/2 tsp. salt		
1/2 cup butter		
1/3 cup brown sugar		
1/3 cup sugar		
1 egg		
1/2 tsp. vanilla		
1 cup chocolate chips		

72 cookies

Ingredients	Conversion Multiple	New Amount
1 cup flour		
1/2 tsp. baking soda		
1/2 tsp. salt		
1/2 cup butter		
1/3 cup brown sugar		
1/3 cup sugar		
1 egg		
1/2 tsp. vanilla		
1 cup chocolate chips		

3 dozen cookies

Ingredients	Conversion Multiple	New Amount
1 cup flour		
1/2 tsp. baking soda		
1/2 tsp. salt		
1/2 cup butter		
1/3 cup brown sugar		
1/3 cup sugar		
1 egg		
1/2 tsp. vanilla		
1 cup chocolate chips		

48 cookies

Ingredients	Conversion Multiple	New Amount
1 cup flour		
1/2 tsp. baking soda		
1/2 tsp. salt		
1/2 cup butter		
1/3 cup brown sugar		
1/3 cup sugar		
1 egg		
1/2 tsp. vanilla		
1 cup chocolate chips		

12 dozen cookies

Ingredients	Conversion Multiple	New Amount
1 cup flour		
1/2 tsp. baking soda		
1/2 tsp. salt		
1/2 cup butter		
1/3 cup brown sugar		
1/3 cup sugar		
1 egg		
1/2 tsp. vanilla		
1 cup chocolate chips		

Recipe Conversion

Name: KEY

For the following recipe determine the conversion multiple. Recipe makes 2 dozen cookies.

$$\text{Conversion Multiple} = \frac{\text{Number of servings needed}}{\text{Number of servings in the recipe}}$$

You want to make 4 dozen cookies.  $4/2=2$

Ingredients	Conversion Multiple	New Amount
1 cup flour	2	2 cups
1/2 tsp. baking soda	2	1 tsp
1/2 tsp. salt	2	1 tsp
1/2 cup butter	2	1 cup
1/3 cup brown sugar	2	2/3 cup
1/3 cup sugar	2	2/3 cup
1 egg	2	2 eggs
1/2 tsp. vanilla	2	1 tsp
1 cup chocolate chips	2	2 cup

1 dozen cookies  $1/2 = 1/2$

Ingredients	Conversion Multiple	New Amount
1 cup flour	1/2	1/2 cup
1/2 tsp. baking soda	1/2	1/4 tsp
1/2 tsp. salt	1/2	1/4 tsp
1/2 cup butter	1/2	1/4 cup
1/3 cup brown sugar	1/2	1/6 cup or 2Tbsp and 2 tsp
1/3 cup sugar	1/2	1/6 cup or 2Tbsp and 2 tsp
1 egg	1/2	1/2 or 1 egg
1/2 tsp. vanilla	1/2	1/4 tsp
1 cup chocolate chips	1/2	1/2 cup

72 cookies  $72/24 = 3$  or  $6/2 = 3$

Ingredients	Conversion Multiple	New Amount
1 cup flour	3	3 cups
1/2 tsp. baking soda	3	1 1/2 tsp
1/2 tsp. salt	3	1 1/2 tsp
1/2 cup butter	3	1 1/2 cups
1/3 cup brown sugar	3	1 cup
1/3 cup sugar	3	1 cup
1 egg	3	3 eggs

1/2 tsp. vanilla	3	1 1/2 tsp
1 cup chocolate chips	3	3 cups

3 dozen cookies

$$3/2 = 1 \frac{1}{2} \text{ or } 1.5$$

Ingredients	Conversion Multiple	New Amount
1 cup flour	1 1/2	1 1/2 Cups
1/2 tsp. baking soda	1 1/2 (1/2 x 3/2 = 3/4)	3/4 tsp
1/2 tsp. salt	1 1/2	3/4 tsp
1/2 cup butter	1 1/2	3/4 tsp
1/3 cup brown sugar	1 1/2 (1/3 x 3/2 = 3/6 = 1/2)	1/2 cup
1/3 cup sugar	1 1/2	1/2 cup
1 egg	1 1/2	1.5 eggs or 1 large or 2 small eggs
1/2 tsp. vanilla	1 1/2	3/4 tsp
1 cup chocolate chips	1 1/2	1 1/2 Cups

48 cookies

$$48/24=2 \text{ or } 4/2 =2$$

Ingredients	Conversion Multiple	New Amount
1 cup flour	2	2 cups
1/2 tsp. baking soda	2	1 tsp
1/2 tsp. salt	2	1 tsp
1/2 cup butter	2	1 cup
1/3 cup brown sugar	2	2/3 cup
1/3 cup sugar	2	2/3 cup
1 egg	2	2 eggs
1/2 tsp. vanilla	2	1 tsp
1 cup chocolate chips	2	2 cups

12 dozen cookies

$$12/2 =6$$

Ingredients	Conversion Multiple	New Amount
1 cup flour	6	6 cups
1/2 tsp. baking soda	6	3 tsp or 1 Tbsp
1/2 tsp. salt	6	3 tsp or 1 Tbsp
1/2 cup butter	6	3 cups
1/3 cup brown sugar	6	2 cups
1/3 cup sugar	6	2 cups
1 egg	6	6 eggs
1/2 tsp. vanilla	6	3 tsp or 1 Tbsp
1 cup chocolate chips	6	6 cups

## Seed To Table

**Lesson Plan:** Reading Ingredient Lists

**Unit:** The Ins and Outs of Preparing Meals

**Objectives:**

- Students will learn how to determine what is in a processed food.
- Students will be able to make more informed and healthier choices of what they eat.
- Students will learn what types of chemical are added to foods.
- Students will learn why these chemical are added to foods.

**Modified Curriculum Objectives:**

**Materials:** Ingredient lists from a variety of foods

**Time:** 1 hour

**Vocabulary:** Preservatives, Sweeteners, Ingredients, Allergens, Trans-fat.

**Background Information:**

How can you find out what is in the processed food you buy? You have to read the ingredient list which can seem like a jumble of words and numbers that at first glance mean little. By learning to read ingredient labels you can spot foods that contain potential allergens or other items that may be harmful to your health.

The Food and Drug Administration (FDA) requires that manufacturers list all of the ingredients in food and beverage products on the package label. On the product label, the ingredients are listed in order of weight. The ingredient present in the greatest amount is listed first, followed by the rest of the ingredients in descending order. Often the first three ingredients are the main ingredients but if you are concerned about additives used as color enhancers, flavor enhancers or preservatives you will want to keep reading.

The following are a few guidelines to keep in mind when looking at ingredients. If you see the words “partially hydrogenated oil,” the product contains trans fats, an unhealthy fat that should be avoided. A package can be labeled as containing No Trans Fat as long as it has less than 0.5 grams of trans fat.

There are many different types of sweeteners that can be found on labels this include both natural and chemical sweeteners. Words like sucrose, glucose, fructose, corn syrup, and high fructose corn syrup indicate types of sweeteners. Natural sweeteners include honey, maple syrup, date

syrup, molasses, and stevia. Artificial sweeteners include; saccharin, aspartame, sucralose, neotame, and acesulfame potassium.

Whole grains are cereal grains that contain bran and germ as well as the endosperm. In contrast to refined grains, retain only the endosperm. Whole grains can generally be sprouted while processed grains generally will not sprout. Whole grains include oats, wheat, rye, maize, and brown rice. Products such as whole wheat bread, rye bread and whole wheat pastas are made from whole grains. Processed or refined grains include white rice, white flour and non whole wheat pastas.

“Monosodium glutamate” or MSG is a flavor enhancer that some people find makes them ill or leaves a metallic taste in their mouths.

Being familiar with ingredient lists is especially important for individuals with food allergies. The FDA now requires manufacturers to list, in simple terms, on the product label whether the product contains one or more of the top eight food allergens: milk, eggs, peanuts, tree nuts, fish, shellfish, soy, and wheat. These foods account for 90 percent of all documented food allergies, and this requirement makes it easier for consumers with food allergies to be aware of the products that contain them. However, for individuals with other allergies, it is crucial that they look at ingredient lists.

In some foods chemical dyes have been added to change the color of the food. These dyes are listed by the color and a number. For example, Yellow 5, Yellow 6, Red 40, Red 3, Blue 1, Blue 2, Green 3, and Orange B. There are no known health risks with these additives but they do not add any nutritional value and can be avoided.

Sodium Nitrite and Sodium Nitrate are two types of food preservatives often found in processed meats. While these chemicals prevent spoilage and prolong shelf life there are concerns about health effects of these chemicals. There have been food additives for preservation for a long time including sugar, salt, vinegar and alcohol. Citric or ascorbic acid from citrus fruits is often added to other fruits to slow the aging process.

Although examining the ingredient list is important for individuals with food allergies and intolerances or other chronic health conditions, it can also be beneficial for the average consumer. Being aware of the ingredients in products may change the way you choose your foods.

### **Teacher Instruction:**

1. Discuss reasons for why there are food labels including allergens; desire to avoid certain chemicals, health or religious reasons, and personal preference.
2. Provide or have students bring in food labels from several types of processed foods.
3. Compare the ingredient list from a variety of foods.

4. Discuss how reading the label could affect the food choices a person makes.

**Student Instruction:**

1. Read the ingredient label of a processed food.
2. Place the ingredient in groups; whole foods, Trans-fats, sweeteners, preservatives, dyes, and/or potential allergens.
3. Circle the items that are artificial chemicals.
4. If you do not know what an ingredient look it up in reference guide or on-line.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What is the purpose of food dyes?
2. What concerns surround using chemical dyes?
3. What natural products can also be used as dyes?
4. What is the purpose of chemical preservatives in foods?
5. What concerns do some people have with using chemical preservatives?
6. What health issues surround Trans-fats?
7. Why are there so many different types of sweeteners?
8. Compare and contrast the difference between natural and artificial sweeteners.
9. Why are the most common allergens required to be listed on the front of food products.
10. Why does water have to be listed as an ingredient?
11. What is the difference between whole grains and refined grains?

**Extensions:** Examine the chemical formulas for different chemical additives. Compare the nutritional values for refined/whole grains. Create a taste test to compare whole/refine grains and /or different types of sweeteners.

**Accommodations:**

**Resources:**

<http://www.monkeysee.com/play/11508-food-labels-ingredients-list> Videos of how to read food packaging including ingredient lists and nutritional information

<http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/FoodLabelingNutrition/FoodLabelingGuide/ucm064880.htm> FDA information on required information on food labels.

<http://www.cspinet.org/reports/chemcuisine.htm> List of common chemical additives to foods.

<http://www.neelikon.com/> Company website for largest producer of food dyes.

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## Reading Ingredient Lists

Natural Whole Foods: Meats(Beef, Chicken, Lamb, Fish), Fruits(Apples, Oranges, Peaches, Pears, Pineapple, Grapes,) Vegetables(Broccoli, Carrots, Tomatoes, Peppers), and Whole Grains(Wheat, Oats, Barley, Maize, Brown rice, Rye)

Food preservatives: Chemical: calcium propionate, sodium nitrate, sodium nitrite, sulfites (sulfur dioxide, sodium bisulfite, potassium hydrogen sulfite,) and disodium EDTA. Antioxidants include Butylated hydroxyanisole (BHA) and Butylated hydroxytoulene (BHT). Natural: salt, sugar, vinegar, alcohol, citric and ascorbic acids.

Types of Sweeteners: anything ending with the term 'ose' - such as sucrose, maltose, lactose, dextrose, fructose, glucose, honey, corn syrup, golden syrup, the term 'saccharides' - such as disaccharides or monosaccharide, molasses, sugar - raw/brown, malt/malt extract, xylitol, sorbitol, mannitol, saccharin, aspartame, sucralose, neotame, and acesulfame potassium and stevia.

Trans-fat: partially hydrogenated oil

Potential Allergens: milk, eggs, peanuts, tree nuts, fish, shellfish, soy, and wheat

Chemical Colors: Yellow 5, Yellow 6, Red 40, Red 3, Blue 1, Blue 2, Green 3, and Orange B.

Directions: On the following sheet place the ingredients from two products into the correct categories. If the ingredient is not listed above you may need to research what that ingredient is.

Circle the items that are manmade chemicals.

Name of first product: \_\_\_\_\_

Place the ingredients in the different categories

Whole Foods	Preservatives	Sweeteners	Trans-Fat	Allergens	Dyes	Other

Name of second product: \_\_\_\_\_

Place the ingredients in the different categories

Whole Foods	Preservatives	Sweeteners	Trans-Fat	Allergens	Dyes	Other

## Seed To Table

**Lesson Plan:** Knife Handling

**Unit:** The Ins and Outs of Preparing Meals

**Objectives:**

- Students will learn how to handle a knife safely.
- Students will learn how set up a cutting station.
- Students will learn what knives to use for which tasks.
- Students will learn how to sharpen a knife.
- Students will learn a variety of knife cuts.
- Students will learn how to properly clean a knife.

**Modified Curriculum Objectives:**

**Materials:** Knives, cutting boards, towels, variety of vegetables, steel,

**Time:** 30 minutes plus

**Vocabulary:** chef's knife, paring knife, serrated knife, cleaver, steel, angle, hone, dice, mince, Batonnet, Julienne, brunoise

**Background Information:**

Learning how to safely use a knife is an important part of food preparation. Cutting fresh meats, fruits and vegetables is necessary to trim off waste and to cut food into appropriate sized pieces. When using a knife you want to have a clean and spacious work environment to avoid cutting yourself.

First a sharp knife in addition to being easy to use is safer, as a dull knife is more likely to slip and requires more force to get a cut. Never hold food in your hand while cutting and do not try to catch a knife if it is falling, step away from the knife. When setting up a cutting station place a wet towel down with a cutting board on top to reduce slippage. You want your work station to be at a proper height so you are not leaning over, overreaching or in an otherwise awkward position. This is very important if you will be cutting for several hours. If you are passing a knife to someone else place the knife down and allow them to pick up the knife by the handle. Store knives in safe location and do not leave knives in soapy water.

There are several types of knives yet the most important and useful knife is the Chef's or French knife. This is a large heavy flat bladed all purpose knife used in chopping, slicing and mincing. A paring knife is a smaller knife useful for peeling and trimming fruits and vegetables. A serrated bread knife is a long knife with a serrated edge used for cutting breads and cakes. There are other

specialty knives and each has value but may or may not be needed in your professional or personal kitchen.

When cutting face the blade away from your body and curl your fingers back away from the edge of the blade. This type of hand position is called the claw and helps to prevent cuts. Types of knife cuts include square cuts: coarse chop, dice, brunoise and mince. Long cuts include: Batonnet, Julienne and slice. In addition there is an irregular diagonal cut. The purpose of different types of cuts is to have uniformity in the end product both for presentation and for evenness in cooking.

Good quality knives are made of stainless steel which will not rust and hold a sharp edge for a long time. Knives should be sharpened regularly to keep them safe and useful, a sharpening stone keeps knives' blades thin and sharp and a steel can be used to maintain the knife's edge in between sharpening. You can sharpen knives yourself or have them professional sharpened. Often the price of the knife reflects the quality of the knife. You should find a knife that has a nice weight with a sturdy handle that fits the needs of your cooking.

Depending on what you are doing with your knife depends on how you want your knife sharpened. For really fine cuts in making sushi or sashimi you want the knife to have an edge on one side at a 10 degree angle. For cutting meat off or through bones you want a knife with wider angle closer to 45 degrees. For most vegetable cuts the angle should be between 20-30 degrees. The smaller the angle the quicker the blade will lose its edge and need to be honed. Cutting meat especially off the bone will quicken the rate of knife dullness.

Knives are probably the most frequently used tool in the kitchen. They are also the leading cause of injury in food service. Safety and proper usage are important to learn and to consistently refresh before using a knife.

### **Teacher Instruction:**

1. Cover safety concerns first.
2. Talk about the value of having a sharp knife and demonstrate how to sharpen a knife.
3. Have students set up their cutting stations with damp cloth folded under cutting board. Make sure stations are on sturdy tables or counters that are at an appropriate height for the students.
4. Demonstrate safe cutting practice before students are given knives. Include passing knives, what to do if a knife drops and how to hold your hands when cutting.
5. Demonstrate how to cut a specific vegetable or fruit.
6. Allow students to practice cutting this vegetable before moving on to something else. Always demonstrate before you hand out a new vegetable. Observe students cutting technique and correct as needed.
7. Remind students that it will take lots of time and practice to perfect their cutting ability.

8. After the introductory day of knife skills, remind students of knife safety before they are going to cut something new.
9. Discuss different ways to cut foods and reasons behind those cuts.

**Student Instruction:**

1. Set up a safe cutting board station.
2. Watch how to cut a specific food item.
3. Ask questions before you start.
4. Knives are sharp, be careful.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. Why is a dull knife more dangerous than a sharp knife?
2. Why do you want a wider angle on your knife when cutting through bones?
3. Demonstrate how to sharpen a knife with a steel.
4. Compare a Chef's knife to a paring knife.
5. List several reasons for why a chef wants uniformly cut pieces.
6. List safety considerations for using a knife.
7. Demonstrate how to cut a variety of vegetables.
8. Show how to safely position your fingers when using a knife.
9. Why does a bread knife have a serrated edge?

**Extensions:** Use a variety of different knives for a variety of purposes. Visit a professional knife sharpener. Practice cutting different vegetables/fruits.

**Accommodations:**

**Resources:**

<http://www.recipetips.com/kitchen-tips/t--1075/types-of-kitchen-knives.asp>

<http://www.knife-depot.com/knife-information-59.html>

[http://knife-guide.com/kitchen\\_cutlery.html](http://knife-guide.com/kitchen_cutlery.html)

The Professional Chef, American Culinary Association knife cut pages

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## Seed To Table

**Lesson Plan:** Salads

**Unit:** The Ins and Outs of Preparing Meals

**Objectives:**

- Students will learn how to prepare a variety of salads.
- Students will learn which salads best complement each meal.

**Modified Curriculum Objectives:**

**Materials:** Necessary ingredients for salads students will prepare

**Time:** 30 minutes to discuss about different types of salad 30-60 minutes to prepare different salads.

**Vocabulary:** Green Salad, Fruit Salad, Bound Salad, Dressing

**Background Information:**

Salads have been part of the human diet for more than 2000 years. The origin of the world salad comes from the Latin “salata” for the salty dressing that was often applied to leafy greens. There are many different types of salads, which can be served as appetizers, side dishes, main courses or desserts. Salads have gained popularity in recent years in the United States as part of a rise in health consciousness.

A typical green salad contains can contain a variety of lettuces, spinach or other greens. This is a new development in the variety of salads which were typically only iceberg lettuce. Green salads are often served as a precursor to the meal. Many restaurants and grocery store have salad bars which allow the customer to build their own salad. Vegetables including tomatoes, cucumbers, peppers, and carrots are often added to green salads. In addition, fruits, nuts, eggs, cheese and meats may be added to the green base. Green salads are often served with a salad dressing that could include oil & vinegar, ranch, thousand island, French or bleu cheese.

Side salads are often bound salads that are made by adding mayonnaise or oil to hold together the vegetables, noodles or meat. Cole slaw made of carrots and cabbage or potato salads are common side salads served at many restaurants and family gatherings. Pasta salads can be made with a variety of different pastas and include different vegetables and meats. Tuna, chicken, or egg salads can be served as a side salad or served on bread as a sandwich.

When the salad is served as the main meal it often include chicken or fish on a bed of greens. Caesar, Greek, and Cobb salads are all examples of salads as the entrée. Taco salads are also served as the main course in Mexican cooking.

Fruit and Jell-o salads may be served as a side or sometimes as a dessert.

When making a salad as part of a meal it is important to use fresh and clean ingredients. Green salads are not cooked and the ingredients may contain pathogens. When serving bound salads it is important to keep the salad cold to prevent the growth of food borne pathogens. In addition, many people enjoy different types of salad dressing which can be prepared or purchased.

Whether the salad is a starter, side, or main course it can be an added boost of color to the meal and a good source of essential nutrients and vitamins. In some situations customers have come to expect a salad as part of the meal and it is easy to accommodate them.

**Teacher Instruction:**

1. Discuss different types of salads and when these salads could be prepared.
2. Discuss the importance of protecting against food borne pathogens when dealing with salads.

**Student Instruction:**

1. Make a green salad.
2. Make a salad dressing.
3. Make a bound salad.
4. Make a salad entrée.
5. Make a dessert salad.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What makes a salad a bound salad?
2. Are salads are part of nutritious and balanced diet?
3. What parts of salads can be fattening?
4. What purpose does a serving a salad before the meal serve?
5. What is the difference between a side salad and a salad that is an entrée?
6. What are the differences in health benefits between using mayonnaise or oil when making salads?
7. Create a list of different types of salad. Place the salads in different categories.

**Extensions:** Prepare multiple salads, have a salad cook-off contest, taste test different store bought and homemade salad dressings.

**Accommodations:**

**Resources:**

<http://saladdressingrecipes.net/>

<http://www.cooksrecipes.com/category/salad.html>

<http://allrecipes.com/Recipes/Salad/>

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## Caesar Salad (<http://whatscookingamerica.net/Salad/CaesarSalad.htm>)

1/2 to 3/4 cup croutons (see directions below)  
1 coddled egg (see directions below)\*  
1 to 2 teaspoons finely chopped garlic  
1 anchovy fillet, mashed\*\*  
Pinch of coarse salt  
2 tablespoons (1/2 lemon) freshly squeezed lemon juice\*\*\*  
3 drops Worcestershire sauce  
6 tablespoons extra-virgin olive oil  
4 tablespoons (1/4 cup) freshly grated Parmesan cheese (Parmigiano Reggiano)  
1 head Romaine lettuce, hearts and tender leaves only  
Coarsely ground black pepper

\* Coddled egg may be substituted with 1/2 cup mayonnaise. If doing this substitution, reduce some of the olive oil.

\*\* Use only good-quality Spanish or Portuguese anchovies in your dressing. Anchovy paste may be substituted (approximately two inches squeezed from the tube will provide the equivalent taste of one anchovy fillet). More anchovy fillets may be added according to your personal taste.

\*\*\* Fresh lemon juice is essential. Some chefs squeeze the lemon through cheesecloth to ensure that only the juice ends up in the salad. If you are careful to keep the lemon seeds out of the salad, a simple squeeze will do.



**How to make croutons:** Preheat oven to 375 degrees F.

Trim the crust from day-old peasant-style bread (Italian or French bread) and dice into 3/4-inch cubes. Toss with enough olive oil to coat, but not drench. Sprinkle lightly with salt and spread out on a rimmed baking sheet. Bake approximately 10 to 15 minutes or until just golden brown. Halfway through the baking time, give the pan a shake to make sure the croutons toast evenly. Remove from oven and completely cool croutons. Store in an airtight container.



**How to coddle eggs:** Coddling causes the yolk to become slightly thickened and warm. Bring a very

fresh egg to room temperature by immersing it in warm water (otherwise it might crack when coddled). Place the egg in a small bowl or mug and pour boiling water around the egg until it is covered. Let stand for exactly 1 minute. Immediately run cold water into the bowl until the egg can be easily handled; set aside.

**How to make Caesar Salad dressing:** In a bowl, whisk together the garlic, anchovy, and salt until blended. Whisk in the lemon juice and Worcestershire sauce. Whisk in the coddled egg until the mixture is thick, approximately 1 minute (this enable the lemon juice to "cook" the eggs). Slowly drizzle in the olive oil with one hand while vigorously whisking the mixture with the other. When the dressing is well combined, whisk in 2 tablespoons of the Parmesan cheese.



**How to assemble Caesar Salad:** Separate the Romaine leaves and discard the coarse outer leaves. Wash, drain, and pat with paper towels or spin dry the remaining leaves. Note: Lettuce should be prepared ahead of time and refrigerated until ready to use. Tear into bite-size pieces and set aside.

In a large wooden salad bowl, add 1/3 of the dressing and toss with the croutons until well coated. Add the Romaine lettuce pieces and the remaining dressing; toss until coated.



**How to serve Caesar Salad:** Divide the salad between chilled plates and sprinkle each salad with the remaining 2 tablespoons Parmesan cheese and coarsely ground pepper.

Serve immediately with chilled forks.

Makes 2 to 4 servings (depending on serving sizes)

**No-Mayo Potato Salad** (<http://allrecipes.com/Recipe/Slimmed-Down-Potato-Salad/Detail.aspx>)

**45 Minutes -- Serves 8**

### **Ingredients**

- 3 pounds red new potatoes
- 1 (12 ounce) package silken tofu
- 3 tablespoons fresh lemon juice
- 1 tablespoon prepared yellow mustard
- 1 clove garlic, minced
- 1 teaspoon salt
- 2 tablespoons olive oil
- 1 cup chopped celery
- 1 red bell pepper, seeded and cubed
- 3 eggs, hard-boiled, shelled, and chopped
- 1/2 cup chopped green onions
- 1/2 cup chopped dill pickles
- salt and ground black pepper to taste
- 2 tablespoons whole milk

### **Directions**

1. Place the potatoes in a Dutch oven and fill with enough water to cover. Bring to a boil; reduce heat to medium-low. Cover and simmer until potatoes are tender, and a fork can be easily inserted and removed, about 20 minutes. Drain and cool slightly. Peel, cut into cubes, and place in a large bowl.
2. To make the dressing, combine the tofu, lemon juice, mustard, garlic, and 1 teaspoon of salt in the bowl of a food processor. Blend until smooth. With the processor running, add the olive oil in a thin, steady stream, blending just until mixture thickens. Set aside.
3. Combine the celery, red bell pepper, eggs, green onions, and pickles in the bowl with the potatoes. Pour the dressing over the potato mixture, and toss lightly to evenly coat all ingredients. Season to taste with salt and pepper. Cover and chill at least 4 hours.
4. Just before serving, toss the salad with milk, 1 tablespoon at a time, to reach the desired consistency.

## Candlestick Salad

**Yield:** 1 Serving

### Ingredients

- 1 Pineapple slice
- 1 Lettuce leaf
- ½ Banana
- 1 Cherry

### Directions

Place pineapple slice on lettuce leaf. In the hollow center of the pineapple, place 1/2 banana so that it stands upright. Use a toothpick to place a cherry on top of the banana.

Be sure to tell guests about the toothpick.



## Lime Cilantro Dressing (<http://saladdressingrecipes.net/>)

### Ingredients:

- 1/2 cup Olive
- 1/3 cup Lime Juice
- 3 tablespoons chopped Fresh Cilantro
- 1 1/2 teaspoons Ground Cumin
- 1 teaspoon Salt
- 1/8 teaspoon Pepper
- 3 cloves Garlic, finely chopped

### Preparation:

Shake all ingredients in tightly covered container. Shake before serving.

## Seed To Table

**Lesson Plan:** Soups

**Unit:** The Ins and Outs of Preparing Meals

**Objectives:**

- Students will learn how to prepare soups as part of meal or the main entrée.
- Students will learn how to prepare stocks.
- Students will learn about different types of soups

**Modified Curriculum Objectives:**

**Materials:** Ingredients and equipment for different soups. Lists of soups and recipes. Stone soup story.

**Time:** 1 period to discuss soups. Additional time necessary to prepare different soups.

**Vocabulary:** Stock, Soup, Soup Bones, Mirepoix, Blanching, Browning, Sweating, Fumet, Roux

**Background Information:**

Soups have been around for thousands of years ever since the invention of a waterproof cooking container in about 9000 BC. While the first soup pot was an animal skin bag most soups today are made using a large metal stockpot. The word soup comes from the Latin meaning to soak up with bread. Soups are any combination of meats or vegetables in a liquid base.

Stocks are the building blocks of many soups and sauces. A stock is a flavorful liquid made by gently simmering bones and/or vegetables water to extract their aroma, color and nutrients. Stocks can be time consuming to make some taking up to 24 hours to prepare yet making your own stock can be a cost effective way to gain flavor from vegetable trimmings and bones. There are also stock bases and prepackaged bouillon cubes available for purchase if there is not enough time to prepare a stock.

To prepare a vegetable stock there are two main methods. One involves using the peelings and ends cut off of vegetables used in other cooking. This is not a compost pile and rotten and other spoiled vegetables should not go into the stock. After the stock has cooked these vegetable trimming can be composted. Another method is to use specific chopped vegetables one example is mirepoix. Mirepoix is a mixture of coarsely chopped onions, carrots, and celery. Vegetables from this stock could be used in the making of the soup or in other recipes.

To prepare stock using bones the bones should be cooked first and the majority of the meat can be removed. Stock can be made from poultry including chicken and turkey or red meat including beef, pork or game bones. Using fish bones or shells from shellfish a special stock called fumet.

Bones can be prepared for making stock by blanching, sweating or browning. Blanching bones requires you to boil the bones and then discard the water and any debris that comes off the bones. This makes for a clear stock. Sweating is the process most often used with making fumet. The bones are cooked in a small amount of fat over low heat until the bones soften then water is added to make the stock. Browning or roasting bones for one hour allows for a robust flavor and a darker color brown stock.

Water is often the liquid added to the bones or vegetables to make the stock. Once the water is brought to a boil the flavor from the ingredients is brought out. Bags of spices and herbs can be added to stocks to add flavor. After the stock is done cooking the stock is strained and the bones, herbs and vegetables are removed. The stock should be cooled quickly. After the stock has been stored in the refrigerator a layer of fat will form on top of the stock. This fat should be removed before the stock is used for making soups.

There are two main types of soup clear soups and thick soups. Clear soups are soups made with stocks or broth with additional ingredients added, chicken noodle soup is an example. Thick soups are cream or puree soups that are made with a thickener of fat and flour or roux. Cream of mushroom and clam chowder are examples of thick soups where the ingredients have been pureed. Often milk or cream is added to make these soups.

Stocks are often made from bones or vegetable peelings that would otherwise be discarded. Stocks allow people to get the flavor out of these foods relatively inexpensively. In some instances butchers will give away excess bones but with increased demand many butchers sell meat bones though often at a very reduce rate. “Stone Soup” is a tale about making soup from nothing but a stone. As the story is read students will discover how the soup becomes more flavorful as additional items are added. The story could have been called “bone soup” and see the amazing soups that can be created from a bone.

While all types of soup can be made from scratch in the kitchen, many Americans have become accustomed to the convenience of prepared soups. Soups that come in a can are often condensed soups that need to have water or milk added. Some soups are dried for camping or an inexpensive meal like ramen noodles. Now many manufactures make soups that come in single serving bowls that are ready to heat in the microwave and eat without adding anything. Often these processed soups contain more sodium than is recommended. There is currently a government push to lower the level of salt in prepared foods to increase healthy choices.

Soups can be served as a starter to a meal or as the main course. Soups are often thought of as a comfort food and are served on many cold and rainy days. A stew is a type soup that general contains less liquid. Chicken noodle soup is often given to people who are not feeling well because it does not require much chewing and soothes a sore throat.

**Teacher Instruction:**

1. Talk about the value of soups in cooking. How to make stocks and the difference between processed soups and soups made from scratch.
2. Have students make different types of stocks.
3. Have students use those stocks to prepare a variety of soups.
4. Use the folklore tale of “Stone Soup” to start a conversation about making soup from ingredients that would often be discarded, bones, shellfish shells, and vegetable peelings.

**Student Instruction:**

1. Create a list of different types of soups.
2. Find a recipe for one of the soup listed on the regional list of soups.
3. Make a stock using bones or vegetables.
4. Make a clear soup.
5. Make a cream soup.
6. Make stone soup.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What are some health benefits associated with soups?
2. What is the value of putting bones in stock?
3. What can be done with vegetables after they have been used to make stock?
4. Why do different regions of the country and parts of the worlds have different types of soups?
5. What is the purpose of a soup kitchen?
6. What happens in the Stone Soup story?
7. Why are soups general less expensive than other foods?

**Extensions:** Making additional soups or stocks.

**Accommodations:****Resources:**

There are many different versions of the folk tale Stone Soup (Stone Soup by Marcia Brown, Stone Soup by Ann McGovern, Stone Soup by Heather Forest, and Stone Soup by Jon Muth)

A Guide for Using Stone Soup in the Classroom by Susan Onion—Lessons surrounding the stone soup story.

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## Traditional regional soups

- Ajiaco - A chicken soup from Colombia
- Avgolemono - A Greek chicken soup with lemon and egg
- Bajajou - A soup of Slovakian origin. Ingredients include boiled cow intestines, chicken egg, onion and rice.
- Bird's nest soup is a delicacy in Chinese cuisine.
- Bisque - A thick, creamy, highly-seasoned soup, classically of pureed crustaceans, of French origin.
- Borscht - A beet-vegetable soup originally from Ukraine and Russia.
- Bouillabaisse - A fish soup from Marseille (Southern France. Also made in other Mediterranean regions. In Catalonia it is called Bullebesa.
- Bourou-Bourou - A vegetable & pasta soup from the island of Corfu, Greece
- Caldo verde - A Portuguese minced cabbage soup
- Callaloo - A thick, creamy soup made with okra and, often, crab meat from Trinidad and Tobago
- Canh chua (sour soup) - A Vietnamese dish made with rice, fish, various vegetables, and in some cases pineapple.
- Canja de Galinha- A Portuguese soup of chicken, rice and lemon.
- Cazuela - A Chilean soup which is a mid-thick flavored stock obtained from cooking several kinds of meats and vegetables mixed together.
- Clam chowder - two major types, New England clam chowder, made with potatoes and cream, and Manhattan clam chowder, made with a tomato base.
- Cock-a-leekie soup - Leek and potato soup made with chicken stock, from Scotland
- Cullen Skink - A fish soup made with Smoked Haddock, potatoes, onions and cream from Scotland
- Egg drop soup, a savory Chinese soup made from adding already-beaten eggs into boiling water or broth.
- Etrog, a fruit soup made up from the citron used in Jewish Ritual at the feast of Succoth, is eaten by Ashkenazi Jews at Tu Bishvat.
- Faki soupa - A Greek lentil soup, with carrots, olive oil, herbs and possibly tomato sauce or vinegar.
- Fanesca - A traditional cod soup from Ecuador
- Fasolada - Traditional Greek bean soup
- French Onion Soup - A clear soup made with beef broth and sautéed onions.
- Fufu and Egusi soup - A traditional soup from Nigeria made with vegetables, meat, fish, and balls of ground melon seed
- Gazpacho (from Spain and Portugal) is a savory soup based on tomato
- Goulash- A Hungarian soup of beef, paprika and onion.
- Gumbo - A traditional Creole soup from the Southern United States thickened with okra pods.

- Halászlé or Fisherman's Soup, a very hot and spicy Hungarian river fish soup with a lot of hot paprika
- Íslensk Kjötsúpa - Traditional Icelandic meat soup made with lamb and vegetables.
- Kharcho - A Georgian soup of lamb, rice, vegetables and a highly spiced bouillon.
- Lagman - A traditional Uzbek soup of pasta, vegetables, ground lamb and numerous spices.
- Lan Sikik - A Thai soup made with noodle, dried fish and tomato extract.
- Leek soup - A simple soup made from Leeks popular in Wales during Saint David's Day
- Lentil soup - A soup popular in the Middle East and Mediterranean.
- London Particular - a thick soup of pureed peas and ham from England: purportedly named after the thick fogs of 19th century London.
- Maryland Crab Soup - A soup made of vegetables, blue crab, and Old Bay Seasoning in a tomato base. From Maryland, United States.
- Menudo - A traditional Mexican soup with tripe and hominy.
- Michigan Bean soup has been a staple for over a hundred years in the U.S. Senate dining room.
- Minestrone - An Italian vegetable soup
- Miso soup - A Japanese soup made from fish broth and fermented soy
- Mulligatawny - An Anglo-Indian curried soup
- Nässelsoppa - A Swedish soup made of stinging nettles, traditionally eaten with hardboiled egg halves. In Sweden it's considered a spring delicacy. Internationally known as nettle soup.
- Noodle soup - A very diverse collection
- Patsás - A Greek tripe soup
- Philadelphia Pepper Pot Soup - A Philadelphia specialty traditionally made with tripe.
- Phở- A Vietnamese beef/chicken soup with scallion, welsh onion, chirred ginger, wild coriander (*Eryngium foetidum*), basil, cinnamon, star anise, cloves and black cardamom.
- Psarosoupa - A Greek fish soup. There are various versions of it and could be made with a variety of fish types.
- Revithia - A Greek chickpea soup
- Sancocho - A Latin American chicken soup with vegetables.
- Shchav, a sorrel soup in Polish, Russian and Yiddish cuisines
- She-crab soup - from Charleston, South Carolina, a creamy soup made with blue crab meat and crab roe.
- Sinigang - from the Philippines. A clear sour soup made from tamarind paste and meat, fish, or vegetables. People may opt to use meat like beef or pork, and various kinds of fish for this soup.
- Snert - A thick pea soup, eaten in the Netherlands as a winter dish, traditionally served with sliced sausage. Also known as *erwtensoep*.
- Solyanka - A cabbage soup from Russia

- Soto (food) - a traditional Indonesian soup made with traditional spices such as turmeric, galangal, etc. Usually contains either beef or chicken.
- **Split peas soup** - A thick & tasty soup made in The Caribbean from "Split peas" also called chickpeas or garbanzo. It usually includes "ground provision" vegetable staples and some type of meat
- Tarator - A Bulgarian cold soup made from yogurt and cucumbers
- Tomato soup - Traditional soup made of tomatoes
- Tarhana soup, from Turkish
- Vichyssoise - A French-style soup invented by a French chef at the Ritz Hotel in NYC. French cold purée soup with potatoes, leeks, and cream.
- Yukgaejang - A Korean spicy beef soup, which also includes vegetables
- Żurek - A Polish sour rye soup with sausages often served in a bowl made of bread.

## How to Make Chicken Stock

### Leftover Chicken Bones ([http://simplyrecipes.com/recipes/how\\_to\\_make\\_chicken\\_stock/](http://simplyrecipes.com/recipes/how_to_make_chicken_stock/))

1. Put the leftover bones and skin from a chicken carcass into a large stock pot and cover with cold water. Add vegetables like celery, onions, carrots, parsley.
2. Add salt and pepper, about 1/2 tsp of salt, 1/4 tsp of pepper.
3. Bring to a boil and immediately reduce heat to simmer.
4. Simmer uncovered at least 4 hours, occasionally skimming off the foam that comes to the surface.
5. Remove the bones and strain the stock.
6. If making stock for future use in soup you may want to reduce the stock by simmering a few hours longer to make it more concentrated and easier to store.
7. Cool stock quickly to prevent food borne pathogens.

### Brown Beef Stock ([http://www.reluctantgourmet.com/beef\\_stock.htm](http://www.reluctantgourmet.com/beef_stock.htm))

#### Ingredients

7 pounds beef, cut into 2 or 3-inch pieces  
1 can best quality tomato paste  
1 cup chopped celery  
1 cup chopped carrot  
2 cups chopped onion  
1 cup red wine or water, for deglazing  
Small handful peppercorn  
4 bay leaves  
3 sprigs thyme  
Cold water



#### How to Make Beef Stock

Preheat oven to 425° F.

Spread bones in a roasting pan and roast for about 30 minutes, turning once. Remove from the oven, and paint a thin layer of tomato paste over the bones. Put the vegetables on top of the bones, and roast an additional 15-20 minutes, until the vegetables begin to caramelize.

Remove the bones and vegetables to a stock pot. Deglaze the roasting pan with wine or water, and pour this into the stock pot. Add peppercorns, bay leaves and thyme. Cover the bones with cold water.

Over medium heat, slowly bring the bones up to a very gentle simmer. Don't let the stock boil. Adjust the temperature to maintain a gentle bubbling. Every thirty minutes or so, skim off any foam that rises to the top of the pot. Let the stock simmer gently for at least four hours. If you have the time, it can simmer for up to 12 hours. Add a little more water and lower the heat if you are getting too much evaporation.

When the stock is done, remove the bones and discard. Strain through a very fine mesh strainer or through a colander lined with three or four layers of cheesecloth. Chill quickly, then refrigerate. Skim off the fat that has solidified on top, and discard.

## **Chicken Noodle Soup (<http://startcooking.com/blog/343/How-To-Make-Chicken-Noodle-Soup>)**

- 2 teaspoons of butter
- 1 onion - chopped
- 1 carrot - sliced
- 1 stalk of celery - sliced
- 5 cups of chicken stock
- 1 cup of noodles
- 1 ½ cups of chicken - cooked and shredded
- ¼ teaspoon salt
- ¼ teaspoon black pepper

Melt the butter over med high heat.

Cook the onions, celery, and carrots, about 5 minutes.

Stir in stock and simmer, covered, until vegetables are tender – 10-15 minutes.

Add noodles and simmer uncovered until they are tender.

Add the shredded chicken and simmer until chicken is warm.

Add the parsley.

Season with salt and pepper to taste.

**The Cliff House Clam Chowder** has been on the menu since 1872. From The Cliff House in Ogunquit, Maine.

Serves six.

**Ingredients:**

- 1 slice hickory-smoked bacon, minced
- 1/2 teaspoon butter
- 1 cup onion, minced
- 1 medium garlic clove, minced
- 1 teaspoon The Cliff House Spice Blend (see below)
- 1 tablespoon all-purpose flour
- 1 can clams (6-1/2 ounces)
- 1 cup bottled clam juice
- 1-1/2 cups Half and Half
- 1/4 teaspoon white pepper
- 2 medium potatoes, boiled, peeled and diced

**Preparation:**

To Create “The Cliff House” Spice Blend, blend 4 tsps oregano, 4 tsps dried parsley, 2 tsps marjoram, 2 tsps dill, 4 tsps thyme, 4 tsps basil, 1 tsp sage, 4 tsps rosemary, 2 tsps tarragon, 1 tablespoon all-purpose flour, crushing in a mortar if possible. Store in a resealable plastic bag to refrigerate.

In a heavy-bottomed, 4-pint soup kettle, sauté bacon, butter, onion, garlic and The Cliff House spice blend over low heat. Do not allow to brown. Drain clams and set aside, reserving the juice. Slowly stir the flour and clam juices in the sauté mixture. Bring to a boil; reduce heat. Add half and half and simmer 20 minutes. Add white pepper, potatoes and clams. Heat to serving temperature. Do not allow to boil, as this toughens the clams. Serve at once with crackers and warm cornbread.

## Seed To Table

**Lesson Plan:** Entrées

**Unit:** The Ins and Outs of Preparing Meals

**Objectives:**

- Students will learn how to prepare different entrées.
- Students will learn how to add additional components to a meal to make a balanced meal.
- Students will learn what makes a good entrée
- Students will learn about full course and multi-course meals.

**Modified Curriculum Objectives:**

**Materials:** Full course meal handout, Ingredients and equipment necessary to prepare the chosen entrée.

**Time:** 1-2 hours per entrée

**Vocabulary:** Entrée, main course, full course meal.

**Background Information:**

In America, the term entrée usually refers to the main dish being served. Often the entrée is made of some type of meat including fish, chicken, beef, or pork. However, there are also pasta entrées and rice entrées that may or may not contain meat. There are also a wide variety of vegetarian entrées that provide protein from non-meat sources.

The entrée is usually the first part of the meal decided and then appropriate sides, soups, salads and desserts are paired with the entrée. Yet in some instances a larger salad or soup may serve as the entrée. Entrées are often served after the salad or soup and before the dessert. Breads, vegetables, or a carbohydrate side is often served with entrée.

In a full course meal and in most European restaurants the term entrée is used to refer to a dish served before the main course or roast. In these situations the entrée is smaller than the main course but still serves as a source of protein. This different definition of entrée could create confusion if dining at a restaurant that serves both main courses and entrées. In this instance an entrée on the menu would usually be a smaller portion of a main course offering.

In a full course meal different courses are served throughout the evening. Depending on the event the meal could include from 3 to 21 courses. Often each course is brought out separately and is cleared before the next course arrives. Each course is relatively small and the dinner is expected to last 4-5 hours. This type of dining experience often includes an elaborate place

setting with multiple types of silverware and dishes each with a different specific purpose. In general, you use the silverware farthest from the plate first and work your way in as the meal progresses.

With a full course meal the entrée is a lighter course served as precursor to the main course. The word entrée comes from French for “entry.” The entrée is usually fish or fowl and served before the main course which typically consists of red meat.

**Teacher Instruction:**

1. Discuss what an entrée is.
2. Discuss what a full course meal is.
3. In the 21 courses course 11, Quail, would be the entrée while course 13, Beef, would be the main course.
4. Have ingredients and equipment available to make a range of entrées.

**Student Instruction:**

1. Using the “A Full Course Meal with Twenty-one Courses” as a guide, determine what each of the courses is. Then create a menu for your own full course meal with 12-21 courses.
2. Create a list of entrées.
3. Prepare an entrée and pair it with appropriate sides to make a healthy and nutritious meal.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. Why do you think the term entrée is used to describe the main dish in America?
2. What benefits or issues arise from serving or eating a full course meal?
3. Why is the entrée usually meat?
4. What goes in to making a healthy meal?

**Extensions:** Eat or prepare a full course meal, Cook additional entrées.

**Accommodations:**

**Resources:**

Websites and cookbooks have thousands of entrée recipes to try.

<http://busycooks.about.com/library/recipes/blentrees.htm> Busy cook entree recipes

<http://www.finestchef.com/Entrees.htm> Gourmet Entree Recipes by Chef George Krumov

How to Cook Everything by Mark Bittman

Joy of Cooking by Irma S. Rombauer, Marion Rombauer Becker, and Ethan Becker

The Fannie Farmer Cookbook by Marion Cunningham

Frugal Gourmet by Jeffrey David Smith

Moosewood Restaurant Cooks at Home: Fast and Easy Recipes for Any Day by Moosewood Collective

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## A Full Course Meal with Twenty-one Courses

Name: \_\_\_\_\_

1. Palate cleanser, or amuse
2. Second amuse
3. Caviar
4. Cold appetizer
5. Thick soup
6. Thin soup
7. Shellfish
8. Antipasto
9. Pasta
10. Intermezzo (Sorbet)
11. Quail
12. Wild mushrooms
13. Beef
14. Green salad
15. Puffed pastry filled with herbed mousse
16. Cheese
17. Pudding
18. Ice cream
19. Nuts
20. Petit four
21. Coffee

Describe each of the courses listed above.

Which course would be the entrée?

Which course would be the main course?

## Seed To Table

**Lesson Plan:** Side Dishes

**Unit:** The Ins and Outs of Preparing Meals

**Objectives:**

- Students will learn how to prepare different side dishes.
- Students will learn how to add additional components to a meal to make a balanced meal.
- Students will learn what makes a side dish.

**Modified Curriculum Objectives:**

**Materials:** Ingredients and equipment necessary to prepare the chosen side dish.

**Time:** 30 minutes per side dish

**Vocabulary:** Side Dish, Balanced Meal, Carbohydrate, Vegetable, Fruit

**Background Information:**

Side dishes are typically served with an entrée to create a more balanced and healthy meal. Often a meal includes two sides. One is a vegetable that could be a small side salad or steamed vegetables. The other is a starch which includes, rice, pasta, couscous, breads and potatoes. Side dishes will sometimes be picked by the chef other times customers are allowed to choose which sides they want with their meals. Sometimes restaurants will serve side dishes a la carte. This allows customers to add their own sides to their entrée or to only order the side dish.

If a salad does not come before the meal which is often include in the price of the meal. A salad could be chosen as a side dish this is often served on a small plate during the meal. Other vegetables that are commonly served as side dishes include corn, carrots, beans, peas, broccoli, cauliflower, and asparagus. These vegetables are often steamed and may be combined with other vegetables, sugar, cheese or spices.

Potatoes are the most popular side dish served in American restaurants. Often potatoes are served as French fries to accompany the meal. However, since fries are often high in fat, people are starting to make other choices. This includes eliminating the use of trans fats in cooking fries, opting for different styles of potatoes or replacing the common fry with a fruit, vegetable or other starch. Potatoes also are served baked, twice baked, mashed, potato salad, hash browns, and oven fried.

Other starch choices are often served as different restaurants. Pasta is a common side dish with Italian cooking. Rice is common with Chinese, Japanese and other Asian cuisines. Typical, Tex-Mex side dishes include Spanish rice and refried beans. Couscous and baba ganoush are often served with Mediterranean dishes. Every culture has a different style of food but all contain the same principle of including vegetables and starches as accompaniments to the main protein based entrée.

**Teacher Instruction:**

5. Discuss what side dishes are.
6. Discuss how side dishes help to make a balanced meal.
7. Have ingredients and equipment available to make a range of side dishes.

**Student Instruction:**

4. Create a list of side dishes
5. Organize the lists of side dishes into different categories.
6. Prepare side dishes and make an entrée to make a healthy and nutritious meal.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

5. Why do side dishes often not contain meat?
6. What health issues arise from eating French fries?
7. What is a healthier replacement for French fries?
8. Create a list for side dishes common for breakfast. Lunch.
9. What goes in to making a healthy meal?

**Extensions:** Prepare more side dishes. Create a menu with different side dish choices. Create an a la carte menu.

**Accommodations:**

**Resources:**

Websites and cookbooks have thousands of side dish recipes to try.

<http://allrecipes.com/Recipes/side-dish/Main.aspx>

<http://www.foodnetwork.com/topics/side-dish/index.html>

How to Cook Everything by Mark Bittman

Joy of Cooking by Irma S. Rombauer, Marion Rombauer Becker, and Ethan Becker

The Fannie Farmer Cookbook by Marion Cunningham

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**Readings/Worksheets/Quizzes/Other Materials:**

Side Dishes

Name: \_\_\_\_\_

Create a list of sides that fit into each of the categories below.

Vegetable	Salad	Fruit

Potato	Rice	Pasta	Other Starch

What sides would go well with.....?

Hamburger

Lasagna

Salmon

Squash Curry

Pork Chop

Tandoori Chicken

Enchiladas

## Seed To Table

**Lesson Plan:** Rice

**Unit:** The Ins and Outs of Preparing Meals

**Objectives:**

- Students will learn the history of cooking with rice.
- Students will learn how to cook a variety of rice dishes.

**Modified Curriculum Objectives:**

**Materials:** Variety of different rice and ingredients and utensils to cook different rice dishes.

**Time:** 30-60 minutes to discuss rice and try different varieties, longer time necessary to prepare different rice dishes.

**Vocabulary:** Whole grain, refined grain, brown rice, white rice, sushi rice

**Background Information:**

Rice is the most important food grain for most of the human population. Rice production is second only to corn and much of the world's corn goes to animal feed or industrial uses. Rice is extremely popular throughout Southeast Asia with much rice being grown in China, India, Bangladesh, Indonesia and Thailand among other countries. Rice requires lots of workers and water so production is often limited to countries with low labor costs and high annual rainfall.

Rice is the grain of a monocot, *Oryza sativa*. It is often grown as an annual but in warmer climates has been cultivated as a perennial lasting for more than 30 years. Rice plants are wind pollinated with each plant producing 100s of seeds. The seeds are then picked, dried, and hulled. Different types of rice are then processed in a variety of ways before being cooked for consumption.

Rice originally grew in Southeast Asia and parts of Africa. The cultivation of rice has been in existence for more than 10,000 years. In most parts of the world rice is grown in flooded rice paddys. Flooding reduces the number of weeds and pests that can affect the rice. However this type of farming requires lots of water and contributes greatly to the amount of methane produced during rice farming. Rice can be grown in non-flooded fields but this method is more labor intensive. Rice is often planted with the companion plant Azolla (mosquito fern), which shades out weeds and provides nitrogen fixation.

After the rice grain is picked the seeds are dried and either rubbed or blown on to remove the chaff. At this point the rice is brown rice which is a whole grain with additional nutrients. The

rice could be further milled to remove the bran which yields white rice which is a refined grain. There are different processes to infuse the white rice with nutrients that were lost in the milling process. Rice is high in carbohydrates and is also a good source of protein. However, rice is not a complete protein because it does not contain all essential amino acids.

Rice can be used in a variety of different foods. It can be milled into flour to use as a gluten free alternative. The flour can then be used to make bread or crackers. Puffed rice is used a cereals or to make rice cakes. Rice is also used to make some noodles, beer, and wine (sake). Rice can also be used in making a variety of desserts.

Wild rice grows in Wisconsin, Minnesota and Canada. Wild rice is not technically rice but a different species of grain, *Zizania sp.* Wild rice is a native grain that grows in lakes in the north central United States and in southern Canada. The rice grains are collected by knocking the tops of the rice into a canoe or flat bottom boat. The grains are dried and the husks are removed by blowing air over the rice with a fan. Most wild rice is grown commercial but “wild” wild rice is still harvested by individuals. The name Menominee comes from the Ojibwa term for wild rice which is a sacred plant in many Native American traditions. Wild rice is typically more expensive than white or brown rice.

Rice is typically boiled or steamed. Rice absorbs much water during the cooking process. Often rice is cooked using a 2:1 ratio of water to rice. This method does not require draining or stirring. Rice and water are added to pot. With the lid on the pot, water is brought to a boil, and then the burner is turned down to simmer until the rice absorbs all of the water. Another method of cooking rice calls for more water than needed to be added and then rice is drained. Rice can then be fried with oil or butter if desired.

Instant rice is rice that has already been partially cooked and then dried. This speeds up the cooking process to less than 10 minutes. Other people especially in Asia and Latin America and people who cook lots of rice use an electric rice cooker. This device frees up room on the stove and ensures a more accurate cooking process.

**Teacher Instruction:**

1. Discuss with students what types of rice they have had and what types of additions they like with their rice.
2. Have students identify different types of rice with picture or examples of a variety of rice.
3. Have students prepare different types of rice dishes.

**Student Instruction:**

1. Compare different types of rice, brown, white, instant, wild, sushi, etc.
2. Cook and eat.
3. Make different types of dishes using rice; curry, stir fry, sushi.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What foods could be used as a substitute for rice?
2. What needs to be added to rice to make a complete meal?
3. Why is rice considered a staple food?
4. Compare brown rice to white rice.
5. Identify a variety of different types of rice.

**Extensions:** Make different types of rice dishes. Use rice as a side dish or part of the main course. Have a rice party make a lot of different types of rice then have people bring their favorite rice toppings. Harvest wild rice.

**Accommodations:**

**Resources:**

[www.foodreference.com/html/art-rice-varieties.html](http://www.foodreference.com/html/art-rice-varieties.html) --Information about different varieties of rice

<http://www.foodsubs.com/Rice.html> --List of different types of rice

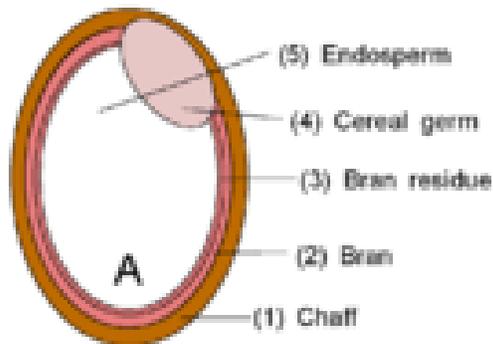
<http://allrecipes.com/Recipes/Side-Dish/Rice/Main.aspx> Rice recipes

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**Readings/Worksheets/Quizzes/Other Materials:**

## Rice Grain Diagram



Rice with chaff the outer hull is removed after the seeds are picked this can be done by letting the rice dry and then allowing the wind or high powered fan blow the lighter chaff away

Brown rice still has the bran attached. Brown rice is higher in protein and other nutrients

White rice with bran residue can be made by parboiling brown rice or adding the bran residue lost in the milling process to white rice. This rice is usually yellow to red and does not stick to the pan as easily as white rice.

White rice is only the internal endosperm of the grain with all of the bran and bran residue removed. White rice can be stored longer than brown rice. Some types of white rice are polished with additional additives to change the level of nutrients.

## Seed To Table

**Lesson Plan:** Pasta

**Unit:** The Ins and Outs of Preparing Meals

**Objectives:**

- Students will learn the history of pasta.
- Students will learn how to cook a variety of pasta dishes.
- Students will make their own pasta.

**Modified Curriculum Objectives:**

**Materials:** Pasta machine, Ingredients for fresh pasta. Other ingredients for different types of pastas as desired

**Time:** 1 hour

**Vocabulary:** Pasta, semolina, wheat durum, couscous, al dente

**Background Information:**

Pasta is a staple in many diets around the world. Pasta is relatively inexpensive and easy to prepare. There are over 100 different types of pasta used to describe what the pasta is made of and the designed shape of the pasta.

Pasta can be dried to store for long periods of time and cooks quickly. The originally pasta was just an unleavened bread. The modern day ingredients of pasta are also similar to breads made of wheat.

Most modern pastas originated in Italy and many carry Italian names. These pastas are made with durum wheat or semolina flour. These pastas have a yellowish tinge and are designed to be cooked *al dente* to a point where the pasta is completely cooked but still firm. In the US many types of pastas are made with refined flours or whole wheat flours which are harder to cook to al dente. In China, there are noodles that are made of rice which are similar but not actually pasta. The first record of pasta is couscous from Northern Africa. Couscous is small unleavened wheat balls that are cooked similarly to other pastas.

Often pastas are served with some type of sauce or stuffing. These can be as simple as butter, tomato or a cheese sauce or much more elaborate sauces with more ingredients. Pasta is a main source for carbohydrates and can be used as a side dish or a part of the main entree. Ravioli, shells, manicotti, and lasagna are example of pastas that can be filled with meat, cheese, or vegetables to provide a main course.

Dried pasta can be stored for up to two years; cooked pasta can store in a refrigerator for several days or be frozen. Fresh pasta or pasta made with eggs keeps for less time.

Pasta comes in a variety of shapes and thicknesses. The time required to cook pasta depends on how thick the pasta is and how soft the cook wants the final product. Pastas typically have few ingredients included semolina flour, eggs or water and salt. There are pastas that also have flavorings including spinach, beet or tomato.

**Teacher Instruction:**

1. Discuss with students what types of pasta they have had and what types of sauce they enjoy.
2. Have students identify different types of pasta with picture or examples of a variety of pasta.
3. Have students prepare fresh pasta.
4. Have students prepare different types of dried pasta.

**Student Instruction:**

1. Follow the recipe for fresh pasta, run through pasta machine.
2. Cook and eat.
3. Make different types of sauces and pastas. Marinara, white sauce, lasagna, and ravioli.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What foods could be used as a substitute for pasta?
2. What needs to be added to pasta to make a complete meal?
3. Why is pasta considered a staple food?
4. Compare fresh pasta to dried pasta.
5. Identify a variety of different pastas.

**Extensions:** Make different varieties of fresh pasta. Make different types of pasta dishes. Use pasta as a side dish or part of the main course. Have a pasta party make a lot of noodles then have your guests bring their favorite pasta toppings.

**Accommodations:**

**Resources:**

<http://www.thenibble.com/REVIEWS/MAIN/pastas/glossary.asp> Glossary of type pastas

<http://www.foodsubs.com/PastaShapes.html> --List of Pasta Shapes

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## **Making Fresh Pasta**

Fresh pasta contains only three ingredients: flour, salt, and eggs.

- Semolina, high-protein flour made from Durum wheat, makes better pasta than all-purpose flour. It creates a stronger gluten structure, allowing for more pliable dough.
- Salt provides flavor, and the eggs create richer dough, along with binding the dough together.
- Olive oil is sometimes added for flavor, or, if the pasta is to be dried, water is used instead of eggs. Spices or vegetables can be added to the mix for variety.

Basic Ratio -- $\frac{3}{4}$  Cup Semolina Flour, 1 egg, 1 tsp salt per serving

## **Mixing**

Kneading the dough creates the important gluten structure that holds the pasta together. Using a stand mixer with a dough hook simplifies the process: just add the ingredients and mix.

Kneading by hand takes more effort.

- Start with a large, clean work surface. Make a mound of the flour and salt with a well in the middle.
- Add the eggs to the well, and start stirring with a fork, slowly incorporating all the flour until the dough comes together.
- Knead the dough until it is soft and pliable. This might take several minutes.

## **Rolling**

A pasta machine makes this process easier.

- Use the machine for the final kneading. Run the dough through the widest setting on the machine, fold into thirds, and roll again. Continue this process until the dough is shiny and elastic.
- Work the dough through the settings of the machine until the desired thickness is reached.
- Use different settings on machine to make desired shapes.
- Four hands are better than two: enlisting some help with turning the handle of the pasta machine will make this job much easier.
- Keep the remainder of the dough wrapped in plastic to prevent it from drying out.

Rolling by hand works, too, and can be done with a rolling pin and a large work surface.

- Just as with a pasta machine, roll the pasta dough flat, fold into thirds, and roll flat again, until the dough is shiny and elastic.
- Make sure the dough is in small enough batches to be workable. Slightly smaller than your fist is a good size. Keep extra dough covered in plastic until you are ready to work with it.
- Roll to the final thickness, and form desired shape.

**Cooking**—Boil water, add fresh pasta to boiling water and remove when done.

- Fresh pasta cooks quickly--smaller shapes can take less than a minute, while ravioli might take up to five minutes, or until the filling is heated through.

Though fresh pasta can be stored, it is best to use right away

- It can be stored in the refrigerator for up to four days, or frozen for up to a month, but remember, it is raw dough, so any moisture can easily damage it.

## Seed To Table

**Lesson Plan:** Desserts

**Unit:** The Ins and Outs of Preparing Meals

**Objectives:**

- Students will learn how to make a variety of desserts.
- Students will learn how to make substitutions in recipes.

**Modified Curriculum Objectives:**

**Materials:** Ingredients and equipment necessary to make dessert choices.

**Time:** 30 minutes or longer depending on recipe choice.

**Vocabulary:** Desserts

**Background Information:**

Desserts are typically served as the last course of the meal. These sweet treats are served after the main course or as a snack. While plain fruits can be served as desserts often this portion of the meal contains a large portion of sugar and should be consumed in moderation as part of a balanced and healthy diet.

Dessert foods typically include; pies, cakes, cookies, ice cream, and fruits. All of these items can be prepared from scratch. Many restaurants hire a baker to prepare all of the desserts. There are other restaurants that focus solely on serving desserts.

While many desserts use chocolate or sugar grown in faraway places it is possible to include local grown fruits and vegetables into this course. Apple, rhubarb, strawberries, and raspberries can be added to pies cakes or muffins. Beets can be added to chocolate cake and zucchini makes a wonderful quick bread.

Desserts are often used as part of a celebration. Birthday cakes are very popular and it is common to bring cookies to afternoon or evening gatherings. People often give chocolates or cookies at Christmas, Halloween, Valentine's Day and Easter. Pies made with pumpkin or apples are also associated with Thanksgiving celebrations.

**Teacher Instruction:**

1. Discuss with students common dessert and the purpose behind deserts.
2. Talk about possible substitutions replacing eggs and/or sugar in recipes.
3. Decide what recipes you want students to prepare.

**Student Instruction:**

1. Create a list of different desserts.
2. Follow a recipe to make a dessert.
3. Make a substitution in a recipe to make a dessert healthier.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. Why are desserts associated with holidays?
2. What is your favorite dessert? To eat? To make?
3. What are ways to make desserts healthier?

**Extensions:** Visit a chocolatier, ice cream factory, bakery, or restaurant specializing in desserts.

**Accommodations:**

**Resources:**

<http://ohioline.osu.edu/hyg-fact/5000/5543.html> Suggestions on how to adapt a recipe to be healthier.

<http://www.foodsubs.com/Sweeten.html> List of substitutions for sugar.

<http://www.foodsubs.com/Eggs.html> List of substitutions for eggs.

<http://www.foodsubs.com/Fatsoils.html> List of substitutions for fats.

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## First Saturday in May Pie

### Ingredients

#### Pie Crust

- ½ cup chilled butter
- 1 ¼ cups of flour
- ¼ cup of chilled water
- 1 teaspoon lemon juice

#### Filling

- 1 stick butter (melted and cooled)
- ½ cup flour
- 1 cup sugar
- 1 egg
- 1 Tablespoon vanilla
- 1 cup chocolate chips
- 1 cup pecans (chopped)

#### Directions

Use pastry knife to cut butter into flour until it resembles coarse crumbs. Add liquids slowly form into a ball. Use rolling pin to roll out pie crust adding flour so it does not stick.

Melt butter allow to cool so it does not cook eggs or melt chocolate. Combine flour and sugar. Stir in egg and vanilla. Add chocolate and pecans. Pour into open pie crust.

Bake at 350° F for 30-40 minutes. Filling should be chewy not runny.

## Chocolate Beet Cake

### Ingredients:

- 2 cups flour
- 1 1/2 teaspoons baking soda
- 1/2 teaspoon salt
- 1 1/2 cups sugar
- 1/2 cup cocoa powder
- 3 large eggs, beaten
- 1 cup tablespoons vegetable oil
- 1 1/2 cups grated beets
- 2 teaspoons vanilla
- powdered sugar, optional

### Preparation:

Preheat oven to 350°.

Combine flour, soda, salt, sugar and cocoa in a bowl; set aside. In a mixing bowl, combine the eggs and oil. Beat in vanilla and continue beating until well blended. Slowly beat in dry ingredients until well mixed; stir in beets. Pour into a greased and floured 9x13-inch baking pan. Bake at 350° for 25 to 35 minutes, or until cake bounces back when touched lightly with finger.

Cool in pan on a rack. Frost cooled cake or dust with powdered sugar.

## **In the Cookies of Life, Chocolate Chips are your Friends**

### **Ingredients**

- 1 Cup White Flour
- 1 Cup Whole Wheat Flour
- ½ Cup Oats
- 1 tsp baking soda
- ½ tsp salt
- 1 stick butter
- 3 eggs
- 1 tsp vanilla
- 1 Cup Chocolate Chip
- ½ cup walnuts

### **Preparation**

Preheat Oven to 350° F

In a large bowl mix flours, oats, soda and salt. Stir in soft butter, eggs, and vanilla. Add chocolate chips and nuts. Spoon onto baking sheet. Bake for 12 minutes allow to cool on rack. Makes 32 cookies.

## **Baked Apples**

### **Ingredients**

1 Firm Apple  
20 Raisins or Craisins  
1 Tablespoon Brown Sugar  
½ Teaspoon Cinnamon  
1 teaspoon butter

### **Preparation**

Core apple leaving the bottom part of the core intact. Put apple in bowl; add mixture of raisins, brown sugar, cinnamon, and butter to the core. Cover with plastic wrap. Cook in microwave for 3 minutes. Or cook several apples in the oven at 350° F for 40 minutes.

## Seed To Table

**Lesson Plan:** Iron Works Chef

**Unit:** The Ins and Outs of Preparing Meals

**Objectives:**

- Students will learn how to use different ingredients in different ways.
- Students will create their own variations on recipes.
- Students will engage in friendly competition with their peers.
- Students will experiment with new items.

**Modified Curriculum Objectives:**

**Materials:** Equipment and ingredients necessary to complete the competition, Copy of rules and judging sheets

**Time:** 1-3 hours depending on competition

**Vocabulary:** Plating, Originality, Sous-chef

**Background Information:**

The idea for this lesson is based loosely on the show Iron Chef produced by the Food Network. On the show contestants battle against other chefs to prepare a meal using a secret ingredient. The meal is judged based on taste, plating, and originality. While the Iron Chef is based on a Japanese show the American version pits a variety of celebrity chefs against one another to create a new meal.

Each chef has the same equipment and ingredients available. They also have two sous-chefs or assistants to help with the food preparation. At times chefs will pair up in a tag team match. The main goals are to prepare a tasty original meal using a secret ingredient. The ingredient is then used in all portions of the meal.

The chefs are given a certain amount of time to prepare the meal usually five courses that incorporate one “secret” ingredient. The chefs are given a list of five possible secret ingredients a day before the show when they can request other ingredients for the each of the secret ingredients. The secret ingredient is announced 15 minutes before the show to give each team a chance to make their final preparations before cooking.

At the end of the time the food is judge by three judges on the categories of taste, plating, and originality, with taste being worth the most possible points. Plating is how the food is presented and if it looks appetizing to the eye. Originality is asking chefs to do something that is new and

different with common ingredients. This is why on one show a chef created trout ice cream. Does not sound good, but is definitely original.

The name Iron Works Chef comes from the Iron Works Café at the Goodman Community Center in Madison, WI. The center is built in the renovated Kupfer Iron Works foundry. The café employs teenagers in a work to learn style program.

Depending on your facility and time available you can run these competitions in a variety of ways. First have teams of students work together you may want to assign a rotating head chef to make final decisions or you can require the group to work by consensus. While the show does not allow for recipes with less experienced chefs it may be good to have recipes or cookbooks to follow exactly or that they can use as a guide when changing the recipe to include a theme or specific ingredient.

Safety is a concern when adding a time constraint to cooking. Most restaurants have a time limit on how quickly they need to prepare the meals. On the show there have been no major accidents but plenty of knife slips that have led to cuts. Students will need to work quickly without taking unnecessary risks.

The items prepared can be judged by other students in the class, by guest judges, or by the general public. Before the contest be sure that the students know how they will be judged and prepare a score card for each of the judges. You will have to decide if the judges will know which cook prepared the meal or will it be blind judging.

The competition can be as an entire meal or a portion of the meal. One idea is to have students prepare their own side dish for a meal. If there is to be potatoes with the meal students can be given the same amount of potatoes and then they can choose how they want to prepare them; mashed, roasted, fried, potato salad, etc. Then the judging can be based on how many people choose which type or people who taste a style can fill out a scoring sheet to rate that dish.

Another idea would be to have the students participate in a bake off where each student prepares 48 cookies. Then judges could taste each of the different cookies and rank them according to their preferences. This could be done as a fundraiser allowing the public to pay to be judges. The judges would get to eat cookies and money raised could help fund the cooking program. Depending on your facility, needs, and resources of your students, this type of competition could be done at the students' homes with the results brought in.

The idea behind the competition is not to be cutthroat but to create a fun way to motivate students and for them to take ownership of their cooking. Students should be encouraged to learn from their triumphs and pitfalls.

### **Teacher Instruction:**

1. Decide what type of competition you will have.

2. Determine the rules, purchase the necessary ingredients, and create the judging sheets.
3. Decide if there will be a secret ingredient or other theme to the competition.
4. Before the contest starts refresh safety rules with the students and be sure each student understands the requirements and how the competition will be judge.
5. Allow students to ask clarifying questions before you begin.
6. If this is a graded activity the grade should be based on participating, not winning the activity. If you want you can create an award for winning that could be used as an additional motivator.

**Student Instruction:**

1. Safely prepare a dish for a cooking competition following the rules that you are given.
2. Sit back and let the judging begin. Be proud of what you made and be willing to accept constructive criticism to be able to prepare a better dish in the future.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What would you do next time to improve the meal you made?
2. Did you feel that there was enough time to complete the activity?
3. List three things that were enjoyable about participating in the competition.
4. List three things that were frustrating about participating in the competition.
5. What is the role of a sous-chef in the kitchen?
6. Why is plating important in preparing a meal?
7. How difficult was it to include the secret ingredient into the meal?
8. Give suggestions for new secret ingredients or ways to improve the competition.

**Extensions:** Watch episodes of Iron Chef or Iron Chef America; try to recreate the foods prepared on the show. Have students enter into other cooking contests: state/county fairs, company bakeoffs, etc.

**Accommodations:**

**Resources:**

<http://www.foodnetwork.com/iron-chef-america/index.html> Iron Chef America website

<http://www.tv.com/iron-chef-japan/show/16226/summary.html> Iron Chef Japan website

<http://www.lifeintheusa.com/food/cookingcompetitions.htm> Listings of a variety of cooking competitions search the internet for more in your area or find information about entering a nation contest.

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## **Iron Work Chef**

### **General Guidelines**

1. Be Safe. Be careful using knives and other sharp objects, be careful around stoves, ovens, fryers and other hot items. Move quickly but do not run.
2. Think about what you plan is before you start. Take time to write down what you are thinking so you can remember it later. Discuss your strategy with your teammates.
3. Be sure you understand the specific rules for this contest, including how the competition will be judged.
4. Know how much time you have and plan to use this time wisely.
5. Divide the tasks between your teammates to make the most of each person's skills and time.
6. Start with the tasks that will take the longest.
7. When an issue arises, stop think and be creative about solving problems in the kitchen.
8. Evaluate your successes and failures and determine how you would improve in the future.

**Iron Works Chef**

Judging Sheet

Name of Judge: \_\_\_\_\_

**Entry** \_\_\_\_\_

**Taste:** \_\_\_\_\_

(On a scale of 1-10, ten being the best rate the taste add a descriptive word for how the dish tastes.)

**Plating:** \_\_\_\_\_

(On a scale of 1-5, five being the best rate the appearance of the meal include a descriptive word.)

**Originality:** \_\_\_\_\_

(On a scale of 1-5, five being the best rate the originality of the meal include a descriptive word.)

**Total** \_\_\_\_\_ (add up the numbers of each of the above categories)

**Entry** \_\_\_\_\_

**Taste:** \_\_\_\_\_

(On a scale of 1-10, ten being the best rate the taste add a descriptive word for how the dish tastes.)

**Plating:** \_\_\_\_\_

(On a scale of 1-5, five being the best rate the appearance of the meal include a descriptive word.)

**Originality:** \_\_\_\_\_

(On a scale of 1-5, five being the best rate the originality of the meal include a descriptive word.)

**Total** \_\_\_\_\_ (add up the numbers of each of the above categories)

**Entry** \_\_\_\_\_

**Taste:** \_\_\_\_\_

(On a scale of 1-10, ten being the best rate the taste add a descriptive word for how the dish tastes.)

**Plating:** \_\_\_\_\_

(On a scale of 1-5, five being the best rate the appearance of the meal include a descriptive word.)

**Originality:** \_\_\_\_\_

(On a scale of 1-5, five being the best rate the originality of the meal include a descriptive word.)

**Total** \_\_\_\_\_ (add up the numbers of each of the above categories)

### **Unit 3: Learning to Work as a Culinary Arts Professional**

In this section students will explore careers in the culinary arts. Students will practice vocational skills that are useful in all employment areas and skills specific to the culinary profession.

Meet a Chef—*Bring a food professional into the classroom.*

Dress for Success--*What to wear to work in the culinary field.*

On Time—*Ready to Work*

Customer Service--*Learn how to provide excellent customer service in the world of culinary arts.*

Working with the Boss--*How to work well with your employer focusing on employment in the culinary arts.*

Tips--*Learn the math needed to determine if a gratuity is appropriate.*

Dishwashing—*Learn how to wash and sanitize dishes in a commercial kitchen.*

Catering--*Learn how to professionally cater an event.*

## Seed To Table

**Lesson Plan:** Meet a Chef

**Unit:** Learning to Work as a Culinary Arts Professional

**Objectives:**

- Students will learn what is required to be employed in the culinary arts.
- Students will be exposed to a variety of different food service opportunities.
- Students will have reinforced a skill that they have learned by another instructor.

**Modified Curriculum Objectives:**

**Materials:** As needed depending on skill being demonstrated/practiced

**Time:** 1 hour (15-25 Minutes for presentation, 30 minutes plus for activity)

**Vocabulary:** Chef, Maître D', Sous-chef, wait staff, restaurateur

**Background Information:**

Students can learn about employment opportunities directly from people who are doing that type of work. Asking people to come into your classroom can be exciting and educational but has some pitfalls as well. Most people are busy and may not have the time to come to into a classroom. Other people may not feel comfortable presenting with students.

As a teacher it is important to both prepare your students and the presenter for what to expect in the classroom.

It is nice if possible to have the presenter to in addition to giving a brief overview of their job to demonstrate and teach a skill that is important to their profession. If the lesson includes eating food this can be a draw for student interest.

Invite a wide range of different professionals into the classroom so that students can learn from a diverse set of viewpoints and have experience with a wide range of professions.

**Teacher Instruction:**

1. Communicate your expectations for the presentation with the presenter.
2. Ask the presenter if there is something they would like to share with the class. You may need to give them some suggestions you could also ask them to participate in a hands-on lesson that you have already planned.
3. Encourage the presenter to dress in their work uniform.

**Student Instruction:**

1. Students should be reminder to be on their best behavior for outside presenters that are volunteering their time.
2. Students should be encouraged to ask questions that relate to the person’s profession.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What about this job sounds interesting?
2. What about this job seems difficult?
3. What other professionals would you like to have invited to the class?
4. What type of profession would you want to job shadow?

**Extensions:** Go visit professionals in their place of work. Job shadow with various culinary professionals.

**Accommodations:**

**Resources:**

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

**Culinary Arts Professional** –Questions to answer in your presentation.

What is your job?

How long have you worked in this profession?

What made you interested in getting into this type of work?

What types of education and experience are necessary to do your job?

What are the three great things about your job?

What is one thing that you wish you could change about your work?

Is there something you would like to do next?

What do you want high school students to be able to learn from you presentation?

The presentation will be improved if there is something you can demonstrate to the students. There are some suggestions attached. Please talk with me to determine how best to accomplish this presentation.

## **List of ideas a Chef could present**

How to preparing a dish (This can be difficult depending on time and facility constraints.)

How to cut a specific vegetable, or fruit

How to make pasta

How to butcher an animal

How to keep a kitchen clean

How to sharpen a knife

How to use a thermometer

How to develop a menu

How to create a recipe

How to purchase food

How to bake bread

How to frost a cake

How to multiply a recipe

**Culinary Professional Worksheet**

Name: \_\_\_\_\_

Presenter's Name:

Presenter's Job:

What type of education is needed to do this job?

How much experience do you need to have this job?

What do you think would be the most interesting part of this job?

What part of this job would be most difficult for you to do?

Write down a question you would like the presenter to answer.

## Seed To Table

**Lesson Plan:** Dress for Success

**Unit:** Learning to Work as a Culinary Arts Professional

**Objectives:**

- Students will learn how to dress appropriately for the work place.
- Students will learn the reasoning behind work place dress codes.
- Students will learn about the differences between different workplace dress codes.

**Modified Curriculum Objectives:**

**Materials:** Dress Code for specific businesses, Pictures from clothing advertisements/magazines. Pictures of appropriately dress food service workers and other employees.

**Time:** 15-45 minutes depending on activity choice

**Vocabulary:** Uniform, business formal, business casual, kitchen whites,

**Background Information:**

Every workplace has some standard of dress for their employees. In some uniforms are issued or required to be purchased. Other businesses allow for more freedom within a general dress code of business formal or business casual dress. Other businesses require different styles of dress depending on if the employee is meeting the public or working in private. The two main reasons for establishing a dress code are for safety and providing a positive impression.

Safety related dress codes can be put in place for the safety of the employee and/or the safety of customers. Wearing closed toed, non-slip, shoes prevents falls, stubbed toes and other injuries. Avoiding loose fitting or baggy clothing, hair and jewelry prevents tripping, fires, and having items become caught in equipment. Wearing clean clothes helps to control the spread of bacteria and reduces the likelihood of foreign objects entering the food. Trimming fingernails, not wearing nail polish or jewelry eliminates places for bacteria to live on your hands. In food service industry hair should be tied back and covered with appropriate head covering.

To make a positive impression with customers and co-workers it is important to dress appropriately for the situation. As noted, what is appropriate varies depending on the workplace and the role of the employee. In general, clothing should be neat and clean free from stains, holes and frays. Clothing should cover the employee's body and undergarments should not be visible. In addition, clothing should also be free of writing, pictures or symbols that may be offensive to

others. Having a good appearance also requires considering smell, this includes bathing to eliminate body odor and using appropriate amounts of deodorant, cologne or perfumes.

If there are questions regarding dress codes it is appropriate to ask a supervisor. However, if you think an item may not be appropriate you should not wear it. You can also observe what other employees wear and wear similar clothing. If a supervisor mentions something you are wearing is inappropriate try to rectify the situation and do not wear that style of clothing again. You can be terminated for not following an established dress code.

### **Teacher Instruction:**

1. Discuss with students the reasons for different dress codes and the variability of dress codes at different workplaces.
2. Read the example dress code and/or provide specific dress codes from another business. Discuss the similarities and differences between dress codes and the reasons why individual businesses have different policies.
3. Prepare a collection of pictures of people at different careers. Talk with students about for what jobs that person would be appropriately dressed.
4. Have each student cut out clothing items to dress a person for a specific job. You can assign jobs for the student's model or they can pick from a list of employment options. Have students share their models and discuss if the clothing choices are appropriate.
5. When creating a collage the students can work in groups but need to know exactly what type of job the collage will represent. If working in groups all students in the team should agree with what pictures are included on the collage. After the collages are complete discuss if the clothing choices are placed on the correct boards. You could also do this activity without pictures and create a list of clothing items
6. With some items there will be debate about the appropriateness of certain items. This is a good time to talk about the difference between different companies and that the company has the right to require certain clothing.

### **Student Instruction:**

1. Look at the collection of pictures. See if you can determine what job the person is ready to do.
2. Create a model of a person who is dressed for work in a specific workplace and someone who is not ready for work. You can create these models by cutting out pictures of the different clothing items and gluing them into the shape of a person. Be sure to include all items necessary.
3. Create two collages as an individual, small group or entire class. One that includes clothing appropriate for a specific workplace (i.e. working in the kitchen) and one that contains clothing that is inappropriate.
4. Complete worksheet.

### **Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What are some safety reasons for dress codes?
2. Why can cooks, servers, and dishwashers wear different clothing in the same restaurant?
3. What type of clothing would you expect someone to wear in a fast food restaurant?
4. What would you do if the person serving your food had on clothes that looked like they had just changed the oil in their car?
5. How is the clothing of employees correlated with the price of the food?
6. Why do kitchen workers have to follow a dress code if the public never sees them?
7. List the benefits of wearing a uniform.
8. Can an employer require an employee to wear a certain color of pants?
9. Can the dress code specify a specific brand of shirt?
10. Do employers have the right to require you to buy uniforms or pay for cleaning?
11. Who decides what is offensive?
12. If you were running a restaurant, what would your dress code include? Explain the reasons behind your choices.

**Extensions:** Have a fashion show of appropriate clothing. Have students write a dress code for a place of employment.

**Accommodations:**

**Resources:**

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

Name: \_\_\_\_\_

### Clothing in the Kitchen

(1) Circle the appropriate clothing (2) Draw a line through clothing that is inappropriate (3) Leave unmarked items that you are unsure about or if you feel it depends on the situation.

Apron	Watch	Skirt	Muscle shirt
Tennis shoes	Belt	Hawaiian Shirt	Rings
High heels	Dangling Earrings	Medical Alert Bracelet	Untied shoes
Socks	Blue Jeans	Slippers	Plastic Gloves
Tank Top	Khakis	Plain t-shirt	Winter Coat
Concert T-shirt	Flip Flops	Company Logo Shirt	Sagging Pants
Polo shirt	Button down shirt	Shirt advertising alcohol	Pajamas
Hat	Oil stained shirt	Pants with holes in knees	Eyeglasses
Tie	Dress	Strapless dress	Shorts

List 3 reasons a dress code ensures the employees safety.

List 3 reasons a dress code ensures the safety of customers.

List 3 reasons why an employer enforces a dress code that are not related to safety.

### Example: **Food & Nutrition Services School - Staff Dress Code**

We are all professionals and we all want to be thought of and treated as such. How we appear to our customers is how our customers perceive what we serve them. How we appear to the school staff and the community is how they perceive our program.

#### **Dress Standards**

- The “TEAM” look is what is expected. Each person in a kitchen must look like a member of our Food & Nutrition Services Team.
- All team members are required to wear royal blue polo shirts while working. These polo shirts are provided by the Food & Nutrition Services Department.
- The standard uniform (polo shirt, smock/apron & visor with hair net) will be worn during meal service periods each day.
- The only exception will be during an individual school’s casual or school "colors" day. Solid colored T-shirts or Polo style shirts are acceptable on these special “school days”. T-shirts must be plain or tie into the Food Service Program or school functions or School District Eleven logo (i.e., DARE, Doherty Spartans, etc). No T-shirts with tobacco, alcohol or profanity. No form fitting or “see through” garments are to be worn.
- Pants, skirts, culottes, or shorts must be black, navy blue, khaki or white.
- Shorts and skirts must be hemmed and no shorter than 4” above mid-knee while standing.
- Undergarments should not be visible from underneath.
- No sweats or other athletic clothing, stirrup pants, spandex leggings or biking shorts.
- Denim pants or “blue jeans” are not allowed and may not be worn except on school meal promotions (i.e. barbecues).
- Hosiery, either white or black must be worn with proper shoes. Pantyhose/nylons are not required.
- Shoes must be closed toe, closed heel, slip resistant, black or white and kept clean.
  - 1” heel maximum.
- Employees must be clean and properly protected against body odor.
- Male employees must be clean-shaven, or have neatly trimmed beards or mustaches.
- All clothing must be clean and unstained. White colors must be kept “sparkling” white.
- Employees working in the Catering Department will follow dress guidelines designated by the Catering Manager.
- Garry Berry Concessions employees will be issued shirts to be worn while working.
- Considering the individual financial impact these guidelines present, each member of the kitchen must meet these guidelines within the first two (2) months of employment.

#### **Hair Restraints**

- In accordance with the El Paso County Health Regulations 3-301B and District 11 HACCP guidelines, employees shall use an effective hair restraint (hair net) to cover hair to prevent the contamination of food or food-contact surfaces.
  - The hair net is required to be worn at all times while in the kitchen and serving areas.
  - All employees are required to wear visors over the hair net during serving. These are supplied by the Food & Nutrition Service Department, as part of the service uniform. Hair must be neatly pulled back. If your hair is long enough to be restrained in a pony tail, then it should. For longer hair in pony tails, it should be braided or positioned in a bun.

#### **Jewelry**

- Jewelry must be limited to a single pair of post earrings (no larger than a dime, cannot dangle in any way) and wedding bands. Other jewelry, including watches, may not be worn during production and/or serving times. Medical bracelets are allowable. If non-smooth wedding rings are worn they must be covered with a glove.

#### **Fingernails**

- Fingernails must be kept short and clean. No artificial nails or nail polish is allowed.

## Seed To Table

**Lesson Plan:** On time—Ready to work

**Unit:** Learning to Work as a Culinary Arts Professional

**Objectives:**

- Students will learn importance of being on time and prepared for work.
- Students will understand what traits employers value in their employees.
- Students will learn how to keep a job.

**Modified Curriculum Objectives:**

**Materials:**

**Time:** 15 minutes for discussion, 45 minutes for role plays.

**Vocabulary:**

**Background Information:**

Often high school students will find a job and within two weeks leave that job. Often reasons given are; “The boss didn’t like me,” “I didn’t get enough hours,” “My co-workers were jerks,” “I didn’t like the work” or something similar. If you dig deeper into these responses you may find that the student called in sick, was late for work, or didn’t want to do the tasks assigned by the employer.

This lesson will encourage students to think about these situations especially from the point of view of the employer. Once students can understand what an employer finds valuable they can then work to make changes in their work habits to be able to maintain a job.

Most employees who are let go within the first month are released because they are late or unprepared for work. Employees who do not know how to do certain tasks can be trained by employers but employees who are not present are viewed as a liability. Many employers in retail and food service with hourly workers will not actually fire an employee but will reduce the employee’s hours to a minimum that will cause the employee to quit.

Showing up on time for every work shift is the number one thing employers look for in a new employee. This is because they hired someone to do a specific task and if the employee does not arrive they have to do that task themselves when they already have their own work to do.

Students will often come up with excuses (some legitimate others not) for why they were late or did not arrive to work. This is often the hardest thing for students to understand is that even if they have a legitimate excuse the employer looks at this in a negative light especially in the first

month of employment. Also if the legitimate excuses are in combination with illegitimate excuses it paints the employee in a negative light.

Secondly, if a student is on time for their shift but not prepared. (Has to go to the bathroom, put away their personal items, find their uniform, call their mom, etc.) Then the employer will likely view this employee as late. A good rule to think about is to be early is to be on time but to be on time is late. In making plans for arriving to work especially the first day is to plan to be 15 minutes early to work. Once you have been working at a job for awhile and you know exactly how long it takes to get to work you could adjust your arrival time. However, it is important to remember that a traffic light, train or accident may slow you down on the way to work and it is best to be prepared for these inevitabilities.

Calling in to work or switching shifts is often allowed in the hourly food service workplace. Each place of employment has different policies regarding these issues and you should familiarize yourself with specific policies. In general employers want to know ahead of time if you will be late or not coming to work. However, just calling in does not alleviate the responsibility of the worker. Employers keep track of how often employees call and will limit the hours of employees who call more often. It is best to avoid having to call in the first month and if the need arises after that to limit calls for being late to less than once a month. Also to call in after the shift has begun does little to help the employer; an employee needs to call as soon as they know there is a problem.

When switching shifts with another employee it is important that the switch is made appropriately so that the employer knows who should be coming if neither employee shows up. Employers also watch which employees shift and how often. Employees that accept others shifts, one get more hours and are seen as more valuable employees to the company.

The reality is employers hire employees to work and if the employee is there they can work and if they are not they cannot.

**Teacher Instruction:**

1. Start a discussion with students about jobs they have had in the past. Discover the high and low points of their employment. Have students talk about why their employment ended.
2. Have students put themselves in the employer's shoes, to work through workplace situations.

**Student Instruction:**

1. Think about your last job. Why did you quit? What were the problems you had at work?
2. Imagine you are the boss. What do you want your employees to do?
3. Create a list of the most important things employees can do.
4. Discuss the work situations from the point of view of the employer.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. Why do employers want their employees to come to work on time?
2. What do you think is more important, coming to work on time or knowing how to do all the tasks assigned?
3. List all the legitimate reasons to be late to work.
4. How can you switch a shift if you know you cannot work when you are scheduled?
5. Why do employers cut employee hours instead of firing them?
6. What is the big deal with being 5 minutes late?
7. If I cut vegetables twice as fast as the other prep chef can I have a 20 minute break?

**Extensions:** Have the students develop situations from their work experience, talk about what happens when the supervisor is late.

**Accommodations:**

**Resources:**

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## **You're the Boss.**

In the following situations discuss what you would do if you were the employer. Discuss both what your feelings are, what you would say to the employee and how you would try to change this situation.

1. On the first day of work a new employee rushes in right on time. The next day the same employee arrives 2 minutes late. On Friday that week the employee is consistently arriving 5 minutes after work begins.
2. Your new line cook hasn't shown up to work. A half hour after the shift began he calls to say, his car broke down and he won't be able to come to work today.
3. Your new cashier arrives at 8 AM for her first shift that starts at 8. Then she goes to hang up her coat, at 5 after she goes to the bathroom, when she come back she makes a phone call to make arrangements for her afternoon ride home. At 8:25 she has her register set and ready for the day.
4. Bobby is listed on the schedule to work, when you call him he says he switched with Carlos and he can't come in. When you call Carlos he says that Bobby never talked to him but he can be there in 20 minutes if you need him.
5. Your new dishwasher has been working really well. On Saturday morning she calls in a half hour before her shift to say she is sick. Then every Saturday for the rest of the month she also calls in sick.
6. Victor has been working at your restaurant for over a year. He has never missed a shift. He calls Thursday afternoon to say he is feeling sick and that he has called Julie and she will be taking his shift that evening.
7. Alyssa arrives for work ten minutes before her shift begins and she always has on a clean uniform. She comes into the kitchen and asks what she can do to help as soon as she arrives.
8. Frankie makes the best cookies that you have ever had. She also takes breaks outside every hour of her shift for 15 minutes. During this time you need her to clean her work station but she refuses.

**On Time and Ready to Work.**

When should you arrive to work if your shift starts at 4 PM?

What do you need to do before you are ready to work?

List three reasons that are acceptable to miss work

When should you call you employer if you are not going to be able to come to work for an assigned shift?

List three things you can do to ensure you arrive to work on time.

## Seed To Table

**Lesson Plan:** Customer Service

**Unit:** Learning to Work as a Culinary Arts Professional

**Objectives:**

- Students will learn how to greet and welcome customers.
- Students will learn the importance of good customer service
- Students will learn how to handle complaints.

**Modified Curriculum Objectives:**

**Materials:**

**Time:** 1-2 Hours depending on how many situations are acted out

**Vocabulary:**

**Background Information:**

Employees' ability to provide good customer service can make or break a business. Repeat business and word of mouth advertising are the most efficient and easiest ways to maintain a successful company. It is the employer's responsibility to train staff on how employees should interact with customers. However, it is the employees that have direct day to day contact with the public and they are the face of the business.

Good customer service starts with being prepared and ready to work. An employee should be clean and dressed appropriately for the job. Then the workplace needs to be clean and prepared for customers to arrive. This includes completing all of the opening tasks to be ready for the day and to make sure that the doors open on time. Opening tasks also include insuring that all the closing tasks were done the night before. Having the business be inviting for customers is the first step in providing good customer service.

Secondly, customers need to be greeted when they arrive. This greeting can vary but should be directed to the customer as they arrive. Examples include: Good Morning. How may I help you? One moment, then I can help you. I will be right with you. Hello, how are you doing today? Even making eye contact and a smile can make a person feel welcome in the store. These simple greetings let the customer know they are important to you and you are happy they are there. However, if a customer feels ignored they will be less likely to return to your business. If you cannot help a customer right away let them know when you will be with them. Think about what tasks you are doing and if you could stop in the middle to help a customer. Be sure that what you are doing would be perceived by the customer as part of your job. Customers do not like having

to wait but dislike it even more if they feel the employee is doing personal tasks while they are waiting. This is the main reason to limit or ban the use of cell phones in the workplace.

After the initial greeting, customers may need additional help. To provide good customer service it is important to check in with customers at least one more time. By asking “How are you enjoying your food?” or “Do you need anything else?” You are building a positive relationship and allowing the customer an opportunity to raise any issues that would be easier to correct right away.

It is also possible to go beyond good customer service and provide excellent service. There are several ways you can achieve excellent customer service. If you recognize a repeat customer, knowing what their typically drink order is or if they always have a muffin to go, will make the customer feel appreciated. In addition, being able to recognize what a customer needs before they ask is also going above and beyond the service required. Examples include providing a high chair, giving them extra napkins, refilling a water glass or bringing them a new piece of silverware if their spoon falls on the ground.

Answering questions and dealing with complaints are two other important parts of customer service. When a customer asks a question tell them an honest answer giving as much information as possible. If you do not know the answer to a question you can let the customer know that but always include that you will find that information. If you say you will find the information for the customer, then you need to do that. One example that customers may ask what an ingredient item is or ask what is in a specific dish. Before beginning your shift if you are prepared to answer these common questions you will be able to provide better customer service.

If a customer has a complaint, try your best to remedy the issue. In general when dealing with a complaint it is important for the employee to stay calm, apologize, and resolve the issue or find someone who can. Sometimes customers will become irate and yell or swear at an employee. This is an extremely unpleasant part of the job and it should not happen often. In order to diffuse the situation, stay calm and acknowledge that you will help resolve the problem. By engaging an irate customer on their level you would be escalating the situation and making it more difficult to correct the original issue. When you apologize this is not necessarily admitting fault but that you are sorry that they did not enjoy their meal or the type of music that is being played. People feel better when they feel like they have been listened to and saying sorry is a good way to show recognition that someone has been hurt in some way. If there is an easy way to correct the situation then do that immediately. If the problem is something you cannot fix find a staff person who can correct the problem. When customers have their problems resolved they do not remember their initial complaint but how the issue was resolved.

When a customer is leaving it is important to thank them for coming. If customers do not come to a business then the company would close down and the employees would lose their jobs.

Customers are the most important resource of a company and good customer service is the best way to keep having customers come back.

**Teacher Instruction:**

1. Discuss the importance to a business of good customer service.
2. Model ways to provide good customer services.

**Student Instruction:**

1. Create a list of ways to provide good customer service.
2. Role play customer service in different situations.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. Is the customer always right?
2. What should you do if someone has a complaint?
3. Create a list of extra things you could do to improve a customer's experience.
4. Whom should you blame if a customer had a bad experience?
5. What is the correct response if someone asks you a question you do not know the answer to?
6. What are several steps you can take to resolve a complaint?
7. Why is the appearance of the store important to customer service?
8. What do customers want when they come into a shop?

**Extensions:** Go to different businesses watch customer service in action. Have different employers talk about why customer service is important.

**Accommodations:**

**Resources:**

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## Customer Service Situations

Role play or describe what you would do in the following situations.

1. A customer walks in the café while you are wiping down tables.
2. Jon who orders a large coffee and muffin every morning enters the café.
3. A customer with two young children orders lunch.
4. A customer asks if the coffee cake contains nuts.
5. A customer accidentally knocks his coffee cup on the ground spilling half of a cup of coffee.
6. A customer says that his sandwich is not cooked enough.
7. A customer asks what a Jerusalem Artichoke is.
8. A customer is irate that they have been waiting for their food for 30 minutes.
9. A customer leaves the café after eating their lunch.
10. Two customers have been sitting at a table in the café for an hour.
11. A customer says that you did not give him correct change.
12. A customer says that her total cost for her meal is more than the menu board said it should be.
13. A customer orders a root beer, but there is no more in the cooler.
14. A customer orders orange juice, but there is none defrosted.
15. A customer asks where the bathroom is.
16. The bus tub is overflowing with dishes.
17. There are no cups next to the water pitcher.
18. A customer with muddy shoes leaves lots of dried dirt underneath a table.
19. A customer asks if the tomato bisque is any good.
20. A customer says that her sandwich is excellent.

## **Seed To Table**

**Lesson Plan:** Working with the Boss (Employee/Employer Interactions)

**Unit:** Learning to Work as a Culinary Arts Professional

**Objectives:**

- Students will learn how to create and maintain a positive interaction with their employers.
- Students will learn about ways to make positive impressions and avoid negative actions.

**Modified Curriculum Objectives:**

**Materials:** Copies of Employee skills and You are the Boss.

**Time:** 1 hour

**Vocabulary:** Ethical, Self-Starter, Critical Thinking

**Background Information:**

Employers want to have employees who come to work and do the tasks expected of them when they are at work. For most employers the first and most valuable skill is that the employee is reliable, shows up on time and consistently. Secondly, employers are looking for employees who are pleasant, especially with customers but also with co-workers. Thirdly the employer wants the employee to have the skills necessary to do the job that is required. Every employer is different in terms of how much leeway they give employees. However, by recognizing what employer want employees can strive to meet this goals and gain longevity and promotion in the work force.

To be on time is the most important requirement for an employee. Employers need workers who can be reliable to show up on time and ready to work. In most positions starting with an hourly wage employers create a schedule to insure that the needs of the business are met. If there are fewer than needed or no employees on the job then business is at a standstill and money is not being made. While hourly workers are only paid for when they are at work an employee that is late, does not come to work or leaves early is often dismissed from the position.

In the culinary field having employees who cook arrive late may mean that the meals they are preparing are late. When the servers or cashiers are late the public cannot be served. If the dishwasher is late this can cause backups that create more work for other people.

Creating a pleasant work environment starts with having employees who are respectful of each other and the customers. While loving what you do makes it easier to enjoy your job it is easier to enjoy your job if your are happy even if your only doing the work for a paycheck. If you have direct interactions with customers it is important to be pleasant and respectful of them. It is true

that the best form of advertising for a business is through word of mouth. If customers have a pleasant experience at your restaurant they will come back and tell their friends. In the same way if a person has a negative experience this will cause the business to lose not only that customer but possibly the friends of that customer as well.

To be pleasant with customers things you can do are: offer a greeting as the person enters the restaurant, ask if they need any help, and be attentive to the needs of the customers. If you need to do something else or help another customer communicate that to the first customer, that being said in general you want to help the customers as they come in and not do something extra or nonessential when working with a customer. Use complete sentences, use please, thank you, your welcome, have a nice day, and come again. Do not use any swear words, words that replace swear words or slang. If there was a mistake say sorry and work to make the situation better. Do not complain about your job to customers or to another employee where customers can hear you.

When working with other people it is nice to build a positive rapport with your coworkers. This can start with a simple good morning, hello, or how are you. Learn your coworker names and use them when you have a question. Secondly, by helping coworkers with tasks you can build a positive relationship. This can be as simple as picking up something they dropped, filling the water glasses at their table or bringing them a tool they request. By building these relationships employees are more likely to help you when you need assistance. Positive relationships with your co-workers means your employer sees you working with others well and people do not have negative complaints about you to bring to the boss.

In most situations there is more than one person who could be considered the employer. This can sometimes be difficult to figure out who everyone is and what the relationships are. Most businesses have an owner or small group of co-owners. Depending on the business you may have a lot or no interaction with the owners. These are the people that you should listen to first. Their decisions can override all other employees' decisions. This can be difficult if there are multiple owners with conflicting directions. In these instances it is best to clarify that you heard the direction and state what you believe the other owner said.

In addition to owner's many businesses have several managers and assistant managers. While typically one of these people is your direct supervisor it is important to remember that each one of them is above you in the business hierarchy and negative interactions could affect your continued employment. Any positive interactions you have with other supervisors can provide opportunities for promotion and positive comments being relayed to your direct supervisor.

Businesses also want employees who have the skills necessary to complete the tasks efficiently and correctly. However, it is not necessary that you have all these skills when you start the job. Employers recognize employees may need to learn a skill that they have not been exposed to yet. In this area employers want employees who can learn new skills and become more efficient over time.

Employers are paying their employees to work and not to spend work time on personal business. This means that an employer does not want an employee to spend time talking on the phone, playing games, or having non business related conversations that conflict with the work that needs to be done. This can mean to turn off a cell phone and not use it during the work shift. In addition, making sure that you are continuing to complete the task you are doing and not letting conversations get in the way of the work you are doing. This can be especially important when working directly with customers. Customers do not want someone who is assisting them to be taking personal calls or talking with other staff.

Find something to do when you are at work. Employers do not want to pay their staff to sit or stand around waiting for something to do. If there is not a specific task that you need to do ask a supervisor what you should do or start by finding a need and taking on that task. This could be wiping down a counter or a table, restocking items, washing dishes, taking out the trash or sweeping the floor. If every time an employer sees you, you are working then they want to keep you as an employee. However, if the employer sees an employee leaning or sitting this puts a negative impression in the employers mind.

Do not steal. This should be obvious, however most business loss is due to employee theft. When there is a theft, employees will be the first suspects. If you are caught stealing or even just suspected of stealing you may be fired. Stealing is not limited to taking money from the business but also eating or taking items without permission or for personal use.

Do not assume if one employee does something then it is acceptable. There are several reasons why you should not just do what other employees are doing. One your example employee may be on the way to being fired. The owner or manager may take what seem to be personal calls and that can be fine for them but not for their employees.

If you are asked to do a specific task you should do that task, unless these directions conflict with other directions. If that is the case find clarification from your supervisor. Try not to get upset with coworkers or supervisors. This can be difficult but sometimes what you say in anger cannot be taken back.

If work conditions are unacceptable for you, in a calm way try to resolve any conflict. Check with other co-workers or the employee handbook about how to resolve conflicts. If it is the owner that you feel you cannot work for then you probably need to find new employment.

**Teacher Instruction:**

1. Discuss with students positive and negative interactions with employers.
2. Discuss ways to change the negative situations.

**Student Instruction:**

1. Create a list of what you think employers want from their employees.

2. Write definitions or examples for the skills listed on the “What Employers Want” sheet.
3. Pretend you are a supervisor determine what you would do in different situations.
4. Create a list of actions you can do to be a better employee.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. Why is being on time so important for businesses?
2. Why are interpersonal skills so important to employers?
3. What types of skills are easier to teach new employees?
4. What should you do if two managers ask you do different things?
5. When you are on the job whose instructions do you need to follow?
6. What is more important knowing how to make a latte or knowing how to make a person feel welcome into a café?
7. What should you do if you see something happening that is illegal? Against company policy?
8. Why is employee theft a big issue?
9. When is it ok to call your boyfriend at work?
10. Create a list of tasks that can be done on your job when there are no other tasks to be completed.

**Extensions:** Meet with different employers to talk about what they value in employees.

**Accommodations:**

**Resources:**

<http://www.arp.sprnet.org/curric/scans.htm> a list of job skill from the US Department of Labor.

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## **What Employers Want**

Name: \_\_\_\_\_

This is a short list of skills and characteristics that employers have stated they want to see in an employee. For each skill write a description of what the skill would look like in an employee.

Good Communication Skills

Self Starter

High Ethical Standards

Good People Skills

Can Follow Instructions

Critical Thinking Skills

Team Player

## **You are the Boss!**

What would you do in the following work situations?

1. The dishwasher has a large stack of dishes waiting to be washed. You notice he is continually walking out to the service area to bring out two clean cups and then slowly returning to put away more dishes.
2. A customer approaches the counter the cashier is talking on the phone to her mother about an important personal issue. The cashier waits five minutes before hanging up the phone and asking the customer if they need help.
3. While a customer is putting cream in her coffee the two employees behind the counter are talking about how an employee was fired the previous week.
4. Whenever you see the cashier if he is not helping a customer; he is rolling silverware wiping down tables, filling the salt and pepper shakers or carrying the tub of dirty dishes back to the dishwasher.
5. The prep cook takes a bathroom break. When you walk down the hall you hear her arguing with her boyfriend on the telephone.
6. Several cookies are not accounted for at the end of the shift. The cashier was seen talking to a group of his friends earlier in the day.
7. The till is short by twenty dollars.
8. Every day the dishwasher arrives 3-5 minutes late for her shift.
9. Servers are supposed to wear black pants. One server always wears blue pants even when he was reminded not to.
10. The prep cook finished chopping all the onions and carrots for the soup. He is now watching a video on his cell phone.
11. The dishwasher has finished washing all the dishes and while waiting for more dishes she sweeps the floor and takes out the trash and recycling.
12. The prep cook does not remember how to cut a pineapple he asks the head cook how he wants it done. After being shown twice he completes the rest of the fruit.
13. The prep cook takes a bathroom break whenever it is time to chop onions.
14. The bakery chef asks the dishwasher to wash some pie tins. The dishwasher says he has other dishes to wash and will get to them later.
15. The head cook is constantly yelling and swearing at the prep cooks to work faster and more accurately.
16. A waiter comes back into the kitchen with a meal that a customer returns. He tells the cook that he obviously does not know how to cook a chicken correctly.

## Seed To Table

### Lesson Plan: Tips

**Unit:** Learning to Work as a Culinary Arts Professional

### Objectives:

- Students will learn the purpose of tips or gratuity.
- Students will learn how to calculate tips.

### Modified Curriculum Objectives:

**Materials:** Tip worksheet

**Time:** 1-2 hours

**Vocabulary:** Gratuity, tips, percent

### Background Information:

In some professions tips or gratuity are how certain employees make their money. In the Culinary Arts, wait staff, bartenders, and bussers often are paid less than minimum wage because there is an expectation that these positions will receive tips in addition to their regular wages. In Wisconsin the standard minimum wage is \$7.25. However, for tipped employees the base wage is \$2.38. The rest of the wage is supposed to be covered by tips.

The amount of tips is supposed to be reported as part of your taxable income. If over the course of a pay period an employee's tips and base wage do not exceed the minimum wage, then the employer is required to cover the difference. While many employees underreport their tips, this is against the law and if employees consistently fall below the minimum with combined wages they will probably be let go. Tips are reported to your employer who sometimes keeps the tip before adding it to your wages in other cases the employee keeps the cash tips as soon as they are received. If the tip is on a credit card the employer will add those tips to your paycheck.

Depending on your employer some set up receiving tips differently. In some restaurants, tips are placed in a communal account and then shared between the entire tipped staff. In other locations the tips are collected by the wait staff and then a percentage are shared with bartenders, bussers and sometimes cooks. In general managers are paid above minimum salary and do not receive tips.

In some countries tips are not expected and can be viewed as an insult. However in the United States it is generally expected for customers to tip between 10-25 percent of the bill at full service restaurants or bars. This amount can be dependent on the experience or personal preference of the customer. It is often recommended that if you have a bad experience at a

restaurant not to forgo the server's tip but to complain directly to a manager. This will allow the restaurant to correct any mistakes that were made and for employers to know what their employees are doing. To just not leave a tip or leave a very small tip may prove a point to a poor server but more than likely the employee will just think that the customer forgot or is a poor tipper as oppose to being a comment on the service received.

Some restaurants have a policy of adding a gratuity to the bill of large parties. This insures that the gratuity is paid but can also mean that the customers do not tip over the required amount. Other restaurants will place suggested tip amounts on the bottom of the bill.

In general, tipped employees have direct customer interactions and work with several customers throughout a shift. These employees can also be required to do other work which is generally not tipped; folding napkins, wiping tables, or mopping floors. As long as the non-tipped work is less than 1/3 of the total hours for the employee then the employer can continue to pay the employee the lower base wage.

Studies show that servers who touch customers on the shoulder, look customers in the eye and provide candy with the bill receive larger tips. In general people tip higher if the server is friendly, the food was good, and the overall experience was pleasant.

If you are a tipped employee it is important to understand how tips are calculated and to understand what your paycheck will be at the end of the pay period. As a customer of restaurants where tips are expected it is important both to be able to figure what a reasonable tip should be as well as understanding that the employees are counting on tips to supplement their incomes.

**Teacher Instruction:**

1. Discuss with students the difference between tipped and non-tipped employees.
2. Have students figure out different percentages of tips and to think about questions related to tipping.
3. A quick way to find 10 percent of the bill. Round to the nearest dollar. Remove the last zero. This is 10 percent for 20 percent double. 15 percent is the midpoint between 10 and 20.
4. Another estimation method that some people use is to double the tax and round up. If the tax of the bill is between 5.5 and 8 percent this will give you a tip of 11-16 percent.
5. Use a calculator on a cell phone to multiply the total bill before tax by .20 (for 20 percent tip).
6. Use a sheet of paper to do the same calculation.
7. In general it is important to get close but does not have to be exact.

**Student Instruction:**

1. Determine what the proper tip amount should be.
2. Discuss different tipping situations.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. Compare a minimum wage job to a tipped job with a lower base wage.
2. What would you do if a customer did not leave you a tip?
3. Is there any time when it is appropriate to not tip a server?
4. Why do employers not pay their wait staff the minimum wage?
5. List some ways that a server could increase the size of their tip.
6. Why do you not include the tax into the total of the bill before you figure the tip?
7. What happens when an employee does not report their tips?
8. Why do some countries not have a culture of tipping at restaurants?

**Extensions:**

**Accommodations:**

**Resources:**

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## Tips

Name: \_\_\_\_\_

Estimate a 10, 15, and 20 percent tip on the following bills.

Bill	Ex. \$23.44	\$57.67	\$112.13	\$34.84	\$83.56	\$13.25
Tax 5.5%	\$1.29	\$3.17	\$6.17	\$1.92	\$4.60	\$0.73
10%	\$2.34					
15%	\$3.51					
20%	\$4.68					

Determine the tip for the following bills for different percentages. Then write the total amount.

Show your work. Formula:  $\text{Bill} \times \text{percentage} = \text{Tip}$  +  $\text{Bill} = \text{Total}$

Example: 18% of \$55

55	\$55.00
<u>x.18</u>	<u>+\$9.90</u>
4.40	Total \$64.90
<u>+5.50</u>	
Tip 9.90	

17% of \$100

21% of \$45

16% of \$20

25% of \$5

18% of \$37

Estimate the percentage when someone leaves a \$23 tip on a \$100 bill. Formula:  $\text{Tip}/\text{Bill} = \text{Percentage}$

\$3 tip on \$10 bill

\$5 tip on \$50 bill

\$5 tip on \$25 bill

\$15 tip on \$50 bill

\$10 tip on \$40 bill

### What is the better tip?

Circle which situation provides a better tip for the server. Be prepared to explain your answer.

1.     A. \$5 tip on a \$22 bill  
       B. \$10 tip on a \$90 bill
  
2.     A. Person orders a coffee sits for an hour leaves a \$2 tip  
       B. Person order a coffee to go leave a \$1 tip
  
3.     A. Bill of \$100 has included a %18 gratuity  
       B. Bill of \$100 leaves a \$25 gratuity
  
4.     A. Person orders a \$10 meal sits for 30 minutes leaves a \$2 tip.  
       B. Person orders a \$10 meal sits for 1 hour leaves a \$3 tip.
  
5.     A. Party leaves a large mess at the table and a \$10 tip.  
       B. Party stacks their used plates neatly with an \$8 tip.
  
6.     A. \$20 tip on an \$80 bill  
       B. \$40 tip on a \$120 bill
  
7.     A. Person is rude to the waiter leaves a \$20 tip.  
       B. Person is pleasant to the waiter leaves a \$15 tip.

## Seed To Table

**Lesson Plan:** Dishwashing

**Unit:** Learning to Work as a Culinary Arts Professional

**Objectives:**

- Students will learn the basics of dishwashing in a commercial setting.
- Students will learn the value of knowing how to run a dishwasher for employment purposes.
- Students will learn about sanitary issues surrounding the dishwashing.

**Modified Curriculum Objectives:**

**Materials:** Lots of dirty dishes, dishwashing station.

**Time:** Overview 15 minutes, Days of dishwashing fun.

**Vocabulary:** Manual Washing, Mechanical Washing, sanitizer

**Background Information:**

The dishwashing station is often the first place new hires find themselves at in the kitchen. While some may consider this a thankless job it holds some major responsibilities. It is estimated that about 10 percent of food borne illnesses are caused because of inadequately cleaned and sanitized utensils. In addition to food safety, a customer's experience is severely downgraded when they encounter unclean dishes.

By learning how to clean and sanitize dishes correctly you can build a positive relationship with cooks and servers. These other employees can help make your job easier and provide you with opportunities to move up in the kitchen hierarchy. It is also valuable for other kitchen workers to know how to run the dishwasher to help in times of need and to make things work smoother.

While it is most important that the dishes are cleaned and sanitized correctly, speed is also important. As a dishwasher you should work as fast as possible while ensuring clean dishes and not hurting yourself or the dishes. It is important that both the cooks and the servers are not prevented from doing their jobs because of a lack of clean dishes. Also if someone asks for something to be washed that he/she needs move this to the front of the line and wash as soon as possible.

In addition to cleaning the dishes the dishwasher also puts the dishes away where they can be found by others. Having the knowledge of what items are and where they go is an important part of being an effective member of the kitchen crew. If you do not know what an item is or where it

goes ask someone where it should go. It is also helpful to remember this information so that if someone else comes looking for a specific item you will know where to direct them.

The information in this lesson is general and will be similar to most commercial settings. It is important to be trained on the specific dishwashing policies of each different operation where you work. Ask questions and get clarification so that you can do the best job possible.

In a commercial setting it is important both in terms of preventing illness and maintaining a clean facility requires you to have a good dishwashing system and sanitizing station in place. Most restaurants have both a 3 tub sink for manual washing of larger cooking utensils and a mechanical washing station for other dishes. Both types of stations require a person to scrape food particles off of dishes, proper sanitizer, and a place for dishes to air dry.

The three tub system has a wash station with warm water and detergent to scrub all food particles off of the dishes. The second station is a rinse in clean water. In the third tub dishes are placed in a sanitizing solution. This is often a bleach solution of 50-100 ppm but could also be quaternary ammonia (200 ppm) or iodine (12.5-25 ppm). Check how your specific location sanitizes dishes and what type of test strips are used to ensure proper sanitizing. Dishes in the commercial setting need to air dry. Dishes that are dried with a towel are no longer sanitized.

When using a mechanical washing machine it is important to scrape and rinse all of the food off of the utensils before they enter the machine. When dishes are racked they need to be placed properly so that the spray can reach the dishes. In general place like dishes together in specific racks. Plates and bowls are placed upright on racks. Glasses are placed upside down in racks. If the glasses are lighter plastic it may be necessary to put a rack on top of the first rack to prevent the glasses from turning over.

Silverware should be run through the dishwasher twice after it has soaked in warm water. The first time it should be placed in a flat rack and run through the machine. For the second run the silverware should be placed in an upright silverware rack and run through the machine again. Special care should be paid to forks as the tines often hold food.

Larger and other items can be placed upside down on flat racks. Larger bus tubs or cutting boards may go through the machine without a rack. The machine heats water to above 180°F and may have a chemical sanitizer as part of the machine. These commercial machines should not be referred to as dishwashers but as dish sanitizers. Again dishes should be left to air dry.

When dealing with dirty knives it is important to not place sharp knives in soapy water or under other dishes. This is necessary to prevent possible cuts. Also knives with wooden handles should not be left to soak in water or run through a mechanical washer as this can damage the wood.

Learning appropriate dishwashing skills keeps the kitchen safe and clean. It also allows you to learn about the inner workings of the kitchen. A good dishwasher can quickly move into other culinary jobs by showing exemplary work skills.

**Teacher Instruction:**

1. Talk with students about the importance of safe dishwashing.
2. Discuss the benefits of starting in the kitchen as a dishwasher.

**Student Instruction:**

1. Demonstrate how to use a three tub manual wash station.
2. Demonstrate how to properly rack and run dishes through a mechanical wash station.
3. Show how to test for proper sanitizing chemical levels.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. List reasons a restaurant needs to have a good dishwasher.
2. What is the purpose of having a sanitizing solution?
3. What are the differences between washing dishes in a home setting and washing dishes in a restaurant?
4. Why should you not use a towel to dry dishes?
5. What lives in a sponge or wet towel?
6. What should you do when you are washing something that you do not know what it is?
7. List precautions that should be taken with knives.
8. What is the importance of having the dish water at a high temperature?
9. What should you do if you are burned or cut on the job?
10. What types of foods or other materials need to be scrubbed harder to remove?

**Extensions:** Wash more dishes

**Accommodations:**

**Resources:**

Module 4: Utensil Washing Safe Food Crew Madison Department of Public Health

[www.safefoodcrew.org](http://www.safefoodcrew.org)

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**

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**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials**

## **Manual Washing Station**

Using a 3 tub sink the first sink is for washing, then rinsing and finally sanitizing.

1. Scrape all leftover food products off of dishes.
2. Wash in first sink with hot water and detergent. The water in this sink should be at 110°F. The dishes should be completely clean before they leave this sink.
3. Rinse dishes in clean water in the second sink.
4. The third sink is for sanitation. There should never be any dishes left in the third sink. Use an appropriate sanitizer.
5. Allow the dishes to air dry.

## **Mechanical Washing Station**

Using a commercial washing machine.

1. Scrape all leftover food products off of dishes.
2. Rack and sort properly.
3. Run racks through the machine to wash, rinse, and sanitize.
4. Allow the dishes to air dry.

## Seed To Table

**Lesson Plan:** Catering

**Unit:** Learning to Work as a Culinary Arts Professional

**Objectives:**

- Students will learn how to appropriately serve a catered meal.
- Students will learn about a variety of place settings.
- Students will learn proper dress for a catering event.
- Students will learn appropriate etiquette for a catered event.
- Students will learn how to handle complaints.

**Modified Curriculum Objectives:**

**Materials:** Place Setting Diagrams, Examples of different plates and utensils.

**Time:** 1 hour

**Vocabulary:** Front of House, Bread and Butter Plates, Flatware, Chafing Pans, dessert fork, salad fork, plated, buffet, family style

**Background Information:**

Catering food for special events is an important and valuable skill to learn. For a restaurant a professional catering business can be an extra money maker. This is due to the guaranteed payment, and the beforehand knowledge of how many people will attend and how much food needs to be prepared.

Catered events can also add extra money into the pockets of employees. The more catering a business does the more opportunities to work extra shifts during off hours.

While catered events can fall into many different occasions it is often reserved for a special event for the attendee including, weddings, anniversaries and birthdays. In addition, many corporations provide catered events to their staff or customers. All of these people want the catered event to go smoothly and are willing to pay more for exceptional service.

Catering businesses get most of their business from positive recommendations from former clients or from guests of other catered events who liked the experience. Many companies will stick with the same caterer for all of their events if they have a positive experience.

This means that it is important for the staff catering the event to pay attention to every detail and strive to make the event the best possible experience for the guests. This includes a polished presentation, excellent food, superb service and most importantly resolving complaints quickly and effectively.

The appearance of servers at catered events is important. This serves two purposes one is to show cleanliness and professionalism the other is so that guests can recognize staff so they know who to ask if they have questions. In general, the catering uniform consists of black pants with black belt, black shoes with black socks and a plain white shirt. Caterers need to practice good personal hygiene by showering before the event and washing hands frequently.

The front of the house or the servers are the direct face of the catering business to the customers. It is important that at all times servers act professionally and are attentive to the needs to the guests. Things to keep in mind are to use appropriate and respectful language. Servers should not use cell phones or other electronic devices. Servers need to be available to meet the needs of the group. Servers should not congregate in one area but spread out throughout the room. By having servers evenly distributed around the room servers can easily be able to respond to guests needs as they arise. When waiting for the next task, servers should stand straight and watch the tables. Servers should not be seated or be leaning against the wall.

### **Three Types of Catering Events**

#### **Buffet Style**

In a buffet event guests line up at a serving table. Servers are responsible for filling plates with food while the guests walk by. Guests take their filled plates back to the table. One server is required for every thirty guests.

#### **Family Style**

During a family style event place settings are set on table. Servers bring bowls/trays of food to the table and guests pass the food around the table helping themselves to the food. One server is required for every 20 guests.

#### **Plated Style**

This is the most elegant and labor intensive serving method. Plates of food are arranged in the kitchen and brought to the table with the food already prepared. One server is required for every 10 guests.

### **Place Settings**

Place settings depend on the style of meal and what foods will be served. In general each setting has a plate, fork, napkin, knife, spoon, and glass. The plate goes in the center of the place setting. Napkins and forks are to the left of the plate while the knives and spoons are to the right of the plate. Glasses go above the knife and spoon. If there will be separate plates for salad or bread and butter these go to the left above the fork. Dessert forks and/or spoons are placed directly above the plate. If there is a soup this bowl is placed directly on top of the dinner plate. In some settings there are multiple spoons, knives and forks. Each of these serves a specific purpose with the

utensil to be used first placed farthest away from the plate. Knives should always be placed with the sharp edge facing the plate.

While it is important to understand the basics of proper place setting with each meal being slightly different it is important to review the place setting for each catered event before you start. When setting the tables you want there to be enough space between guests and for it to be clear as to which salad and which drink belongs to which plate. In general solids; salads, bread, napkins, forks are placed on the left and liquids; water, wine, coffee, soup spoon are placed on the right.

When placing the setting be sure to only touch the handles of silverware and the outsides of cups and bottoms of plates. It is also important to look at the dishes to insure that there is no dirt, stains or chipped edges. Dirty items should be taken directly to the dishwasher to be washed before the meal. Broken items should be thrown away.

While tables can be set before the meal begins and the guests arrive, the clearing of dishes happens while the guests are present. It is important to not rush guests into finishing portions of their meals but also to clear the dishes as they are finished to allow the guests to have room to eat the next portion of their meal. If a soup or salad is served these plates or bowls will often be cleared before the meal begins. In the same way, dinner plates should be served before dessert is served. When clearing dishes it is important to be polite and respectful to the guests while being as unobtrusive as possible. You do not want to distract the guests from their meal and conversations.

During plated meals the server brings the food to the table and serves each of the guests while they are seated. At some events you may need to ask which option each of the guests want.

At buffet catered events guests take their own plates to their table. Servers dish the food out from chafing pans which are designed to keep the food warm during the serving process.

Servers are the people that are going to be asked questions about when the food will be served what ingredients are in the food. It is important to know this information or be able to find out quickly. When complaints arise, servers will be the first to hear these issues. It is important to try to solve the problem or find someone who can solve the problem quickly. It is not that people expect to have an issue free event, but when a problem arises that it needs to be taken care of efficiently and to the satisfaction of the party. When responding to complaints be pleasant and find the main contact to resolve the issue.

At the end of the catering event all of the tables need to be cleared. Dishes need to be run through the dishwasher. Table cloths and napkins need to be put in the laundry. When the event is over servers are often tired but also have the satisfaction that they made a group of people happy.

**Teacher Instruction:**

1. Discuss the importance of catering events to the catering business to employees and to the guest who attend.
2. Ask students to describe any catered events they have attended and what stood out as positive or negatives at these events.
3. Discuss the importance and what is appropriate dress and behavior for catering staff.
4. Describe the different types of catering events and what are the different staff responsibilities for each type.
5. Have students identify different types of plates and utensils and demonstrate how to set a proper place setting.
6. Discuss how to serve meals while guests are seated and how to pour water/coffee.

**Student Instruction:**

1. Identify different pieces of a place setting.
2. Set an appropriate place setting.
3. Practice serving food, clearing dishes, and pouring drinks.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. Which fork should you use first?
2. What side of the plate does the spoon go on?
3. What is a B and B plate? (Bread and Butter)
4. Why is catering a money maker for a restaurant?
5. How do new clients decide to use a specific caterer?
6. Which direction do knives point?
7. Why are dessert utensils placed above the dinner plate?
8. What should you do if you find a dirty fork when you are setting the table?
9. When should you clear the soup bowls from a table?
10. What is the difference between plates, family, and buffet catering styles?
11. How do you show you are attentive to a group?

**Extensions:**

Cater a variety of different meals.

**Accommodations:****Resources:**

<http://www.wholesale-table-linens.com/setup-tableware.html> This website has an interactive link you enter what you are serving and it creates the place setting.

Prostart Year 2 Chapter 4 Has information on types of flatware and plates and how to set a table.

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**

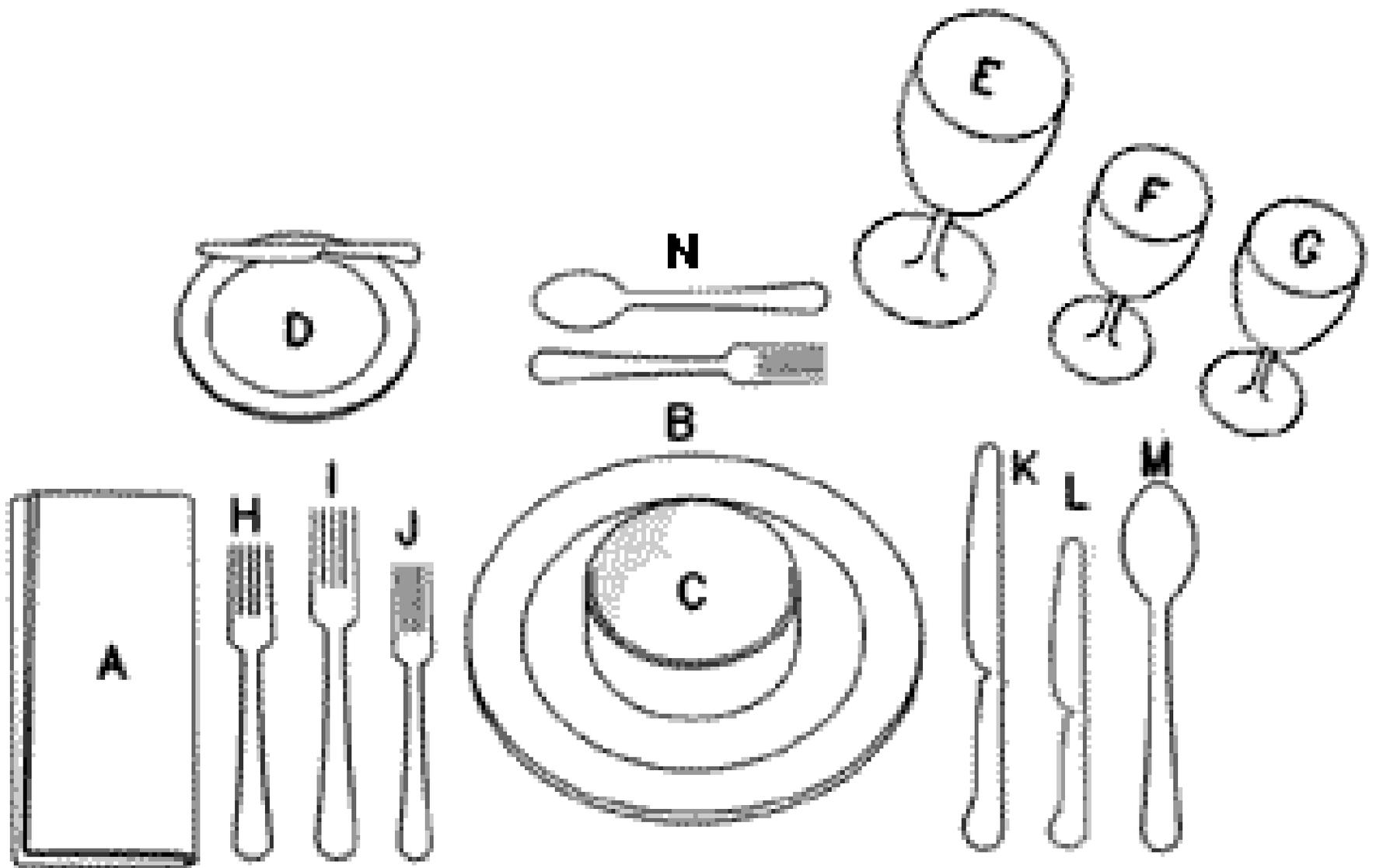

**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## Catering Cart

\_\_\_ Number of People

- Wipe down cart first
- \_\_\_ Dinner Plates \_\_\_ Dessert \_\_\_ Salad \_\_\_ Bread/Butter
- \_\_\_ Dinner Forks \_\_\_ Salad Forks \_\_\_ Dessert Forks
- \_\_\_ Table Spoons \_\_\_ Soup Spoons
- \_\_\_ Butter Knives \_\_\_ Steak Knives
- \_\_\_ Water Glasses
- \_\_\_ Coffee mugs
- \_\_\_ Napkins
- \_\_\_ Salt/pepper
- \_\_\_ Chafing pans
- \_\_\_ Serving Utensils
- \_\_\_ Water Pitchers
- \_\_\_ Coffee Pitchers

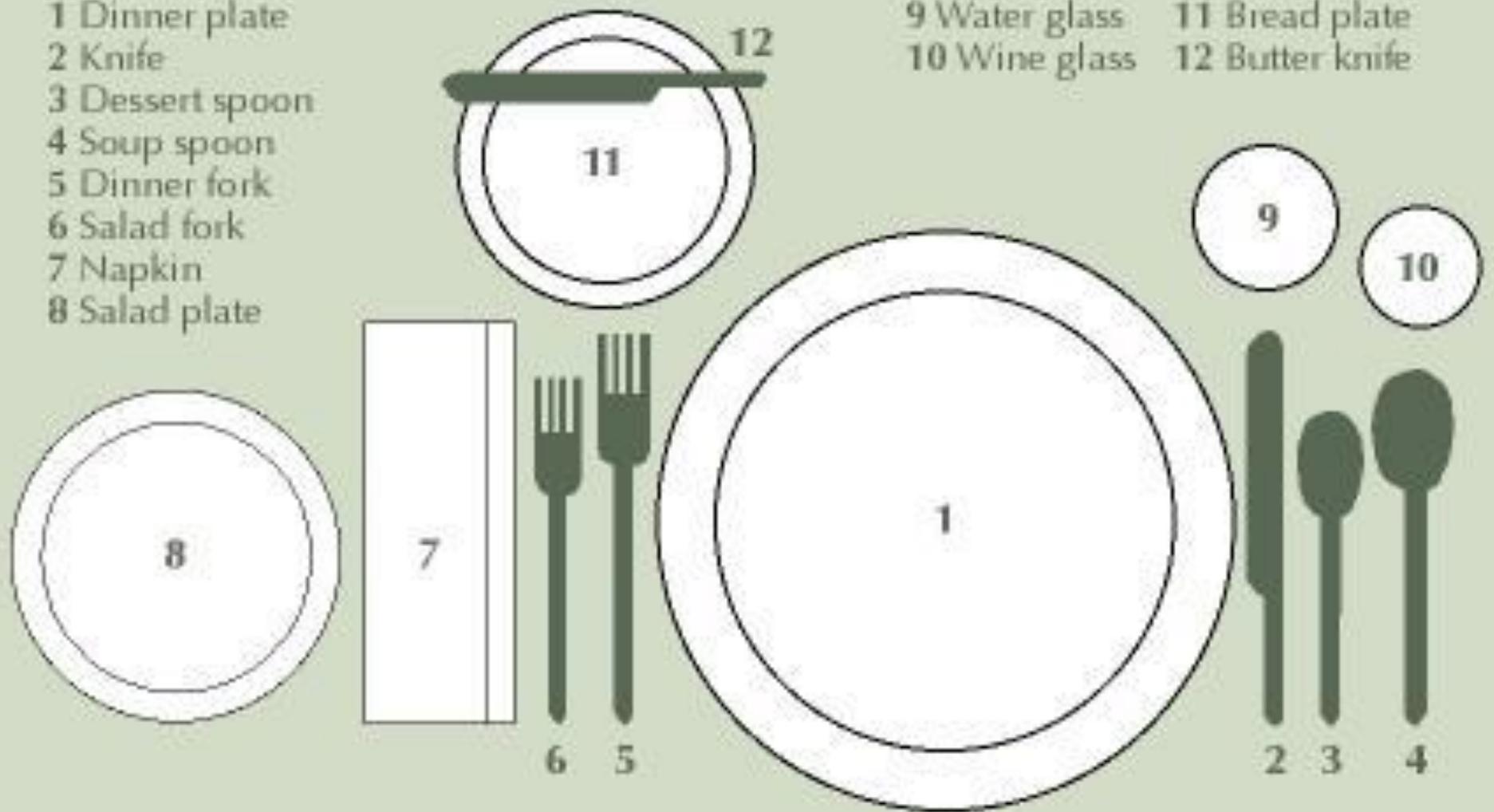


<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
Serviette (napkin)	Service plate	Soup bowl on plate	Bread & butter plate with butter knife	Water glass
<b>F</b>	<b>G</b>	<b>H</b>	<b>I</b>	<b>J</b>
White wine	Red wine	Fish fork	Dinner Fork	Salad fork
<b>K</b>	<b>L</b>	<b>M</b>	<b>N</b>	
Service knife	Fish knife	Soup spoon	Dessert spoon and cake fork	

Note that it often is recommended that the salad fork (J) is placed to the left of the dinner fork (I). However, in this formal setting the dinner fork is placed to be used before the salad fork because it is suggested that the guest awaits the main meal before helping him/herself to the salad.

- 1 Dinner plate
- 2 Knife
- 3 Dessert spoon
- 4 Soup spoon
- 5 Dinner fork
- 6 Salad fork
- 7 Napkin
- 8 Salad plate

- 9 Water glass
- 10 Wine glass
- 11 Bread plate
- 12 Butter knife



## **Unit 4: Science of Cooking**

In this section lessons explore science related topics using common items found in a kitchen. A cook has to learn how different ingredients interact.

Got Milk? —*Dairy industry and how to make dairy products.*

Eggs—*All about eggs.*

Edible Parts of an Animal—*Anatomy of common food animals.*

Salt—*All about salt.*

Fruits—*The science behind the fruits we eat.*

Yeast and Other Leaveners—*Explore the science behind leaveners and make bread.*

Sprouts—*Learn about how to grow a variety of sprouts and their nutritional value.*

## Seed To Table

**Lesson Plan:** Got Milk?

**Unit:** Science of Cooking

**Objectives:**

- Students will learn about where milk comes from.
- Students will learn about other dairy products and how they are made.
- Students will make a variety of dairy products.
- Students will learn about conflicts within the dairy industry.

**Modified Curriculum Objectives:**

**Materials:** Ingredients and utensils to make cheese, butter, ice cream and/or yogurt.

**Time:** 1 hour overview. 30 minutes per dairy making (Cheese requires a longer period, yogurt needs to warm overnight)

**Vocabulary:** Cottage Cheese, Sour Cream, Pasteurization, Butter, Whole Milk, Skim Milk, Dairy, Raw Milk, Manure, Sewage Lagoon.

**Background Information:**

All female mammals produce milk for their infants. This milk provides necessary nutrients and antibodies for babies to survive. Humans are the only animal to continue to drink milk into adulthood. Even though close to 75 percent of adults show at least some signs of lactose intolerance. The majority of milk for human consumption comes from dairy cows. Milk is also used for a wide variety of products.

Milk does provide protein and calcium as well as other vitamins and nutrients including vitamin D and potassium. Milk has various levels of fat content due to the processing of milk before packaging. This affects the taste and people have different preferences based on what type of fat content they enjoy in their milk.

The first document use of human consumption of animal milk was 5000 BC. While originally domesticated animals were first used for meat soon secondary uses of wool and milk were utilized. While cows produce the majority of milk for human consumption, goats, sheep, camels, horses, and water buffalo are also milked in various parts of the world. Each type of milk has a different composition of both fats and nutrients. Milk can be used in a wide range of products included butter, cheese, yogurt, ice cream, buttermilk, kefir, evaporated milk, dry milk, and sour cream. These products can be made by separating solids and fats away from milk.

A cow only produces milk after she gives birth to a calf. The cow then produces 6-8 gallons of milk each day for 12-18 months after the birth of a calf. Cows are milked two-three times a day. Cows often developed a fairly regimented schedule for when they need to be milked. Originally cows were milked by hand pulling on one of the four teats on the udder to fill a bucket. Now most milking operations use automatic pumping machines that attach to all four teats at once. The milk is then pumped directly into a cool and sterile storage container. The milk is then trucked to a processing plant to be pasteurized and sold as a wide range of products

Milk is often sold based on its fat content. Whole milk contains about 3% fat while skim milk contains less than 0.5% fat. There are also several types of flavored milk sold which include strawberry and chocolate. These flavorings while some people say it improves the taste others point to the increased amount of sugar in these drinks as a reason to avoid them.

Yoghurt and kefir both contain bacteria that are helpful to the human digestive system. Both of these products are more acidic than milk and often are sold with fruit flavorings which add to the sugar content on the product.

Buttermilk is a type of sour milk that is often higher in fat content. Many recipes that call for buttermilk can be replaced by adding 1 tablespoon of vinegar or lemon juice to every cup of regular milk.

While many adults are lactose intolerant they still enjoy the taste of milk, cheese and/or ice cream. Lactose is the sugar that is produced in milk. The ability to digest lactose is highest in the intestines of infants and starts to lessen with age. There are products available to help with lactose digestion as well as milk replacers such as soy milk, rice milk, or coconut milk that do not contain lactose as they are produced from plants as opposed to animals.

The pasteurization process was first developed by Louis Pasteur in 1864 to stop the spread of microbes and bacteria in foods by using a heating process. While pasteurization is usually associated with milk this process was not used with milk until 1886. Most milk that is now sold in stores is pasteurized using regular pasteurization or Ultra heat pasteurization which heats the milk to a higher temperature for a shorter period of time. Pasteurization kills 99% of the bacteria in milk both that can cause disease and those bacteria which are helpful for nutrition.

Raw milk is milk that has not gone through the pasteurization process. Farmers and their families often drink raw milk before it goes to the pasteurization plant. Consumers in some states can buy raw milk directly from farmers in other states the sale of raw milk is prohibited by the state. In 2010, Wisconsin legislatures are debating whether to allow consumers the right to buy raw milk from producers. (Legalization of raw milk passed the legislature but was vetoed by the governor due to public safety concerns.)

Milk was originally sold out of large communal buckets into consumers personal containers. Late milk delivery was common in reusable glass containers. Now most milk in the United States is sold in 1 gallon plastic jugs or smaller wax lined paper containers. Milk is dated with a sell by date and should be kept refrigerated. When milk spoils it produces an off odor and should not be consumed. In Europe most milk is sold in aseptic packaging which allows the milk to be stored unrefrigerated for 3-4 months.

In school lunch programs milk is an important part. Milk is typically sold in ½ pint waxed cardboard containers. Most schools sell chocolate and white milk. There is a movement to eliminate the sale of chocolate milk because of the higher sugar content and its possible contribution to childhood obesity. Milk advocates argue for its inclusion, both that it is a good source of nutrients and much better for children than soft drinks.

Wisconsin is known as the dairy state and while for many years had more cows than any other state it has now been surpassed by the state of California. Other states in the mid west and northeast are also home to a wide range of dairy cattle.

In the 1800's most farms had one or two cows which produced all the milk needs for the family with the possibility for extra for sale. In the first part of the 1900's most farms had between 30-100 cows. This milk was then sold to milk bottlers. Many dairy producers formed cooperatives that send the milk to one plant for pasteurization and bottling. Now many farms are larger factory or industrial farms that have over 700-10,000 cows.

While there are still many family farms throughout the United States it is difficult to make a good living. The price of land near expanding cities makes it cost prohibitive to keep the acreage in farm land as it is worth more money as land for housing development. Other small family farms sell their operations to large farms which can make more money taking advantage of savings based on economies of scale.

In producing milk and raising cattle there are several considerations. Cows need to eat. While cows have four stomachs that allow for them to use internal bacteria to help digest grass and other foliage these requires a steady diet of forage. Some cows are allowed to graze in fields this method is labor intensive requiring animals to be moved through a series of fences so that the animals do not kill the plants that they are eating. Other cows reside in a feedlot where they are brought food usually in the form of corn which is harvested elsewhere.

Cows also produce manure. Manure can be used as a fertilizer that is high in nutrients especially nitrogen. Depending on the area that this manure is spread over depends on whether this fertilizer is helpful or destructive. In many grazing operations the cow manure is spread evenly across the field and can be used by the grass in the field. In feedlots the manure must be collected and then spread over fields. In larger feedlots the manure is stored in a sewage lagoon and then pumped or trucked to fields farther away from the farm. In certain instances manure has been spread on

frozen fields and with a heavy rainstorm as led to fish kills in streams. Other times sewage lagoons will overflow causing environmental damage to nearby wildlife.

Vegans and some vegetarians refuse to eat milk and other dairy products. This can be for a variety of reasons including the need to eliminate male cows, the removal of calves from their mothers at a early age, the culling of non productive cows or other issues with animal containment.

Some milk producers use Bovine Growth Hormone (BGH) which increases a cow's milk supply. Farmers also use a wide range of medicines and antibiotics to treat and prevent diseases in cows. While there is no documentation that BGH is harmful for humans some consumers choose not to purchase milk with hormones and milk is labeled as BGH free. Organic milk is also available for a higher cost. This milk is produced with cows free from hormone additives and feed that was grown organically. These animals are allowed to have grazing areas and often calves are kept with their mothers for a longer period of time.

Wisconsin is the largest producer of cheese in the United States while there had been a steady decline of cheese producers in the state in recent years the number of small specialty cheese producers has started to grow. Cheese is relatively easy to make it involves heating milk slowly so that the milk separates into curds (solid parts) and whey (liquid parts). The curds can be strained from the whey using cheesecloth different spices or rennet can be added to the curds to produce hard or soft cheeses. Cheese is then aged for varying lengths of time for how sharp of cheese taste is desired. Often the longer cheese is aged the more expensive the cheese is. Mold that grows on cheese is not harmful. Many people will simple cut off the moldy sections of the cheese and consume the rest. Blue cheese is in fact moldy cheese.

Butter is made by separating the cream off the top of milk and stirring the cream until it becomes solid. Ice cream is made by cooling cream, milk, and sugar while stirring to add air. Yogurt can be made by adding live bacteria to heated milk. These live cultures include *Lactobacillus delbrueckii* subsp. *bulgaricus* and *Streptococcus salivarius* subsp. *thermophilus* bacteria. These bacteria can be purchased separately or by adding store bought yogurt that contains live cultures.

Milk and other dairy products can be an important part of cooking. It is possible to make your own cheese, butter, ice cream or yogurt from milk. This can allow a chef to control what ingredients are added and to allow for specialty products to be produced on a small scale. While it takes longer to produce dairy products in the kitchen the raw ingredients are typically cheaper than purchasing the final product.

### **Teacher Instruction:**

1. Discuss with students the changing role of the dairy industry especially in Wisconsin.

2. Talk with the students about the wide range of dairy products that can be produce from milk.
3. Debate some of the issues surrounding dairy farms including: factory vs. family farm, grass fed vs. corn feed, pasteurized vs. raw milk, using milk vs. not using milk, organic vs. non-organic and/or flavored vs. unflavored milk.
4. Students could produce a poster/paper either arguing for one side of a dairy debate or comparing the two sides. Or groups of students could research one side of an issue and then debate against the group who represents the other issue.
5. Prepare ingredients and materials for students to make their own dairy products. See attached recipes or use one of your own.

**Student Instruction:**

1. Research issues surrounding the dairy industry.
2. Prepare talking points and arguments in favor of one side of the debate.
3. Create a list of dairy products
4. Follow a recipe to create cheese, butter, ice cream and/or yogurt.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. Should consumers be allowed to purchase raw/unpasteurized milk?
2. Compare smaller dairy operation to larger factory farms.
3. What types of products can be made from milk?
4. Describe how cheese, butter, ice cream and yogurt are made?
5. What are benefits and issues surrounding the use of manure as fertilizer?
6. Compare store bought dairy products with homemade dairy products.

**Extensions:** Visit a dairy farm (organic and factory), visit a cheese producer, visit an ice cream producer. Milk a cow.

**Accommodations:**

**Resources:**

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## **Ice Cream**

Ingredients:

2 Cups Milk

2 Cups Heavy Whipping Cream

1 Cup Sugar

1 teaspoon Vanilla

Optional (Fruits, nuts, chocolate, other flavorings)

Directions:

Mix milk, cream, sugar and vanilla. Add mixture to inside of ice cream maker. Depending on your maker you may need to add rock salt and ice to the outside container. Spin consistently for 20-30 minutes may be longer for non electric models. Add chopped fruit, nuts, and chocolate as desired. Spin for an additional 5-10 minutes. Ice cream should then be stored in the freezer.

If no ice cream maker is available ice cream can be made in two zip lock bags or with one container inside a larger one.

## **Butter**

Ingredients:

Heavy whipping cream

Directions:

Fill a glass jar with sealable lid at most half full of cream. Shake bottle vigorously until cream begins to solidify. Pour off remaining liquid. You may want to add salt or other spices.

## **Cheese**

### Ingredients:

4 tsp. of non-iodized salt

1 fl oz. diluted rennet (3 drops of liquid rennet mixed with 1/3 cup water)

4 fl oz. cool water (1/2 cup)

1.25 gallons whole milk

4 fl oz. cultured buttermilk (1/2 cup)

1 tsp. liquid rennet

Non-iodized salt, spices and herbs

2.67 fl. oz. buttermilk (1/3 cup)

Cheese wax

2 gallons of whole milk

## **Make Soft Cheese**

Pour the milk in a stainless steel or enamel pot. Warm it on the stove until the temperature reads 80 F.

Stir in the buttermilk and the diluted rennet solution.

Stir well and cover the pot with a tight fitting lid.

Allow to set at room temperature for eight to 12 hours. Note that the texture of the milk will change and it will start resembling thick, soft cheese.

Line another pot with cloth.

Pour the cheese mixture in and let the cheese drain for about six to eight hours. Most of the liquid should drip and the cheese should be fairly thick.

Mix in spices, salt and herbs of your choice, after the cheese has drained.

## **Make Hard Cheese**

Pour the milk in a stainless steel or enamel pot. Warm it on the stove until the temperature reads 88 F.

Stir in the buttermilk.

Set the milk aside for one hour to cultivate. Ensure that the mixture stays at 88 F. You may put the pot containing milk in a sink filled with hot water.

Mix in the rennet with the cool water. Stir it into the milk.

Keep this solution aside for about 45 minutes, while maintaining the temperature at 88 F. This process coagulates the milk.

Test whether the curd is ready for cutting by dipping your finger in the curds. If the curds break evenly on your finger, it is ready.

Cut the curds into half-inch cubes and let them sit for 20 minutes.

Increase the temperature to 99 F. Remember to increase heat very slowly over a 30-minute period.

Stir often to prevent the curds from getting entangled. Cook the curds at this temperature until you notice that the curds feel spongy and have lost a custard-like consistency. This will usually take 30 to 45 minutes.

Let the curds settle to the bottom of the pot and carefully drain some of the whey.

Pour remaining curds and whey into a colander. Allow to drain for 10 minutes.

Put the curds back into the pot and mix in four teaspoons of salt.

Ensure that you mix properly by breaking up any curds that have stuck together. Also remember to keep the curds warm by placing the pot in a sink full of hot water for about an hour.

Line a cheese press with cheesecloth and pour curds into the press.

Press at 15 pounds pressure for 20 minutes. Remove the cheese from the press. Turnover and redress onto another clean cheesecloth and press at 30 pounds pressure for two hours. Remove cheese from press, redress in a clean cheesecloth and press at 30 to 40 pounds for 12 hours or overnight.

Remove the cheese from the press and allow to air dry several days until the cheese is dry to the touch.

Turn the cheese several times a day while it is drying.

Coat with cheese wax when the cheese is dry to the touch.

Age the cheese at 55 degrees F for two to six months. For stronger cheese, age it for six to 12 months or longer.

## Yogurt

### Ingredients:

- 1 quart milk
- 2 tablespoons existing yogurt with live cultures (or freeze-dried bacteria)
- Flavorings (optional fruit/vanilla)

### Directions

1. Heat milk to 185F (85C). Using two pots that fit inside one another create a double boiler. This will prevent your milk from burning, and you should only have to stir it occasionally. If you cannot do this, and must heat the milk directly, be sure to monitor it constantly and stir. Milk starts to froth at 185 F.
2. Cool the milk to 110F (43C). The best way to achieve this is with a cold water bath. This will quickly and evenly lower the temperature, and requires only occasional stirring. If cooling at room temperature or in the refrigerator, you must stir more frequently. Don't proceed until the milk is below 120F (49C), and don't allow it to go below 90F (32C).
3. Warm the starter. Let the starter yogurt sit at room temperature while you are waiting for the milk to cool. This will prevent it from being too cold when you add it in.
4. Add the starter. Add 2 tablespoons of the existing yogurt, or add the freeze-dried bacteria.
5. Put the mixture in containers. Pour your milk into a clean container or containers. Cover each one tightly with a lid or plastic wrap.
6. Allow the yogurt bacteria to incubate. Keep the yogurt warm and still to encourage bacteria growth, while keeping the temperature as close to 100F (38C) as possible. You can use a heating pad or yogurt incubator. After seven hours a custard-like texture, a cheesy odor, and possible some greenish liquid on top will form. The longer you let it sit beyond seven hours, the thicker and tangier it will become.
7. Refrigerate the yogurt. Place the yogurt in your fridge for several hours before serving. It will keep for 1-2 weeks. If you are going to use some of it as starter, use it within 5-7 days, so that the bacteria are still active. Whey, a thin yellow liquid, will form on the top. You can pour it off or stir it in before eating your yogurt.
8. Add optional flavorings.

## Seed To Table

**Lesson Plan:** Eggs

**Unit:** Science of Cooking

**Objectives:**

- Students will learn about the nutrition value of eggs.
- Students will learn where eggs come from.
- Students will prepare different egg dishes.

**Modified Curriculum Objectives:**

**Materials:** Eggs, Egg Diagram

**Time:** Egg discussion 30 minutes, Egg Cooking 30-60 minutes, Naked egg 15 minutes for several days, egg protector 1 hour to multi day.

**Vocabulary:** Yolk, Albumen,

**Background Information:**

Eggs have been an important part of the human diet for thousands of years. Eggs of birds, reptiles, and fish are all available as food sources. However, chickens produce the most eggs for human consumption.

While eggs are part of the reproduction cycle of birds. Only hens or female chickens lay eggs. The eggs are not fertilized because a rooster is often not present with hens. Even when a rooster is present in the barn refrigeration stops the egg from reproducing.

Eggs are an excellent source of protein and contain a wide variety of essential minerals and vitamins. Eggs contain all essential amino acids, Vitamin D, K and A as well as iron, calcium and magnesium. Eggs contain three main parts; the shell, white (albumen) and yolk (yellow). Each part of the egg is edible although most people discard the shell. Egg shell can be composted to add calcium to the soil.

The egg yolk contains all of the fat and cholesterol in the egg as well as most of the vitamins and minerals. The yolk also contains most of the protein in the egg. In some eggs you may find a double yolk this twin egg is generally not viable to produce offspring. There are also times when a chicken will produce an egg without a yolk. These yolkless eggs are often much smaller and generally the result of a hen that is not yet ready to reproduce.

Egg whites are valued by chefs as a way to make a batter fluffier and to make meringues. To separate an egg use an egg separator or pour the egg yolk between two egg shells allowing the

white to drip into a separate bowl. Using a copper bowl and an egg beater stir the egg white until it becomes stiff. Using egg whites also eliminates fat and cholesterol and can be useful for people on restricted diets.

Some issues with egg consumption include allergies to eggs common in infants. Egg yolks also contain cholesterol and fat. In addition, that outside of eggs may contain the bacteria salmonella which is harmful but killed during the cooking process. With improve handling practice there are fewer instances of salmonella poisoning associated with raw eggs. However, it is still required to include a warning on menu items about the dangers of consuming raw or undercooked eggs. In addition this is why there is a recommendation against eating raw cookie dough. While some people eat raw eggs cooking the egg improves the body's capacity to process the nutrients found in the egg.

While most eggs that are eaten come from chickens, other bird eggs are eaten as well. Quail eggs are small and treated as a delicacy. Duck, goose, and pheasant eggs are also eaten. Ostrich eggs are much larger and can be found at farmer's markets or specialty grocery stores.

Eggs are often used in baking as a binding agent. Applesauce and bananas can be used as a substitute for eggs. In addition, egg substitutes can be purchased to avoiding baking with eggs. This can be useful for cooking for vegans or people with egg allergies.

Most chickens that are raised for egg production are kept in small cages in a barn with no access to the outside. These poultry farms produce many eggs with lots of birds in a small space. The birds are debeaked to prevent injury and cannibalism. Many birds die in these cages because of the heat. The birds are also forced to molt to speed egg production. These birds are feed a diet of mainly corn with additives. In addition, the birds are killed after about 120 days of egg laying and because of the breeding process are not thought to be suitable for eating.

Some farmers have begun to raise organic, natural, or cage free eggs. Depending on the farm this can mean a variety of different things. However, in general this means that the chickens have more space access to outside and food that is more varied. These eggs come from diverse breeds of birds. These eggs are generally brown in shell color, and have higher levels of nutrients. The cost for these eggs is often more because of the additional space needed to raise the chickens and not forcing the same production of eggs. When after several years, these birds are no longer productive egg layers they are often used as stew birds.

Individuals can raise their own chickens in their own backyards. This allows a consumer to have a direct relationship with the birds that produce their eggs. Chickens can eat a wide range of foods including vegetable scraps and insects. Often each chicken will lay one egg a day. However, if you have four chickens you will average three eggs every day.

Chickens go through a molting period each year when they will not lay any eggs, chickens also lay fewer eggs during the winter due to decreased daylight. However, this can be counteracted by providing the chickens with artificial light. Some producers provide only artificial light to have the chickens produce two eggs in one day.

Eggs are often eaten for breakfast but can be prepared in many different ways. Eggs can be hard or soft boiled inside the shell. Eggs can be poached, fried sunny side up or over easy with the yolk intact. In addition eggs can be scrambled or made into an omelet or frittata with the egg mixed together. Eggs are also used in baking; pancakes, waffles, cookies and cakes.

Eggs that are fertilized and allowed to incubate to form new chicks take about 21 days. At this point the baby chick uses a specialized egg tooth to crack through the egg shell. When chicks are born they are small with fluffy yellow feathers and cannot fly.

Eggs are also decorated during early spring as a sign of birth and new life. While many Christians decorate eggs for Easter celebrations the first decorations found on an egg are 60,000 years old found on an Ostrich egg in South Africa. In Persia during the spring equinox it was also common to have a basket of eggs on the table to celebrate the birth of a new season. In Eastern Europe, many people will blow out the insides of the egg leaving a hollow egg shell that can be decorated and will not spoil. Often in the United States hard boiled eggs are dyed and hidden by the “Easter Bunny” for children to find.

Protestors also use eggs as an inexpensive missile. Egg whites contain ingredients that can do damage to paints on houses or cars.

### **Teacher Instruction:**

1. Discuss the importance of eggs in nutrition and cooking.
2. Discuss the different ways for chickens to be raised to produce eggs.
3. Provide directions/recipes for different ways to incorporate eggs into cooking.
4. Provide directions for different egg related experiments.

### **Student Instruction:**

1. Complete the diagram of parts of egg (see handout)
2. Compare different types of eggs. Organic, Conventional, Duck, Pheasant, Quail, Ostrich.
3. Separate the yolk from the white. Beat the white until it is stiff. Make Meringues.
4. Cook eggs in different styles. Hard/soft boiled, poached, fried (sunny side up, over easy), scrambled, omelet, frittata, etc.
5. Complete one or more of the following egg related science experiments.

### **Egg Experiments:**

#### **Build an Egg Protector**

Students can plan and design an invention to protect an egg dropped from a height. Materials can be limited to a certain number of drinking straws and tape or students can be allowed to bring in their own materials. The height from which the egg is dropped can be from 10 feet to 50 feet depending on location. This experiment can be lengthened with students making blueprints, back ground stories or market information for their egg protectors.

### **The Naked Egg**

Place an egg in vinegar. The vinegar dissolves away the shell. This can be done with a hardboiled or raw egg. Place the raw naked egg in corn syrup and the egg will shrink. Place the raw naked egg in Water and it will grow in size. This can be done multiple times with the same egg. Place the naked egg in a mixture of water and baking soda and something similar to an egg shell will form around the egg.

### **How Strong is an Egg**

In this experiment you can test the strength of an egg both horizontally and vertically. Eggs need to be strong enough to support the weight of a mother hen. There are records of chicken eggs being able to support 200 pounds of weight. However, most times doing this experiment with students the eggs hold between 20-50 pounds.

Place 3 or 4 eggs in an even pattern so the eggs are the same heights. Place weights on top of the eggs evenly and gently. One method that works well is to use egg cups designed to serve soft boiled eggs. Then use textbooks as the weights. You can also try to use the bottom of an egg carton to hold the eggs though these often slip and that can change the pressure applied to the egg causing the egg to crack. Most eggs will break when the weight is not applied evenly.

### **Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. List three issues surrounding the conventional raising of chickens.
2. List the benefits to raising chickens in an urban setting.
3. Compare different types of eggs from different birds. Look, feel, smell, taste.
4. What is the biological purpose of an egg?
5. What nutritional benefits come from eggs?
6. Why do organic eggs cost more than conventional eggs?
7. Why do eggs need to be strong?
8. What architecture shape is similar to an egg?
9. What is happening to the egg shell when vinegar is added?

**Extensions:** Watch the movie “Mad City Chickens” about urban chicken raising filmed in Madison, WI. Raise your own chickens, visit farms or homes where chickens are raised both organically and conventionally.

**Accommodations:**

**Resources:**

McGee, Harold 1990. The Curious Cook. MacMillan USA. On pages 100-133 discusses using eggs in mayonnaise, hollandaise, and béarnaise.

[http://www.planet-science.com/parents/easter\\_pdfs/eggbox.pdf](http://www.planet-science.com/parents/easter_pdfs/eggbox.pdf) Seven experiments to do with eggs.

<http://www.motherearthnews.com/eggs.aspx> Article about the nutritional value of organic eggs.

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## Nutrient Content of a Large Egg

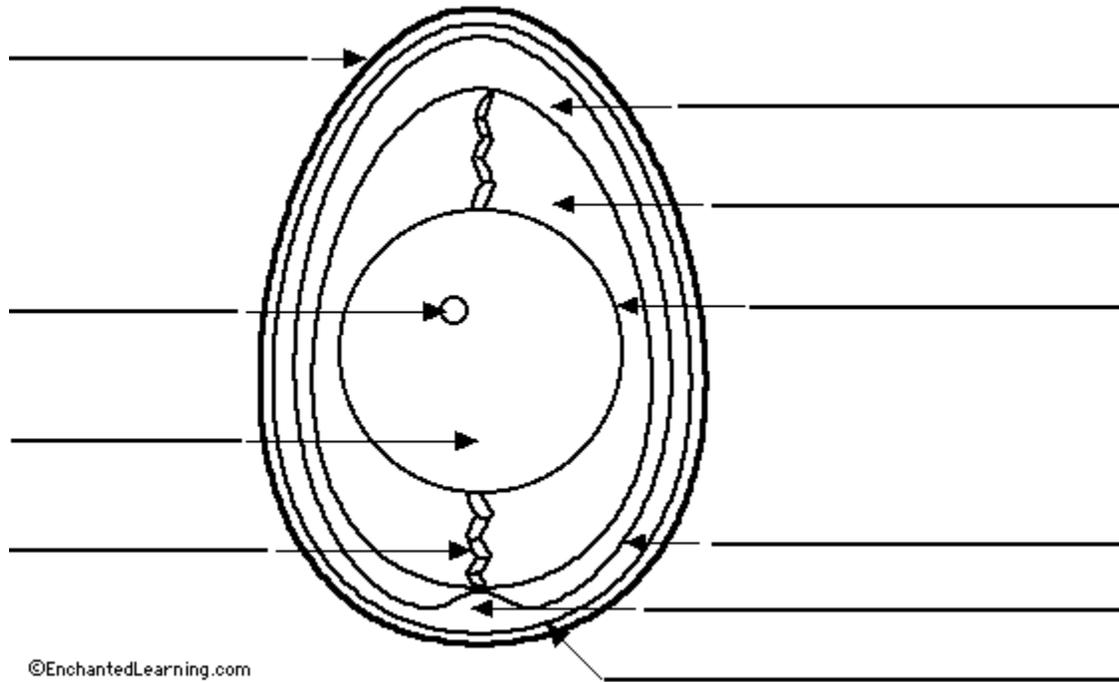
Nutrient (unit)	Whole Egg	Egg White	Egg Yolk
Calories (kcal)	70	17	55
Protein (g)	6.29	3.60	2.70
Carbohydrate (g)	0.39	0.21	0.61
Total fat (g)	4.97	0.06	4.51
Polyunsaturated fat (g)	0.682	0	0.715
Monounsaturated fat (g)	1.905	0	1.995
Saturated fat (g)	1.55	0	1.624
Cholesterol (mg)	212	0	210
Choline (mg)	125.5	-	-
Lutein & Zeaxanthin (mcg)	166	0	186
Vitamin A (IU)	244	0	245
Vitamin D (IU)	18	0	18
Vitamin E (mg)	0.48	0	0.44
Vitamin B6 (mg)	0.071	0.002	0.059
Vitamin B12 (mcg)	0.65	0.03	0.33
Folate (mcg)	24	1	25
Thiamin (mg)	0.035	0.001	0.03
Riboflavin (mg)	0.239	0.145	0.09
Calcium (mg)	26	2	22
Sodium (mg)	70	55	8
Potassium (mg)	67	54	19
Phosphorus (mg)	96	5	66
Magnesium (mg)	6	4	1
Iron (mg)	0.92	0.03	0.46
Zinc (mg)	0.56	0.01	0.39

Note: Organic eggs contain Lower cholesterol and saturated fat and higher Vitamin E, Beta Carotene and Omega 3.

Cholesterol 107 mg, Vitamin E 0.75 mg, Beta Carotene 79 mcg, Saturated fat 0.95 g, Omega3 0.33 g.

Label the Parts of an Egg.

Name: \_\_\_\_\_



**air cell** - an empty space located at the large end of the egg; it is between the inner and outer shell membranes.

**chalaza** - a spiral, rope-like strand that anchors the yolk in the thick egg white. There are two chalazae anchoring each yolk; one on the top and one on the bottom. (The plural of chalaza is chalazae.)

**germinal disc or blastodisc** - a small, circular, white spot (2-3 mm across) on the surface of the yolk; it is where the sperm enters the egg. The nucleus of the egg is in the blastodisc.

**inner shell membrane** - the thin membrane located between the outer shell membrane and the albumin.

**outer shell membrane** - the thin membrane located just inside the shell.

**shell** - the hard, protective coating of the egg. It is semi-permeable; it lets gas exchange occur, but keeps other substances from entering the egg. The shell is made of calcium carbonate.

**thick albumin** - the stringy part of the egg white (albumin) located nearest the yolk.

**thin albumin** - the watery part of the egg white (albumin) located farthest from the yolk.

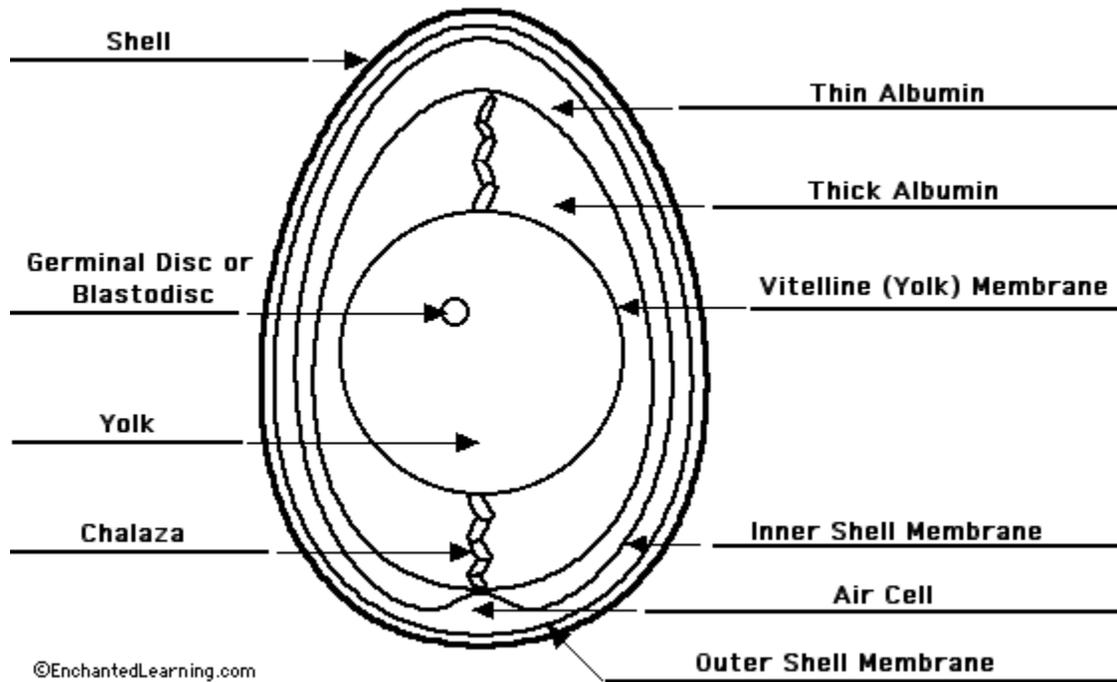
**vitelline (yolk) membrane** - the membrane that surrounds the yolk.

**yolk** - the yellow, inner part of the egg where the embryo will form. The yolk contains the food that will nourish the embryo as it grows.



Label the Parts of an Egg.

Name: Answer Key



**air cell** - an empty space located at the large end of the egg; it is between the inner and outer shell membranes.

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## **Egg White Meringue - How To Make Perfect Meringue** (<http://whatscookingamerica.net/Eggs/perfectmeringue.htm>)

Whipping egg whites are much like blowing air into a balloon. Beating or whisking causes the protein in the egg whites to unfold, forming films that trap the air bubbles, and the sugar stiffens the foam.

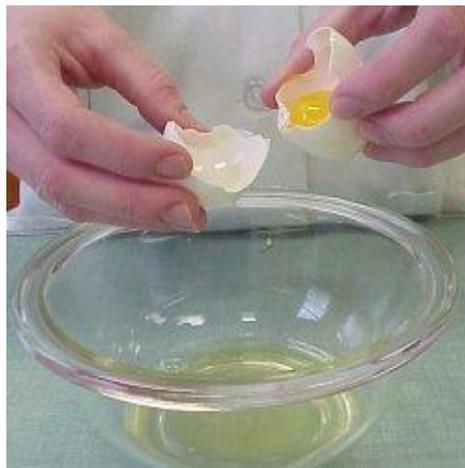
A meringue is a big collection of bubbles. Fat interferes with the formation of foam in the egg whites. Fats tend to collapse egg foams. Egg whites are free from fat while egg yolks contain all the fat from an egg.

Don't make egg white meringues on a rainy or really humid day (remember that they are mostly air and if that air contains a lot of water, it will have an effect).

### Separating Eggs:

Cold eggs separate more easily than those at room temperature because the whites hold together better.

To separate an egg: Crack the egg and hold the shell halves over a bowl. Transfer the yolk back and forth between the halves, letting the white drop into the bowl. Do not cut the yolk (whites containing any yolk will not beat properly). Transfer the yolk to another bowl. Another option is to use an egg separator, an utensil, that has a spoon to catch the yolk but allow the white to run down into the bowl.



The tiniest bit of fat or egg yolk will wreck a meringue, as fat interferes with the formation of good foam. When separating eggs, if a speck of egg yolk falls into the egg whites, lift it out with an empty eggshell half. Do not try to fish it out with your fingers; the oil on your skin will prevent the egg whites from expanding.

After separating, bring egg whites to room temperature, as warmer eggs whip faster than cold eggs. The ideal temperature to whip a common meringue is room temperature, about 70 degrees F. (21 degrees C.). Usually 30 minutes is adequate to obtain room temperature. A beaten egg white can foam to 6 to 8 times its original volume.

### Bowls and Utensils:

Copper, stainless-steel, or glass bowls work best for making meringues. Avoid using plastic bowls for whipping egg whites as they can often harbor traces of grease or fat, which prevents the whites from getting stiff. Be sure the bowl is clean.

Make sure that all your utensils are clean, completely grease-free, and completely dry. Meringues are very sensitive. Grease and moisture can slow the ability of egg whites to foam.

Place the egg whites into a large, tall bowl and set your mixer to medium-high speed. Hand beating with an egg beater or whisk takes much longer. Beating causes the protein in the egg whites to unfold, forming films that trap the air bubbles. As the mixing time increases, the bubbles become smaller and more numerous; this increases the volume and makes a more-stable structure.

#### Adding Sugar:

Do not add sugar before whipping the egg whites. Adding sugar at the beginning can double the time you have to whip the egg whites. Add the sugar at the very end when the whites have formed soft peaks.

I like to use superfine sugar when making meringue because it dissolves faster than table sugar. When beating egg whites and the recipe calls for sugar, Gradually add the sugar, a few spoonfuls at a time, beating the whole time.

As a general rule, add a total of 1/4 cup of granulated or superfine sugar for each egg white.

Do not make meringues that have less than 2 tablespoons of sugar per egg white. If you use any less, the foam will not set and the meringue will shrink.

To tell if the sugar is dissolved when you are beating egg whites for meringues, rub a bit of the foam between your fingers. If it feels gritty, the sugar is not dissolved, so keep beating for a few minutes.

By varying the amount of sugar in the final mix, you control how hard or soft the final meringue will be.

For soft peaks - place egg whites in a clean glass or metal bowl (not plastic), and beat with an electric mixer on medium speed or with a rotary beater until egg whites form peaks with tips that curl over when the beaters are lifted. For stiff peaks, continue beating egg whites on high speed until they form peaks with tips that stand straight when the beaters are lifted.



For stiff peaks - continue beating egg whites on high speed until they form peaks with tips that stand straight when the beaters are lifted.

Once you start making whipped egg whites, continue it straight through and finish it off. Do not stop halfway to take a break.

The meringue is done when it is not runny and when you can hold a spoonful of it upside down and none of it drops off. Also when you swirl a spoon through it and the swirls hold their shape.

#### Using Meringue:

Make the meringue first - then prepare the filling (such as pie filling).

Place meringue on the piping-hot filling to begin cooking the bottom of the meringue. The residual heat carried by the filling cooks the base of the meringue ever so slightly, making it less prone to leaking or shrinking.

#### Baking Meringue:

Meringues will become more done if you bake them at a lower temperature for a longer time. Bake at 325 degrees for 20 to 30 minutes.

#### Storing Meringue:

Meringue Pies should be stored under an inverted bowl at room temperature.

Remember, meringue pies only last a day or two, and then the meringue starts breaking down. If you place any cooked meringue in the refrigerator, no matter how long you baked it, it will bead and weep.



#### Cutting Meringue:

To cut baked meringue into serving pieces, use a knife dipped in cold water.

## Seed To Table

**Lesson Plan:** Edible Parts of an Animal

**Unit:** Science of Cooking

**Objectives:**

- Students will learn the edible parts of a variety of animals.
- Students will learn from where different cuts of meat come.
- Students will learn how to cook different cuts and styles of meat.

**Modified Curriculum Objectives:**

**Materials:** Meat Anatomy Charts, Meat to cook and necessary equipment.

**Time:** 1-2 hours to discuss issues surrounding meat production

**Vocabulary:** Anatomy, Organs, Muscle, Prions

**Background Information:**

For most Americans meat provides the main source of protein in the diet. While much of this meat comes from cattle; pigs, chickens, and sheep are also raised. Currently antelope, camels, ostrich and alligators are also been raised for specialty meats. Animals have been raised for consumption for many years. As with most food production this animals are either raised in an industrial style farm or in an organic manner.

While humans have hunted for meat from wild animals since the beginning of humans, the domestication of animals for meat is approximately 5-10 thousand years old. The domestication of animals allows for selective breeding. This has allowed for the continually changes in the size and quality of animals breed for meat.

The majority of meat people eat is muscle flesh and connected fat. Adult mammalian muscle flesh consists of roughly 75 percent of water, 19 percent of protein, and 2.5 percent of intramuscular fat. This is a good source of digestible protein. Muscle also contains all of the essential amino acids, and is a good source of zinc, vitamin B12, selenium, phosphorus, niacin, vitamin B6, iron and riboflavin. The fat often improves the taste of the meat but contains high levels of cholesterol. Meat is low in carbohydrates and does not provide any dietary fiber.

In the United States many people eat meat every meal. This is much more than in many parts of the world. Meat is typically more expensive than other sources of protein. Americans also typically eat larger portions of meat than other cultures. By reducing meat consumption

Different animals contain different amounts of fat. The consumption of this fat can lead to certain health problems including heart disease and obesity. In general, wild animals are leaner and are preferred by some people for that reason. Meat can also be the source of certain food borne illnesses. However, proper cooking and avoiding of cross contamination prevents the spread of these bacteria.

Animal organs including heart, liver, and kidneys can be eaten. The heart is very high in protein. The liver is high in iron and Vitamin A. Brains can be eaten as well though some may contain prions associated with incurable and deadly mad cow disease.

Mammals have very similar internal organs to humans. This one reason why doctors practice on pigs and students in perform dissections in biology class. The process of butchering an animal for meat will allow one to see the same similarities. Through observations of animals used to produce meat you can learn about the internal workings of your own body and other animals.

When butchering an animal the butcher cuts select parts of meat from different sections of the animal. Meat that cannot be cut into whole steaks or roasts is used as stew or ground meat. For example from a 1200 pound steer yields 500 pounds of retail cuts from a 750 pound carcass; 22% are steaks, 22% are roasts, 26% is ground beef and stew meat, and 30% is made-up of fat, bone & shrinkage.

A large portion of the meat produced today is raised in large feedlots with many animals confined to a small space. These animals are often fed a corn based diet. In addition the animals are often given growth hormones and antibiotics. While it is less expensive to raise meat in these confined feedlots it does raise environmental and social issues. Environmental issue include the use of petroleum products to ship feed, meat and waste, the large requirements of water and the disposal of manure. Social issues are concern the humane treatment of animals.

Animals can also be raised in a more labor intensive methods by allowing rotational grazing. This allows for a varied diet and animal wastes to be spread throughout the field. Animals are also less likely to get sick and are not treated with the same level of chemicals. Organic or grass-fed meat is often more expensive to purchase. However, this can provide sustainable jobs to local farmers.

The production of meat uses more land and resources than the production of vegetables. It takes 16 pounds of grain to produce one pound of meat. Meat production uses more land, water, fertilizers and petroleum than growing vegetables.

Poultry including chickens, turkeys, and ducks are raised for meat. In the same way there are large buildings that contain feed chickens and there are smaller producers that allow chickens to have a varied diet. There are some studies that show that meat feed different foods produces different nutritional levels.

With many types of meat there is a disassociation with the animal that produces the food. For example we eat beef instead of cow and pork instead of pig. In many urban settings people may not realize from where their meat comes. Even if they have an association with the fact that animals produce meat, many people are unsure of how animals are raised and butchered for food.

When selecting meat there are a wide range of choices. There are several different grades of meat and different breeds of animals that produce different meat. When cooking meat it is important to realize that the quality of the initial ingredients can have a large impact on the final product. The best chefs using the best recipes also want to choose the best ingredients to create the best meal.

There are also people who choose not to eat any meat for a variety of reasons. Some religions prohibit the consumption of certain types of meat. Other people choose to follow a vegan or vegetarian diet for social, environmental, health, or economic reasons.

**Teacher Instruction:**

1. Discuss the use of animals for food production.
2. Set-up a debate vegetarian/meat eating, industrial/organic, etc.
3. Look at charts showing where meat comes from different animals.
4. Prepare recipes to cook a variety of different meats.

**Student Instruction:**

1. Find out from where your meat comes.
2. Research different points of view to debate or write a research paper on issues surrounding meat production.
3. Follow recipes for different cuts of meat.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. Why does the production of meat require more environmental resources?
2. What are sources of protein besides meat?
3. Compare the raising of organic beef to industrial beef.
4. What parts of animals do we usually eat?
5. What parts of an animal are usually not eaten?
6. Where does ground beef come from?
7. What are the health risks associated with eating meat?

**Extensions:** Buy a whole animal and cut it into different parts. Visit a butcher/meat processor. Visit a farm where animals are raised for meat. Watch the movie Food, Inc about industrial farming. Read the Jungle about meat production in Chicago.

**Accommodations:**

**Resources:**

<http://virtualweberbullet.com/meatcharts.html> Charts of where meat comes from for cows, pigs, sheep, and goat.

<http://www.mealsforyou.com/cgi-bin/customize?meatcutsTOC.html> Guide on how to cook various cuts of meat. Beef, Pork and Lamb.

<http://www.goveg.com/> Website encouraging a vegetarian diet.

<http://www.beef.org/> Website encouraging eating beef.

<http://www.nppc.org/> Website encouraging eating pork.

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## Seed To Table

### Lesson Plan: Salt

**Unit:** Science of Cooking

### Objectives:

- Students will learn the chemical properties of salt.
- Students will learn ways to cook with salt.
- Students will learn the history behind using salt.
- Students will be able to experiment with different types of salt.

### Modified Curriculum Objectives:

**Materials:** Salt (Table Salt, Rock Salt, Sea Salt), Magnifying glass/microscope

**Time:** 45-60 minutes 30 minutes observing salts, 30 minutes making ice cream

**Vocabulary:** Sodium, Chloride, Halite, Potassium, Preservation

### Background Information:

Salt (NaCl) Sodium Chloride has been used in food for thousands of years. Salt was first used as a way to preserve meats from spoilage and is now primarily used as a flavor enhancer. It is also an important way to include sodium and chloride into our diets and iodine through an additive.

Chemically speaking the term salt can refer to a wide variety of chemical compounds. However in cooking we use the term salt to refer to sodium chloride. Table salt is not 100% sodium chloride but close, the FDA requires salt to contain at least 97% sodium chloride. The common additives in salt include potassium iodide, to supply iodine in our diets and calcium silicate an anti-caking agent. For people with a low sodium diet a common substitute contains potassium chloride. Salts for curing meats often contain sodium nitrates and sodium nitrites.

Salt is a rock. So if you want to show someone you can eat a rock just pick up some salt. In mineral form it is called Halite. Salt is obtained from two main sources mining halite from the earth often in large salt domes or by evaporating the water out of ocean water. While some people prefer sea salt all the salt we eat was originally from the sea the question is, “When did the water evaporate?” In the case of halite domes the water evaporated millions of years ago. However some manufacturers will sell both table salt and sea salt from the same mine.

The big difference between different types of salt is the shape of the crystals. Table salt is often finer and more uniform shape. There are even finer specialty salts sold for popcorn at expensive prices. Sea Salt is often larger crystals with more irregular shapes. This can enhance the salty

flavor when used as a condiment. However, there is no difference when salt is used in cooking or baking as the salt is completely dissolved in the water or other liquid.

Some cooks prefer to cook with salt without additives as it is possible for these additives to change flavor, coloring, or consistency of the food. If the salt does not contain an anti-caking agent and you will be storing the salt for an extended period of time it may be useful to include a desiccant such as rice to the salt to help pull moisture out of the air. Larger grains of salt are also less likely to clump. Larger grains of salt are also easier to pinch, which some chefs prefer as a way to add salt to the food. Salt is a mineral and will not rot or spoil so the freshness of salt does not matter. If salt does clump you can spread it out on a baking sheet and dry in the oven.

Salt is an important part of a balance diet. However, most people in the United States intake twice the recommended 4 grams of sodium chloride per day. Excess salt may lead to high blood pressure and other illnesses. Many processed foods and can goods already contain salt so adding additional salt at the table often adds more than you need. Some low salt substitutes contain potassium chloride others are sodium chloride in bigger flakes which prevents the salt from compacting and means that a teaspoon will contain less salt.

Salt has been used in the practice of meat preserving for centuries because of its ability to draw out moisture and prevent the survival of bacteria. Long before refrigeration and freezing, salt was the preservative of choice for ancient civilizations, sailors and early pioneers. Salt preservation is still a valid method that is widely used. Meat should be kept cold so that the salt has time to cure the meat allowing it to be free of bacteria.

Pickling was widely used to preserve meats, fruits and vegetables in the past, but today is used almost exclusively to produce "pickles," or pickled cucumbers. Pickling uses the preservative qualities of salt combined with the preservative qualities of acid, such as acetic acid (vinegar). Acid environments inhibit bacteria. To make pickles, cucumbers or other vegetables are soaked in 10-percent salt water brine for several days, then rinsed and stored in vinegar to preserve them for years.

Rock Salt is a cheap form of non food grade salt often used to melt ice on roads and sidewalks. It is also used in making ice cream. Not in the ice cream but in the ice cream maker to lower the freezing point of water. Adding salt also raises the boiling point of water. However, with the small amount of salt added the change in temperature needed to boil is imperceptible.

Some butter also comes salted as a preservative. Many recipes call for unsalted butter and then a certain amount of salt to be added to the recipe. This is because there is no standard for the amount of salt in a pound of butter. In order to better control the amount of salt in a recipe measure it yourself.

**Teacher Instruction:**

1. Using magnifying glasses or dissecting microscopes look at the crystal structure of salt. Can also compare to sugar.
2. The ice cream recipe could also be expanded and used in an ice cream maker or all ingredients could be mixed in a bowl and then given to individual students to mix in their bags about ½ cup per person. Often the ice cream takes awhile to freeze. Though it also tastes good as milk shake/ soft serve. You can freeze in the freezer to harden but the ice cream must be close to complete or the milk will freeze separately in ice crystals.
3. You can also try different food cooked with or without salt and taste the difference. Or taste tests different types of salt

**Student Instruction:**

1. List the uses of salt
2. Take a look at the salt crystals either with a magnifying glass or microscope.
3. Follow the directions to make ice cream

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What is salt?
2. What are some common uses of salt?
3. What happens when salt is put in water?
4. Compare and Contrast table salt, sea salt and rock salt?
5. Does changing the size of the salt crystals change the chemical composition?
6. Why are there chemicals adding to regular table salt?
7. Find on a map where salt can be found.
8. What are some ways to reduce your intake of salt?
9. What happens when you put salt on ice?

**Extensions:** Visit a Halite mine or a sea salt evaporation facility. Try to cure meat with salt or create your own pickles

**Accommodations:**

**Resources:**

<http://www.foodsubs.com/Salt.html>

“What Einstein Told His Cook” Robert Wolke, 2002

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## **Salt**

Name: \_\_\_\_\_

What are the two main chemical components of table salt?

List three uses of salt

Draw a picture of the different crystals of salt.

Why do chefs use salt in their cooking?

List three ways to reduce your salt intake.

## **Materials--Ice Cream**

- 1/4 cup milk
- 1/4 cup whipping cream (heavy cream)
- 1/8 cup sugar
- 1/8 teaspoon vanilla or vanilla flavoring
- 1/2 cup sodium chloride (NaCl) rock salt
- 2 cups ice
- 1-quart Ziploc bag
- 1-gallon Ziploc bag
- thermometer

## **Procedure**

1. Add 1/4 cup sugar, 1/2 cup milk, 1/2 cup whipping cream, and 1/4 teaspoon vanilla to the quart Ziploc bag. Seal the bag securely.
2. Put 2 cups of ice into the gallon Ziploc bag.
3. Use a thermometer to measure and record the temperature of the ice in the gallon bag.
4. Add 1/2 to 3/4 cup salt (sodium chloride) to the bag of ice.
5. Place the sealed quart bag inside the gallon bag of ice and salt. Seal the gallon bag securely.
6. Gently rock the gallon bag from side to side. It's best to hold it by the top seal or to have gloves or a cloth between the bag and your hands because the bag will be cold enough to damage your skin.
7. Continue to rock the bag for 10-15 minutes or until the contents of the quart bag have solidified into ice cream.
8. Open the gallon bag and use the thermometer to measure and record the temperature of the ice/salt mixture.
9. Remove the quart bag, open it, serve the contents into cups with spoons and ENJOY!

## **Explanation**

Ice has to absorb energy in order to melt, changing the phase of water from a solid to a liquid. When you use ice to cool the ingredients for ice cream, the energy is absorbed from the ingredients and from the outside environment (like your hands, if you are holding the baggie of ice!). When you add salt to the ice, it lowers the freezing point of the ice, so even more energy has to be absorbed from the environment in order for the ice to melt. This makes the ice colder than it was before, which is how your ice cream freezes. Ideally, you would make your ice cream using “rock salt”, which is just salt sold as large crystals instead of the small crystals you see in table salt. The larger crystals take more time to dissolve in the water around the ice, which allows for even cooling of the ice cream.

You could use other types of salt instead of sodium chloride, but you couldn't substitute sugar for the salt because (a) sugar doesn't dissolve well in cold water and (b) sugar doesn't dissolve into multiple particles, like an ionic material such as salt. Compounds that break into two pieces upon dissolving, like NaCl breaks into  $\text{Na}^+$  and  $\text{Cl}^-$ , are better at lowering the freezing point than substances that don't separate into particles because the added particles disrupt the ability of the water to form crystalline ice. The more particles there are, the greater the disruption and the greater the impact on particle-dependent properties (colligative properties) like freezing point depression, boiling point elevation, and osmotic pressure. The salt causes the ice to absorb more energy from the environment (becoming colder), so although it lowers the point at which water will re-freeze into ice, you can't add salt to very cold ice and expect it to freeze your ice cream or de-ice a snowy sidewalk (water has to be present!). This is why NaCl isn't used to de-ice sidewalks in areas that are very cold.

## Seed To Table

**Lesson Plan:** Fruits

**Unit:** Science of Cooking

**Objectives:**

- Students will learn how to identify a variety of fruits.
- Students will learn which fruits are locally produced in Wisconsin.
- Students will explore a variety of different ways can be used in cooking.

**Modified Curriculum Objectives:**

**Materials:** A variety of fruits, or pictures of fruits.

**Time:** 1 hour

**Vocabulary:** Fruit, Pome, Drupe, ovary, vegetable, berry, aggregate fruit, composite fruit, citrus

**Background Information:**

A fruit is the ovary of a plant, the ripened seed-bearing ovary. It is usually considered to be sweet and fleshy, as in plums, but may be dry, as in poppies, or be a simple edible supporting structure, as in strawberries. Scientifically fruit is a seed bearing organ of a flowering plant. This definition includes many foods traditionally thought of as vegetables including tomatoes, peppers, cucumbers and squash.

Evolutionarily plants from good tasting fruit to help with seed dispersal. When an animal consumes the fleshy fruit the seed passes through the animal's body and is deposited in new location. The animal even provides some fertilizer to help the seed start to grow. This type of dispersal allows for large seeds to travel farther than the wind could carry them.

Wisconsin is home to many locally produced fruits including apples, pears, strawberries, blueberries, raspberries, mulberries, grapes, cranberries, etc. In addition to cultivated varieties there are many fruits that grow wildly in Wisconsin.

Fruits are often used as a snack, a base for a dessert or an accompaniment to a meal. Fruits are naturally sweetened with fruit sugar, fructose.

There are many ways to classify fruits. These include when the fruit is harvested as a winter or summer fruit. Fruits also can be classified by how the form. Drupes are fruits with a hard stone including peaches, plums and nectarines. Pomes are fruits with several small seeds in the center of the fruit such as apples and pears. While many small fruits are called berries only some are true berries including blueberries, gooseberries, currants and grapes. Strawberries, mulberries

and raspberries are in fact aggregate fruits or a collection of smaller fruits in one bunch. Citrus fruits which cannot grow in the northern climate of Wisconsin include oranges, grapefruit, and tangerines.

Fruits taste better when they are fresh and in season but you will not find fruits growing year round in Wisconsin. If you enjoy fruit, preserve some for the winter and/or purchase fruits from more distance areas when local fruits are unavailable.

There are many ways to preserve fruits. Fruits can be dried whole like raisins or prunes or spread out and dried like fruit leather. Fruits can also be canned, frozen, or made into jams and jellies. Fruit can also be turned into fruit juice or cider. Fruit contains many valuable nutrients and are part of a healthy diet.

**Teacher Instruction:**

1. Discuss with students the variety of fruits that exists and how to use fruits in cooking.
2. Create an opportunity to taste test or compare different fruits.

**Student Instruction:**

1. Create categories to place different fruit into. You can make these based on color, taste, size, shape or some other trait.
2. Compare the categories you created to those other students created.
3. Compare the look, feel, smell, and taste of different varieties of apples.

**Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What benefit does a plant receive from producing fruits?
2. Why are tomatoes and peppers considered fruits?
3. Why was it important for the early sailors to take fruit (limes/oranges) on the boat with them?
4. What health benefits are associated with eating fruits?
5. What causes fruits to be sweet?

**Extensions:** Make apple cider, make a fruit pie, make fruit leather, make jelly, care for fruit trees, or visit a u-pick farm.

**Accommodations:**

**Resources:**

<http://www.thefruitpages.com/sitemap.shtml> Website with information about many types of fruits.

Waters, Alice 2002. *Chez Panisse Fruit*. Harper Collins, New York. Book with information on how to select fruit and recipes to prepare many types of fruit.

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## **Summer Fruits**

Drupes--Peaches, plums, nectarines, apricots, cherries, have a central pit with one seed.

Berries—Blueberries, grapes, cranberries, gooseberries

Aggregate fruits—Raspberries, strawberries, huckleberries, mulberries, are many fruits forming one fruit.

## **Winter Fruits**

Pomes—Apples, pears, quince

Apples – There are over 7000 varieties of apples however 90% of apples sold are from only 15 varieties.

Citrus Fruits –Oranges, Lemons, Limes, Grapefruit, Clementine, Mandarins, Satsumis, Tangerines.

## **Tropical Fruits**

Bananas, kiwis, mangoes, papayas, figs, dates, pomegranates, ugli fruit, coconuts, and passion fruit.

## **Vegetable Fruits**

Tomato, pepper, eggplant, squash, cucumber

Not a fruit but used a one—Rhubarb.

## Seed To Table

**Lesson Plan:** Yeast and other leavening agents

**Unit:** Science of Cooking

**Objectives:**

- Students will learn what types of leavening agents are useful in food preparation.
- Students will be able to identify and appropriately use yeast.
- Students will understand the biological process of using yeast as a leavening agent.

**Modified Curriculum Objectives:**

**Materials:** Balloon activity { 1 Tablespoon of active dry yeast, 1 cup warm water (80° F–100° F), 2 tablespoons sugar, a large rubber balloon, a 1-liter plastic bottle. } Bread Activity { Recipe, Ingredients }

**Time:** Overview 15 minutes, Balloon activity 15 minutes, Bread making 2 hours

**Vocabulary:** yeast, carbon dioxide (CO<sub>2</sub>), fungus, leavening agent, proofing, retarding, fermentation, glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>), ethanol (CH<sub>3</sub>CH<sub>2</sub>OH)

**Background Information:**

The purpose of any leavening agent is to produce the gas that makes bread rise. Yeast does this by feeding on the sugars in flour, and expelling carbon dioxide in the process. Fermentation is a step in creating yeast breads and baked goods where the yeast is allowed to leaven the dough.

While there are about 160 known species of yeast, *Saccharomyces cerevisiae*, commonly known as baker's yeast, is the one most often used in cooking. Yeast is tiny: Just one gram holds about 25 billion cells. That amount of fungi can churn out a significant amount of carbon dioxide (CO<sub>2</sub>), provided it has the simple sugars it uses as food. Fortunately, yeast can use its own enzymes to break down more complex sugars—including granulated sugar, brown sugar, and honey—into a form that it can consume. Yeasts will grow over a temperature range of 10 °C (50 °F) to 37 °C (99 °F).

Proofing (also called proving) is the final dough-rise step before baking, and refers to a specific rest period within the more generalized process known as fermentation. Fermentation rest periods are not often explicitly named, and normally show up in recipes as "Allow dough to rise." Rest periods contrast with work periods when the dough is manipulated by the baker, some work periods are called mixing, kneading, and folding, as well as shaping.

During fermentation, yeast converts glucose and other carbohydrates to carbon dioxide gas which gives the dough rise, and alcohol which gives the baked bread flavor. In sourdough, bacteria which coexist with wild yeast consume this alcohol, producing lactic and acetic acids.

The use of potatoes, water from potato boiling, eggs, or sugar in bread dough accelerates the growth of yeast. Salt and fats such as butter slow down yeast growth.

Over proofing is when fermenting dough has rested so long its bubbles have grown so large they have popped, if baked at this point would result in poor structure. Length of rest periods, including proofing, can be determined by time at specific temperatures or by characteristics of the dough. Often the "poke method" is used to determine if the dough has risen long enough; if the dough, when poked, springs back immediately it is under proofed and needs more time.

Retarding may occur at any time during fermentation and is accomplished by placing the dough into a dough retarder, refrigerator, or other cold environment to slow the activity of the yeast. You may want to retard the fermentation process to save dough for a later cooking.

In 1857, Louis Pasteur discovered yeast is a living organism whose respiration causes fermentation. Yeast also produces alcohol as it feeds, which is why it is an important ingredient in making beer and wines. Beer froth has a long history as a source of yeast. It was used both in ancient Egypt and in nineteenth-century Europe. Yeast was probably first discovered as wild yeast was naturally introduced to bread dough producing a lighter and tastier bread.

### **Other Leavening Agents:**

Chemical leaveners are chemical mixtures that release carbon dioxide or other gases when they react with moisture and heat; they are almost always based on a combination of acid and an alkali. They usually leave behind a chemical salt. Chemical leaveners are used in quick breads and cakes, cookies and other applications where a long biological fermentation is impractical or undesirable.

Since chemical expertise is required to create a functional chemical leaven without leaving behind off-flavors from the chemical precursors involved, such substances are often mixed into premeasured combinations for maximum results. These are generally referred to as baking powders (Baking soda and cream of tartar).

Mechanical leavening includes creaming the process of beating sugar crystals and solid fat (butter) together in a mixer. This integrates tiny air bubbles into the mixture, since the sugar crystals physically cut through the structure of the fat. Creamed mixtures are usually further leavened by a chemical leavener. This is often used in cookies.

Using a whisk on certain liquids, cream or egg whites, can also create foams by mechanical action. This is the method employed in the making of sponge cakes, where an egg protein matrix produced by vigorous whipping provides almost all the structure of the finished product.

### **Teacher Instruction:**

1. Familiarize yourself with background material.
2. Prepare materials necessary for balloon and bread activity.

## **Student Instruction:**

### **Balloon Activity**

1. Stretch out the balloon by blowing it up repeatedly, and then lay it aside.
2. Add the packet of yeast and the sugar to the cup of warm water and stir.
3. Once the yeast and sugar have dissolved, pour the mixture into the bottle. You'll notice the water bubbling as the yeast produces carbon dioxide.
4. Attach the balloon to the mouth of the bottle, and set both aside.
5. After several minutes, you'll notice the balloon standing upright. If you don't see anything happen, keep waiting. Eventually, the balloon will inflate.

Extension A. Try the same experiment using hotter and colder water. Use a thermometer to measure the temperature of the water. At what temperature is the yeast most active? At what temperatures is it unable to blow up the balloon?

Extension B. Repeat the above experiment putting 1 tablespoon of vinegar in the bottle and 1 tablespoon of baking soda in the balloon.

### **Bread Activity**

1. Follow directions in your favorite yeast bread recipe.
2. You can also try a variety of different ingredients to slightly change the flavor or texture of the bread.

### **Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. Is yeast a living organism?
2. How can you determine if yeast is living?
3. Is baking soda a living organism?
4. Compare yeast to baking powder as leavening agents?
5. What happens to the alcohol that is produced by yeast when baking bread?
6. Describe the importance of temperature in leavening.
7. What can you do to speed up or slow the leavening process?
8. Create a graph that shows the speed of carbon dioxide production for different temperatures.

**Extensions:**

Make Sourdough, quick breads, and Irish Soda Bread. Take a tour of a bakery or brewery. Make root or ginger beer.

**Accommodations:**

**Resources:**

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

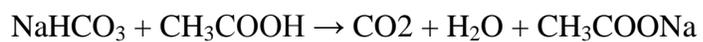
**Readings/Worksheets/Quizzes/Other Materials:**

## Reactions

Glucose → Ethanol + Carbon Dioxide



Baking Soda + Vinegar → Carbon Dioxide + Water + Sodium Acetate (actually 2 simultaneous reactions)



## Seed To Table

**Lesson Plan:** Sprouts

**Unit:** Science of Cooking

**Objectives:**

- Students will understand how seeds grow into plants.
- Students will discover a variety of foods that are easily grown in limited space.
- Students will learn how to combine sprouts with other foods.
- Students will learn the difference between monocots and dicots.

**Modified Curriculum Objectives:**

**Materials:** Mung Beans, Quart Glass Jar, Screen, Water, Smaller Jars, Plastic Bags, Corn Kernels

**Time:** 15 minutes setup. Grow sprouts over a period of 3-4 days.

**Vocabulary:** Sprouts, Alfalfa, Mung Bean, Angiosperm, Cotyledon, Monocot, Dicot, Vitamin C

**Background Information:**

Beans and grains are a time-honored way to get plenty of protein with low fat, high fiber and no cholesterol. Sprouts: Alfalfa, Mung Bean, and Bean Mix, are beans that have been sprouted and are a wonderful option for a variety of meals.

Grown locally year round, sprouts are a good source of protein and vitamin C. Three ounces of Mung bean sprouts contain 30 calories. A 12-ounce bag served as a side dish or salad is enough for 4 to 6 people.

**Sprout History**

Medicinally and nutritionally, sprouts have a long history. Ancient Chinese physicians recognized and prescribed sprouts for curing many disorders over 5,000 years ago. Sprouts have continued to be a main staple in the diets of Asian-Americans.

In the 1700's, sailors were riddled by scurvy (lack of Vitamin C) and suffered heavy casualties during their two to three year voyages. From 1772-1775, Captain James Cook had his sailors eat limes, lemons, and several varieties of sprouts; all abundant holders of Vitamin C. Using these fruits and a continuous program of growing and eating sprouts were credited with preventing scurvy, reducing a major cause of death among sailors.

**Biology of Sprouts**

Flowering plants (the Angiosperms— angio = vessel, box, case; sperma = seed) can be divided into two subgroups: the Monocotyledons (mono = one; cotyl = cavity) and the Dicotyledons (di = two). Monocotyledons (monocots) have one cotyledon (nutrient storage area) in their seeds and several fibrous roots. Examples of monocots are the various grains such as wheat, corn, barley, rice, millet, etc. When these seeds sprout, they will look similar to sprouting grass, another monocot. Dicotyledons, (dicots) have two cotyledons, in their seeds and usually one thicker taproot. Examples of dicots include a wide variety of plants such as peas and beans, nut trees such as almonds or walnuts, sunflower, radish, cabbage, etc. When these seeds sprout, they will look similar to a sprouting bean seedling

### **Nutritional Advantages of Sprouts**

Dr. McKay of Cornell University led off with this dramatic announcement: "Wanted! A vegetable that will grow in any climate, rival meat in nutritive value, mature in 3 to 5 days, be planted any day of the year, require neither soil nor sunshine, rival tomatoes in Vitamin C, be free of waste in preparation and can be cooked with little fuel or eaten raw."

Dr. McKay was talking about soybean sprouts. He and a team of nutritionists had spent years researching the amazing properties of sprouted soybeans. They found that sprouts retain the B-complex vitamins present in the original seed, and show a big jump in Vitamin A and an almost unbelievable amount of Vitamin C above that present in un-sprouted seeds. Nutritionists point out that this high vitamin content is gained at the expense of some protein loss, the figures are still impressive: an average 300 percent increase in Vitamin A and a 500 to 600 percent increase in Vitamin C. Additionally, in the sprouting process starches are converted to simple sugars, thus making sprouts easily digestible.

### **Teacher Instruction:**

1. The Mung beans will grow quickly and can be cooked or eaten raw.
2. The beans will break through the glass jar or push the lid off if it is not seal tight enough.
3. The corn will sprout and the root will start growing towards the earth and the stem will go away from the earth. Geotropism.

### **Student Instruction:**

1. Follow instruction to sprout Mung Bean Sprouts
2. Jar break—Place beans and water in a glass container with sealed lid. Store in a dark location observe over time.
3. Corn sprouts—Tape corn seeds in different orientations to a paper towel in a plastic bag with water. Tape bag to a sunny window. Observe sprouts over time.

### **Questions: (Knowledge, Comprehension, Application, Analysis, Synthesis, Evaluation)**

1. What is the nutritional value of sprouts?
2. How easy is it to grow sprout?

3. What time of year can sprouts be grown?
4. What facilities do you need to grow sprouts?

**Extensions:** Grow additional types of sprouts. Conduct a taste test of different sprouts.

**Accommodations:**

**Resources:**

**Wisconsin Model Academic Standards (<http://dpi.wi.gov/standards/>)**


**Written By:** Keith Pollock

**Readings/Worksheets/Quizzes/Other Materials:**

## **Grow Your Own Bean Sprouts**

½ Cup Mung beans

1 quart glass jar

Cheese cloth/Screen

The procedure:

Begin by washing 1/2 cup of Mung beans and draining, then soaking overnight in water. Drain the soaked beans and place them in a quart glass jar (4 cups / 32 ounces) and cover with water. Place a piece of cheesecloth or similar material over the jar, using a rubber band to hold it in place. Change the water once a day. After several days the sprouts will be plump and long. Rinse them, drain and refrigerate.

Sprouts can be eaten raw or added to stir fry. Sprouts should be added at the end of the stir fry only cooking for about 30 seconds.



**Nutritional Value of Sprouts**

Raw Sprouts (1 cup)	Calories	Protein (grams)	Fiber ( % )	Vitamin C ( D a i l y )	Iron ( V a l u e )	Folate
Alfalfa	10	1.3	3	5	2	3
Mung Bean	26	2.5	4	23	4	9
Radish	16	1.4	n/a	18	2	9
Soybean	86	9.0	3	17	8	30
Wheat	214	8.0	4	5	11	10

(Source: U.S. Department of Agriculture)

## Types of Sprouts and Suggested Uses



### ALFALFA

Alfalfa Sprouts contain significant dietary sources of phytoestrogens connected with prevention of menopausal symptoms, osteoporosis, cancer and heart disease

**Uses:** Great texture in sandwiches, salads and omelets



### SUNFLOWER

Sunflower Sprouts are a rich source of lecithin and vitamin D. The sunflower sprout is known for its crispness and nutty flavor. It breaks down fatty acids into an easily digestible, water soluble form.

**Uses:** Sunflower sprout greens are a delicious addition to salads. They can also be juiced and used in green drinks.



### BROCCOLI

Broccoli Sprouts have a mildly peppery flavor. They are also high in the cancer fighting compound, sulforaphane.

**Uses:** Excellent juiced or in salads.



### MUSTARD

Mustard Sprouts are characterized by their tiny, spicy leaves. They are delicate, but very spicy.

**Uses:** Hot and spicy, this tiny sprout can spice up everything from eggs to salads.



### CLOVER

Clover sprouts contain the most significant dietary sources of isoflavones of any sprout variety. Isoflavones have been proven to have powerful anti-cancer properties.

**Uses:** Healthful addition to salads or sandwiches.



### ONION

Distinct onion flavor without the tears or waste.

Onion sprouts are 20% protein and good sources of vitamins A, C and D.

**Uses:** Spice up a salad or sandwich.



### LENTIL

Lentil Sprouts are 26% protein. They can be cooked or eaten raw.

**Uses:** Nutritious addition to steamed veggies or soups.



### MUNG BEAN

Mung Bean Sprouts are a good source of protein, fiber and vitamin C. A 3 oz. serving contains only 30 calories.

**Uses:** Perfect for many asian dishes. Best when lightly cooked.



### RADISH

Radish Sprouts have 29 times more vitamin C than milk and 4 times the vitamin A. These spicy sprouts have 10 times more calcium than a potato and contain more vitamin C than pineapple.

**Uses:** Too delicate for cooking, radish sprouts are generally used to spice up salads or sandwiches.



### SOYBEAN

Soybean Sprouts are very high in protein, and high in vitamin C, folate and fiber.

**Uses:** Good in casseroles or stews.

# Acknowledgements

## Authors

**Megan Cain** helped create the Kids' Gardening Program at Troy Gardens in Madison, WI. She now manages the East High Youth Farm. Her passions revolve around helping youth get their hands dirty in the garden.

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**Keith Pollock** is the Seed To Table Curriculum Writer at The Goodman Community Center. Keith has worked with youth developing and teaching innovative, hands-on experiential curriculum for more than 15 years. Keith is a certified 6-12 science teacher and has a Masters of Education Psychology from UW-Madison. He also enjoys gardening and cooking with his two young daughters.

## Reviewers

**Elizabeth McCann** is the Director of the Environmental Education Program at Antioch University New England.

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