***Lesson Plans***

**1) Food Systems**

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| **Defining Success** |
| **Goal(s) –** What you want to do / accomplish? The big idea of the unit/lesson/activity. |
| Build a critical framework around and practical knowledge for the creation of a school garden. Students will explore issues of sustainability, agriculture, nutrition, and social justice through the lens of environmental science. Students will have the knowledge and skills necessary to start a school garden and start their own garden. |
| **Learning Objective(s) –** What the students will learn or what the students will be able to do? |
| Analyze the relationship between food systems and food justice. |
| **Content standards**  List the content standards you will address. | **Materials / Resources**  What resources will you use? |
| Analyze factors that affect food choice.  Analyze factors that impact nutritional choices of adolescents. | Cheeseburger  White Board or Smart Board  Food Inc. DVD |

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| **Lesson Cycle** |
| **Procedure for Teaching –** Outline your process for teaching. Include a step-by-step plan that others could follow. What do your students already know? What model will you provide for them? Specify the strategies/techniques you will use. |
| **Agenda**  **Introduction (5 min)**  **Dissect Cheeseburger (5 min)**  **Create Food System Timeline (10 min)**  **Food System Definition (5 min)**  **Food Inc. Clip (10 min)**  **Define Food Justice (5 min)**  **Exit Slip (5 min)**  **Snack – Baby Carrots (5 min)** |
| Do Now: Introduce the teacher(s) and talk briefly about the Urban Nutrition Initiative.  Take a Cheeseburger out from under a box and present it to the class. Ask them how much it costs. Draw a horizontal line on the board and put write ‘cheeseburger $1.08’ at the far right. Under that list the various ingredients found on the cheeseburger.  Ask students to tell you what had to happen in order to make this cheeseburger. As they come up with various components, list them on the timeline (eg: cow, slaughter, transportation, packaging, etc) Label these parts as Production, Processing, Distribution, Consumption, Waste Management. Write on top of the timeline “Food System”  Have students write in their notes the definition of a food system: The term "food system" is used to describe all the activities involved in producing, processing, transporting, storing, selling, and eating food.  Watch clip from Food Inc where a family tries to buy dinner at a fast food restaurant versus a grocery store.  Draw a second timeline on the board to dissect the food system of the broccoli. Ask students why a much more simple system costs more than a much more complex one. Define food justice: Food Justice is communities exercising their right to grow, sell and eat healthy food.  Exit Slip – One Paragraph response: What can be done, in these food systems, that we can actively change or do something about to make them more just?  Distribute baby carrots, reinforce eating vegetables every day. Talking points: Eat a Rainbow, 3-5 a day, Vitamin A |
| **Assessment –** How will you show that your objectives were met or that learning took place? How will you gage mastery? This can be written or oral but include a copy. |
| Students will write a paragraph picking one point of the food system and describing a way they could change it to make it more just. |
| **Homework / Application –** How will the students practice or apply what they have learned? |
| An understanding of food systems will be the foundation for the remaining lessons during this semester. Students will need to retain the information in order to use it on many future occasions as a point of reference. |

**2)** **Food Systems, Part II**

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| **Defining Success** |
| **Goal(s) –** What you want to do / accomplish? The big idea of the unit/lesson/activity. |
| Keeping the class engaged and interactive, we aim to reinforce the information covered last class in a different format. This encourages students to reclaim information and apply it in a more critical thinking manner. We also want this class to self-define goals for the semester, and take ownership over their classroom learning. We want to ensure that we begin this semester with a clear understanding that the classroom is a safe space in which all ideas are valid. |
| **Learning Objective(s) –** What the students will learn or what the students will be able to do? |
| Students should be able to explain their own version of a food system, as well as define a few goals for themselves for the semester. |
| **Content standards**  List the content standards you will address. | **Materials / Resources**  What resources will you use? |
| We will be covering food systems in a more open-ended, interactive manner. Our activity should foster creative thinking amongst students. | Pictures of individual steps in a food system  Index cards for questions |

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| **Lesson Cycle** |
| **Procedure for Teaching –** Outline your process for teaching. Include a step-by-step plan that others could follow. What do your students already know? What model will you provide for them? Specify the strategies/techniques you will use. |
| **Agenda Outline**  **Roadmap (3-5 mins)**  **Icebreaker (15 mins total)**  **Anonymous questions (10 mins)**  **Food Systems Activity (20 mins)**  **Closing discussion/Reflection (5 mins)** |
| **Agenda Detailed**  **Roadmap:** Introduce the class to the schedule for the lesson, establishing that there is a plan to the information and activities they will be doing.  **Ice breaker #1:** “Hey you! What’s your name?” – Activity centered around getting the students comfortable with our presence as co-learners in their classroom.  **Ice breaker #2:** : “My name is \_\_\_\_\_\_. I live in/ I am from \_\_\_\_\_\_\_\_\_\_\_\_. My favorite food is \_\_\_\_\_\_\_\_\_\_\_\_\_.” Aimed at creating a friendly atmosphere.  **Anonymous questions**: Frame the class as an open space for questions (anonymous or not) about anything…   * Introduce idea of pool/ safe space to write down any questions they might have. * Ask if they have any questions or ideas at this point they might not understand * Encourage them to write down one before next activity and one afterwards.   Food Systems Activity: On the floor, lay out printed pictures of each “step” in the food system (growing, tending, harvesting, transporting etc.). The pictures should not be in order, but jumbled up. Have students stand up in a circle around the pictures and each take a turn moving the cards into a ‘system’ on the floor. Everyone’s ideas are valid, but students are encouraged to collaborate and correct one another.  **Closing Activity:** What goals do you have? Personal goals? Larger activity goal? What do you want to get out of this—this being very loosely defined (activity, semester, garden, relationship with Bryn Mawr, etc.) |
| **Assessment –** How will you show that your objectives were met or that learning took place? How will you gage mastery? This can be written or oral but include a copy. |
| Students will go around and explain how a food system works. (Different answers are okay). |
| **Homework / Application –** How will the students practice or apply what they have learned? |
| Students will need this knowledge as we move forward through our lessons; food systems are integral to gardens. |

**3)** **Nutrition by the Numbers**

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| **Defining Success** |
| **Goal(s) –** What you want to do / accomplish? The big idea of the unit/lesson/activity. |
| The main goal for this lesson is to raise student awareness about nutrition. Since proper nutrition can be a potentially sensitive topic, the lesson aims to provide the information in an accessible and non-threatening way. |
| **Learning Objective(s) –** What the students will learn or what the students will be able to do? |
| We would like the students to leave the lesson more informed about nutrition labels as well as what is in the foods they eat. The students should walk away with a general understanding of how to read a nutrition label. We hope this encourages more attention to what students eat. |
| **Content standards**  List the content standards you will address. | **Materials / Resources**  What resources will you use? |
| We will review previously taught content on carbohydrates, proteins and vitamins. We will address basic understanding of food labels, and the key ratios that students should be aware of, for example, fat to protein.  We will also be including a social context through “food facts” that the students will reflect upon. | Empty containers of foods (cereal boxes, chip bags, soup cans) with nutrition labels intact  One set of index cards with numbers that relate to statements about nutrition in the US which are found on the other set of index cards |

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| **Lesson Cycle** |
| **Procedure for Teaching –** Outline your process for teaching. Include a step-by-step plan that others could follow. What do your students already know? What model will you provide for them? Specify the strategies/techniques you will use. |
| **Agenda Outline**  **Opening: Nutrition Label Scavenger Hunt (15 mins)**  **Discussion (5 mins)**  **Class Collaboration (20 mins)**  **Nutrition by the Numbers: Fact selection (10 mins)**  **Fact reflection and sharing (5 mins)** |
| **Agenda Detailed**  **Instructor Prep:** The lesson-leader should provide several ‘typical’ food items that have nutrition labels. For this lesson, we are aiming to expose some of the less healthy contents of foods. So boxed/processed foods along with maybe one non-processed food might make sense. NOTE: The point of this lesson is not to tell students they cannot have certain foods, it is to explain balance in diet.  The instructor will also need to prepare at least one index card per student with a “food fact” on it. These can be calorie counts from fast food meals, or the number of pounds of corn produced every year in the USA. Be creative!  **Opening:** Nutrition Label Scavenger Hunt. Students will sit in groups with a few different products and analyze/observe the labels. What do they see on the label? Are there any words on the label they cannot pronounce? How many ingredients are there? Can you find how much sugar/protein/fat is in this food? Etc.  **Discussion:** Class will reconvene to discuss the different findings they made. What was their most surprising observation? What did they think of the foods now that they had read the labels?  **Class Collaboration:** The instructor shall devise a simple graph on the board with the foods listed on the y axis and the different nutrition facts listed on the x axis. As the instructor goes through each food, students will be asked to find and call out the statistics. Once the graph is full, students will be asked to find the food on the graph that has the most fat/protein/sugar. After discussing these facts, the instructor should lead a discussion in which a sample day’s diet was made up of some of the foods on the graph. The class should then discuss if this was a relatively balanced day based on what they understand about nutrition.  **Nutrition by the Numbers:** The prepared index cards will be passed out to the same groups that worked on labels. The groups should discuss the facts and pick their favorite/most interesting/most shocking fact to share with the class.  **Sharing and Reflection:** The different groups will go around and share their chosen fact with the rest of the class. The class should comment/discuss each one – how does is change their perception of nutrition/food/health? This can be followed by a larger class discussion of the implications of these facts. |
| **Assessment –** How will you show that your objectives were met or that learning took place? How will you gage mastery? This can be written or oral but include a copy. |
| Student assessment will occur across the lesson, with class sharing about nutrition labels and sharing about food facts. As they grapple with nutrition issues, they should be able to articulate why certain foods are bad/good/neutral for them. |
| **Homework / Application –** How will the students practice or apply what they have learned? |
| Students should apply knowledge to their own lives, if not simply be more conscious. It should be emphasized that lessons on adapting one’s diet are not the easiest to be adopted. Good nutrition should be emphasized across lessons and curriculum often. |

**4) Life Cycle of a Seed**

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| **Defining Success** |
| **Goal(s) –** What you want to do / accomplish? The big idea of the unit/lesson/activity. |
| The students should leave with a better understanding of how seeds work to produce a garden. It is important that students see the cycles and systems at work as their garden slowly begins to take shape. |
| **Learning Objective(s) –** What the students will learn or what the students will be able to do? |
| The students should have a grasp of the basic science and systems behind the life cycle of a seed. They should be able to relate this life cycle to the seeds they will soon be planting, as well as to ‘full grown’ foods that they encounter outside of the classroom. |
| **Content standards**  List the content standards you will address. | **Materials / Resources**  What resources will you use? |
| This lesson covers each stage of a seeds life cycle in detail. Students will hear new information (erosion, decomposition, seed growth) and review concepts (the Nitrogen cycle) from earlier in the semester. Students should come away with new connections . | Packet of Beet (or other vegetable) seeds  Bag of Soil  Magnifying glass  Visuals of photosynthesis and pollination  Black paper and white crayon to draw roots |

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| **Lesson Cycle** |
| **Procedure for Teaching –** Outline your process for teaching. Include a step-by-step plan that others could follow. What do your students already know? What model will you provide for them? Specify the strategies/techniques you will use. |
| **Agenda Outline**  **Introduction (1 min)**  **Seed Reflection (5 mins)**  **Life Cycle of the Seed Activity (25 mins)**  **Recap Video of Sped-up Seed Growth (5 mins)**  **Crossword Puzzle (15 mins)**  **Exit Card (1 min)** |
| **Agenda Detailed**  **Introduction/Objective:** Transitioning from food systems to giving knowledge for how to do this. We are going to start planting soon, so this is an important lesson for you.  **Ask:** Where have they seen a seed before? Everyone gets a seed. But what happens between a seed and a plant. Take two minutes to inspect your seed and now we will divide you all into groups and follow the various steps of the seed lifecycle.  **Main Activity: Life Cycle of a Seed**  Rotating stations: each one run by one leader/teacher/instructor. Students told they are acting as drops of water and travel around to the different stations/ stages of life of a seed!  1) What is a seed? What is in it? When do you plant them? What do they do?  2) Planting the seed? What kind of soil available? What soil is? Etc.  3) Anatomy of a root symbiosis with bacteria and roots. Seed growth. Sprouting of the seed. Two leaves poke out of the ground- milestone. Growing a stem and more sprouts.  Have students use chalk on black construction paper to draw the roots below the soil.  4) Plant is grown. What characterizes a plant?  Students can start anywhere in this activity because it is the life of a seed is a cyclical process.    **\*\*Music to play between stations\*\***    **Recap:** **Video** http://www.youtube.com/watch?v=d26AhcKeEbE  Recap of the seed cycle    **Assessment:** Crossword Puzzle  **Exit Card:** One thing you learned and one thing you want to learn |
| **Assessment –** How will you show that your objectives were met or that learning took place? How will you gage mastery? This can be written or oral but include a copy. |
| For this lesson in particular we developed a quick crossword puzzle for the class to work on collectively and generate answers. |
| **Homework / Application –** How will the students practice or apply what they have learned? |
| Students will apply their knowledge as they continue to foster and grow the seedlings. It will be important for them to understand why and how the seeds are growing. |

***Here we have basic notes as well as follow-up questions (which can be formatted as a worksheet) for a guided class or group discussion regarding soil; after that is a “fill in the answers” worksheet regarding plants.***

**Discussion Notes**

The seed is planted in the soil.

**What about the soil makes it good for planting?** Nutrients for the seed!

**Why are there nutrients in the soil?**

Soil covers much of the land on Earth. **(What are some places that don’t have soil?)** It is made up of minerals (rock, sand), air, water, and organic material **What is organic matter?** Matter from dead plants and animals.

**What does soil do?** Soil provides a place for the roots to grow and anchor, a source of food for plants, and a home for many animals (insects, spiders, centipedes, worms, burrowing animals, bacteria, and many others).

**Types of Soil**: There are 12 different types of soils.

**How do you think we can tell the difference between different types?** Unique characteristics, like color, texture, structure, and mineral content. The depth of the soil also varies. The kind of soil in an area helps determines what type of plants can grow.

**What kind of soil do you think we have around here?**

**Soil Formation**: Soil is formed slowly as rock erodes into tiny pieces near the Earth's surface. Organic matter decays and mixes with inorganic material (rock particles, minerals and water) to form soil.

**Soil Horizons (layers)**: Soil is made up of distinct horizontal layers; these layers are called horizons. They range from rich, organic upper layers (humus and topsoil) to underlying rocky layers ( subsoil, regolith and bedrock).

**Ground level** – Decomposed organic matter. Plants and animals live on top   
**Topsoil** - Seeds germinate and plant roots grow in this dark-colored layer.

**Eluviation layer** – It is light in color. It is made up mostly of sand and silt, having lost most of its minerals and clay as water drips through the soil (in the process of eluviation).

**Subsoil** - It contains clay and mineral deposits (like iron, aluminum oxides, and calcium carbonate) that it receives from layers above it when mineralized water drips from the soil above.

**Regolith -** It consists of slightly broken-up bedrock. Plant roots do not penetrate into this layer; very little organic material is found in this layer.  
**Bedrock** – It is solid rock. The lowest layer.

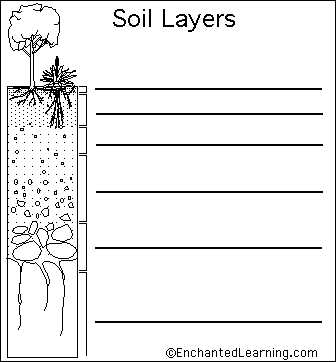
**Soil Questions**

What about the soil makes it good for planting?

What are some areas on Earth that don’t have soil?

What is organic matter?

How is soil formed?



**Life Cycle of a Seed- Step: Plant Grows**

**What are the two general categories of plants? How do they differ in their process of pollination?**

**What do stems do?**

They support the plant. They act like that plant’s plumbing system, conducting water and nutrients from the roots and food in the form of glucose from the leaves to other plant parts. They can be herbaceous or woody.

**What is the difference between a fruit and a vegetable plant?**

A fruit is what a flower becomes after it is pollinated. The seeds for the plant are inside the fruit. Vegetables are other plant parts Carrots are roots, asparagus stalks are stems, and lettuce is a leaf.

**What are the key things that plants need to survive?**

**What are the two main ways plants can be pollinated?**

**What are the products of Photosynthesis? And what path does it follow?**

Vocabulary:

**Herbaceous:** Plants with stems that are usually soft and bendable. These stems die back to the ground every year.

**Woody:** Plants with stems like tree trunks that are hard and do not bend easily. They usually don’t die back to the ground each year.

**Photosynthesis:** a process by which a plant produces its food using energy from sunlight, carbon dioxide, from the air, and water and nutrients form the soil.

**Chlorophyll:** is the green pigment found in plants that helps to capture the sunlight and help the plant carry out photosynthesis to help the plant make food.

**Pollination:** The movement of pollen from one plant to another. It is the transfer from a stamen of one plant to a pistil, namely the stigma of another. This is the process that starts that production of seeds. Bees, butterflies, birds, and moths can act as pollinators.

Plant Parts and Functions:

**Leaves:** Most plants' food is made in their leaves. Leaves are designed to capture sunlight which the plant uses to make food through a process called photosynthesis.

**Flowers:** Flowers are the reproductive part of most plants. Flowers contain pollen and tiny eggs called ovules. After pollination of the flower and fertilization of the ovule, the ovule develops into a fruit.

**Fruit:** Fruit provides a covering for seeds. Fruit can be fleshy like an apple or hard like a nut.

**Seeds:** Seeds contain new plants. Seeds form in fruit.

**5) Erosion, Nitrogen and Planting Seeds!**

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| **Defining Success** |
| **Goal(s) –** What you want to do / accomplish? The big idea of the unit/lesson/activity. |
| By the end of this lesson it is expected that students have a grasp on possible soil problems due to erosion. As well, students should have an understanding of how the nitrogen cycle relates to soil health. |
| **Learning Objective(s) –** What the students will learn or what the students will be able to do? |
| This lesson will review previously learned information, the Nitrogen Cycle, as well as present new information on erosion and soil problems. Students should be able to make the connections between all soil information they have learned so far and the effect this information has on their knowledge of the garden. |
| **Content standards**  List the content standards you will address. | **Materials / Resources**  What resources will you use? |
| This lesson will review the nitrogen cycle and cover information about soil health and problems due to natural and man-made causes. The students will also be planting seeds, which is a unique experience and lies outside of the curriculum standards that can be quantified. | Seed Journals  Bag of soil from outside of school  Vegetable seeds (Beets, Turnips, Yellow Squash, Hot Peppers, Sweet Peppers, etc.)  Flats  Soil  Water |

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| **Lesson Cycle** |
| **Procedure for Teaching –** Outline your process for teaching. Include a step-by-step plan that others could follow. What do your students already know? What model will you provide for them? Specify the strategies/techniques you will use. |
| **Agenda Outline**  **Objective and Roadmap (2 min)**  **Quick Journal (3 min)**  **Soil analysis (5 minutes)**  **Erosion (5-10 minutes)**  **Nitrogen Cycle (5-10 minutes)**  **Connection/transition to seed planting (5-10 minutes)**  **Seed Planting (15 mins)**  **Closing Activity (2 mins)** |
| **Agenda Detailed**  **Objective + Road Mapping**: Today, we will relate what we’ve learned about the life cycle of the seed/ plant and food system, while touching on ideas of erosion and the nitrogen to prepare us for the beginnings of our garden.    As we begin this project, we will also establish/designate responsibility within the group for individual plots of crop (in both the flats stage and the seeds/seedling stage)  1. The aim of this project is to learn how easy it is for us to grow some of our own food and then make some tasty meals or snacks. This fits in with how important it is for us to eat at least five fruit and vegetables every day.  2. We will be growing different vegetables/fruit over the next few weeks. You will be divided into four groups. Your group will be in charge of looking after your plants from sowing the seeds all the way through to picking them when they are ready to eat.  **Ice Breaker**: A writing prompt: If you were a plant, what would you need in your soil to grow? Connect this activity with soil analysis.    **Soil analysis:** Bag of soil collected from right outside the school will be passed around to the students for analysis and observation. Ask everyone to make a different comment (texture, color, content, analogies).  **Information Presented on Erosion and the Nitrogen Cycle**    **Connection and transition to seed planting** (i.e. planting seeds that are nitrogen fixing and prevent erosion).    **Main Activity: One person introduces activity and each of us will facilitate a group?**  · Disseminate seed information/ directions  · Pass out egg cartons/flats, seeds, other supplies  · Have students work in groups at each table to plant select seed(s)  **Closing Activity:**  Have students start a journal, documenting this process: start with observations and pictures of seeds and current state of the plant, have a weekly or tri-weekly observation of seeds, seedlings, plant, etc. They should include questions or comments/pictures they have. |
| **Assessment –** How will you show that your objectives were met or that learning took place? How will you gage mastery? This can be written or oral but include a copy. |
| Assessment will be conducted by the sharing of the seed journals and the application of material discussed in class in student observations and analysis. Information learned should become part of their working vocabulary. |
| **Homework / Application –** How will the students practice or apply what they have learned? |
| Students will continue to apply what they have learned as they progress with writing in their seed journals and discussing the growth of the seedlings. |

**6) Water**

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| **Defining Success** |
| **Goal(s) –** What you want to do / accomplish? The big idea of the unit/lesson/activity. |
| This lesson will focus on the relationship between water and a garden. By the conclusion of the lessons students should have an understanding of this relationship and how it applies to their garden. |
| **Learning Objective(s) –** What the students will learn or what the students will be able to do? |
| The students will learn the role water plays in the growth of food that they eat. Students will follow up on connections they made earlier in the semester about water’s role in food systems. |
| **Content standards**  List the content standards you will address. | **Materials / Resources**  What resources will you use? |
| Students will learn about the scientific process of seed/plant hydration. Students will also learn about different types of water: tap water, purified water, grey-water etc. and develop connections between these “types” and the watering of their garden. | Bottle of commercially bottled water  Bottle of water from school sink  Seed Journal |

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| **Lesson Cycle** |
| **Procedure for Teaching –** Outline your process for teaching. Include a step-by-step plan that others could follow. What do your students already know? What model will you provide for them? Specify the strategies/techniques you will use. |
| **Agenda Outline**  **Objective/Ice breaker (5 min)**  **Seed Journal Prompt 1 (10 min)**  **Water Stations Activity (20 min)**  **Free Write and Idea Share (10 min)**  **Closing: Seed Journal Prompt 2 (5 min)** |
| **Agenda Detailed**  **Objective:** Using issues of general water access, we will apply alternatives ways of water accumulation to address the needs and function of our school garden.    **Ice Breaker:** Have students stand in a circle, throwing around a bottle of water (Poland Spring) and have them describe what they see, smell, where it comes from. Then throw around a bottle of rainwater and repeat process.  **Seed Journal Prompt #1:** What are the things you do with water? (What types of water play a role in those parts of your day?)    **Transition to Stations Activity:**  **1)** Grey Water  **2)** Rain Water Run-Off  **3)** Where does water come from? : Working within and through their notions of water in Philadelphia, in their homes, where does water play a role in their daily routine/ life and where does that water come from?  **4)** How do we get water in the garden? : Suggest ways to apply these different types/ challenges we may run into when doing this  **Free Write and Idea Share:** Brainstorming ideas on how to get water into the garden. Do a class-wide share and narrow down a few possible solutions.      **Closing: Seed Journal Prompt #2:** How does water play a role in the growth of these seedlings and how will it play a role in the bigger system of the garden? |
| **Assessment –** How will you show that your objectives were met or that learning took place? How will you gage mastery? This can be written or oral but include a copy. |
| The students’ ability to apply the information learned throughout the lesson to the problem of getting water to the garden site will be a demonstration of their understanding and implementation of the knowledge. |
| **Homework / Application –** How will the students practice or apply what they have learned? |
| Students will need to continue to think about water as a crucial element to their garden, particularly over the summer. They will also need to apply this knowledge when researching their seed for the final project. |

**Weeks 7, 8 and 9: Final Project**

Below are the directions for the final project.

**Environmental Science Garden Final Project**

Directions: To tie together the different lessons we’ve covered and to give you a space to showcase your interests, this project will work as a capstone to the garden project unit. It will be due on **\_\_\_\_\_\_\_.**On this day, you will present to the class at the garden to celebrate the work you’ve put in this semester.

Here are some guidelines to help you get started.

1) Pick one of the two vegetables/ herbs you planted in your groups.

2) Use laptops and books to research different aspects of this plant’s life that you find interesting.

Some ideas:

* Talk about how to plant the seeds and how to take care of them (ie. type of soil, amount of water and sunlight, distance apart from each other in the trays.)
* How and when to harvest the crop.
* The life cycle of the seed and plant.
* Anything else you find interesting.

3) Include a family recipe that uses your vegetable or herb, as well as any pictures you find of that recipe.

4) Either draw or print out pictures of your vegetable and create a collage of these images.

5) Present all this information in a decorated booklet or poster.

**7) Research Period**

* Students will use the time to research their seed, collect and record their information

**8) Creation Period**

* Students will spend the period starting their posters and presentations. Instructor should provide markers/crayons/scissors/glue

**9) Presentation and Celebration**

* Last day of class! As a nice surprise for students, the teacher/instructor is encouraged to decorate the classroom with students’ work to showcase the semester’s work. It may also prove really successful to prepare the recipes the students have selected. Students will all give their final presentations to an audience comprised of their classmates, other high school students, faculty, and administration, as well as key community members and allies.

**Rubric for Final Project**

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| Category | Comments | Rating (1-5) |
| **Research**    1. Chose a plant that you planted  2. Talked about how to plant the seeds and how to take care of them (ie. type of soil, amount of water and sunlight, distance apart from each other in the trays, etc.)  3. Discussed how and when to harvest the crop.  4. Included the life cycle of the seed and plant.  5. Family Recipe |  |  |
| **Poster**    1. Neatness  2. Colorful and creative  3. All information/ research included on poster  4. At least 2 pictures/ collage of pictures (drawn or printed) included. |  |  |
| **Presentation**    1. ~2 minutes long  2. Speaks loudly and clearly  3. Makes eye contact with the audience |  |  |

***Potential Math Lesson***

In the interest of making the process of building an urban garden fully interdisciplinary, we have created a potential math lesson to be included in the curriculum already devised, or used as inspiration for a math curriculum.

***Applying Knowledge: Building Raised Beds***

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| **Defining Success** |
| **Goal(s) –** What you want to do / accomplish? The big idea of the unit/lesson/activity. |
| Apply current knowledge of geometry, particularly area and volume, to the creation of a school garden. These concepts will be used to determine dimensions of raised beds and to determine volumes of soil needed to fill each of these beds. Students will explore issues of length, width, through the lens of application and creation. Once completed with this lesson, students will have the knowledge and background to physically create the raised beds to really jumpstart their own school garden. |
| **Learning Objective(s) –** What the students will learn or what the students will be able to do? |
| Students will be able to take their knowledge of geometry and apply it within the context of an environmental studies class, and in an even larger scale of interdisciplinary nature, students will recognize the role of math within issues of nutrition, food access, and the implementation of such values. |
| **Materials / Resources**  What resources will you use? |
| Index Cards  8.5 x 11 Paper  Tape Measures  Tape  Scissors  Vacant Lot To Garden In  White Board or Smart Board |

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| **Lesson Cycle** |
| **Procedure for Teaching –** Outline your process for teaching. Include a step-by-step plan that others could follow. What do your students already know? What model will you provide for them? Specify the strategies/techniques you will use. |
| **Agenda**   1. Do Now / Introduction-- 15 minutes 2. Urban Garden Photo Discussion—5 minutes 3. Human Box and Dimension Discussions– 10 minutes 4. Volume Problems– 10 minutes 5. Raised Bed Pictures– 10 minutes 6. Exit Slip | **Prompt / Do Now**   1. Leave tape and different combinations of four index cards and sheets of paper at each desk. Give students the simple task of creating a box out of these four differently sized papers. 2. Then pass out scissors and give them the task of altering the box so that it covers a certain amount of area. 3. Create a gallery and have students walk around to each different structure with the guiding question: **How can each of these structures, if placed in the garden, be effective in the mission of creating a student-run community garden?** |
| 1. Do Now: Introduce application of math and geometry to environmental studies and garden project through a hands-on, group activity- “Box Gallery.” 2. Show an array of photos of urban gardens with geometric figures as the key aspect that ties them all together, Whether through signage of the garden, fences, raised beds, or art fixtures, make sure there is an array of ways geometry is prominent in these urban garden photos. 3. Guide students through this question by going back to the “Do Now” question of how their geometric figures would fit into the context of a community urban garden. 4. Connect these two discussions back to the application of geometry to implement their ideas. Model the ideas of length, width, area, and volume by having students stand up. 5. Tell them to arrange themselves in height order around a 5x5 box without talking. Once the figure is formed, have one student measure the height of the box. Using these dimensions tell the class to return to their desks and determine the volume of the box they’d created. 6. Write 5 more examples of dimensions and volume problems and have the class work together to solve them. Review the answers with the group. 7. Have students choose four sets of dimensions for a raised bed that they feel are most ideal for the land in our garden plot. Have them work in groups to create diagrams/ pictures of their envisioned lot. 8. Group Exit Slip – One Paragraph response: How can/ will we teach they people on our community garden service day about the geometry and dimension calculations that go behind building the raised beds? Have these responses executed on the garden workday by having students facilitate the groups of other Bryn Mawr and Parkway students at the event. |
| **Assessment –** How will you show that your objectives were met or that learning took place? How will you gage mastery? This can be written or oral but include a copy. |
| Students will work in two groups to apply their dimension, area, and volume calculations to the creation of raised beds to be put into the lot. The other shapes/structures from the “Box Gallery” Do Now might make room for art project fixtures, or a sign for the entrance of the garden and can be incorporated as such. This activity will take place at a service day where other Bryn Mawr students and Parkway students can join in on the event and creation of garden fixtures. |