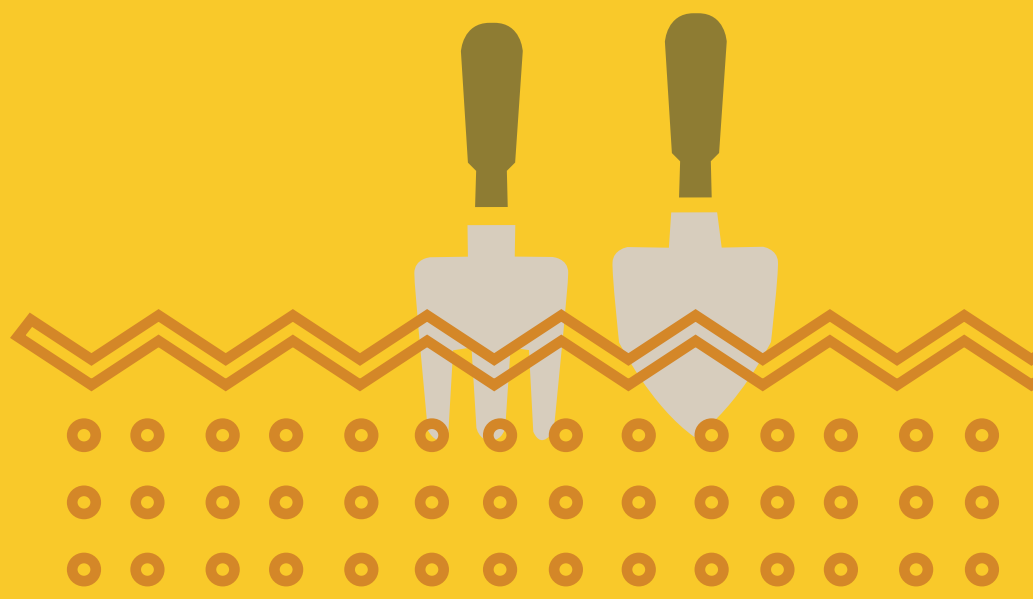
The Outdoor Garden Classroom

Hands-On STEM Teaching Curriculum, Pre-K-5

5

Fifth Grade Lessons

Farmers' Market
(2nd Edition)



THE OUTDOOR GARDEN CLASSROOM

Hands-On STEM Teaching Curriculum, Pre K-5

Lessons are to Nevada State and Next Generation Science Standards

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The Outdoor Garden Classroom: Hands-On STEM Curriculum K-5 was funded by The American Honda Foundation and created by teachers from the Clark County School District in Southern Nevada in Association with Green Our Planet and Three Square.

The **American Honda Foundation** helps meet the needs of American society in the areas of youth and scientific education by awarding grants to nonprofits, while strategically assisting communities in deriving long-term benefits. Since 1984, the American Honda Foundation has awarded more than $32 million to organizations serving over 115 million people in every state in the U.S.

Green Our Planet is a nonprofit, 501(c)(3) organization established in 2013. Its mission is to raise money for green projects worldwide via its crowdfunding platform and to educate the public about the most pressing environmental issues facing the planet today. Green Our Planet's overall goal is to help conserve, protect, and improve the environment through funding green projects and through education, which includes STEM, nutrition and conservation education in K-12 schools. In 2013, Green Our Planet launched its "Outdoor Garden Classroom Program" in Las Vegas, Nevada, which is designed to help schools fund and use outdoor vegetable gardens as "hands-on" classrooms. For more information on Green Our Planet and its programs, please visit *www.greenourplanet.org*.

Three Square's mission is to provide wholesome food to hungry people, while passionately pursuing a hunger-free community. Three Square combines food banking (warehousing canned and boxed goods), food rescue (obtaining surplus or unused meats, bread, dairy and produce from hospitality and grocery outlets), and ready-to-eat meals as the most complete food solution for Southern Nevada. Three Square works with more than 1,300 partner sites in the Southern Nevada community. Three Square distributed more than 30 million pounds of food, the equivalent of more than 25 million meals.

Achieving Excellence Through Education. The vision of Clark County, in conjunction with the Clark County School District, is to provide a safe, supportive environment which enables each student to acquire knowledge, skills and values necessary to a lifelong learner and to become a responsible, contributing member of our changing society.

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A NOTE ON THE SECOND (REVISED) EDITION

Since its release in October, 2014, the Outdoor Garden Classroom Hands-On STEM Teaching Curriculum has been used at an increasingly greater number of schools. During the 2014-2015 school year, 63 teachers at 15 CCSD schools provided feedback on their use of the curriculum with their students. The feedback and improvements they suggested were used by five of the original teachers who created the curriculum so that the 2nd edition could be revised and improved. In addition, the curriculum was extended into Pre-K. Further improvements occurred in the summer of 2015 when nutritional facts were added to the lessons for grades 1 through 5. The nutritional facts are aligned to Nevada State Standards and are tied to the information in each science lesson. Also added to this edition are "Brain Breaks" that occur every 15 minutes. These consist of vigorous exercise breaks that are connected to gardening. For example, students might jump up and down while picking imaginary apples from a tree or students might pretend to dig holes in the ground in order to transplant vegetables. Grades 3, 4, and 5 also now have worksheets and a "lesson map" added to them, so that teachers can more easily plan out the teaching of each lesson.

In subsequent years, the OGC curriculum will continue to be revised based on further teacher feedback. In this way, the lessons can continually be improved so that they become a "living curriculum." A special thanks to all of the teachers who contributed to this revised 2nd edition!

TEACHER FEEDBACK—LET US HEAR FROM YOU!

Teacher feedback is welcome—we want to hear from you about your experiences using this curriculum so that the lessons can be continually improved! All feedback can be left at: **lessons.greenourplanet.org**

Click on the tab at top that says " Teacher Feedback."

Teachers and administrators can also contact us directly at:
info@greenourplanet.org

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There are two units to the 5th grade lessons. **Farmers' Market Unit 1** focuses on training students how to run a successful Farmers' Market. Students will learn how to write a business plan for their garden, how to figure out profit and loss as well as identify the expenses for the garden. Students will learn how to conduct market surveys to find out what their customers want, how to create a successful advertisement for their garden as well as a social media campaign. Students will then run a farmers' market in the Fall and again in the Spring.

Food Justice Unit 2 focuses on food justice in the community and around the world. Students will learn about the different kinds of agriculture practices from large industrial farming to more sustainable farming and permaculture. Students will learn about pesticides and GMOs and how alternatives are possible. Students will learn what a food desert is and how to create a food desert map of their city. Students will learn about Food as a Solution Bill of Rights.

SEPTEMBER

Farmers' Market Lesson 1 - Starting a New Business

Objectives

NV Standards: (5)1.1 Use evidence recorded in a science notebook to develop descriptions, models, explanations, and predictions.
Next Generation Standards: 3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
Common Core Standards: Writing: W.5.2.b Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic. W.5.2.d Use precise language and domain-specific vocabulary to inform about or explain the topic. W.5.2.e Provide a concluding statement or section related to the information or explanation presented. W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. W.5.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. Speaking and Listening: SL.5.1.b Follow agreed-upon rules for discussions and carry out assigned roles. SL.5.1.d Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

Overview

Students will learn the basics of starting their own business. Students will be introduced to the idea of starting and running a farmers' market centered on their own school garden. Big or small it all starts with an idea. This lesson is all about the big idea and the basic need-to-knows of starting a business. Students will learn how to define 'entrepreneur', work through the steps for starting a business, explain how to make a profit and discuss how to set prices for profit.

Food Justice Lesson 1 - Where does our food come from? Part 1

Objectives

NV Standards: (5) 1.11 Describe the positive and negative impacts of technologies (dams, agriculture, using natural resources) on society and the environment. [N.5.B.2, E.5.C.3, L.5.C.3, L.5.C.4]. (5) 4.7 Investigate and describe how some environmental conditions are more favorable than others to living things. [L.5.C.3] (5) 4.8 Investigate and describe how organisms, including humans, can cause changes in their environments. [N.5.B.2, L.5.C.4]
Next Generation Standards: ESS3.C: Human Impacts on Earth Systems
Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. [5-ESS3-1] (5) 1.4 Draw conclusions from scientific evidence. [N.5.A.3] (5) 4.8 Investigate and describe how organisms, including humans, can cause changes in their environments. [N.5.B.2, L.5.C.4]
Common Core Standards: English Language Arts: CCSS.ELA-Literacy.RL.5.1- Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

Overview

Students will read articles about different ways of farming in the modern United States and compare and contrast the methods. Students will be able to define, compare, and contrast industrial and sustainable farming.

OCTOBER

Farmers' Market Lesson 2 - Cost and Profit

Objectives

NV Standards: (5)1.1 Use evidence recorded in a science notebook to develop descriptions, models, explanations, and predictions.

Next Generation Standards: 3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Common Core Standards: Reading Informational Text: RI.5.3 Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text. RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. Math: 5.NBT.A.3 Read, write, and compare decimals to thousandths. 5.NBT.B.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Writing: W.5.2.d Use precise language and domain-specific vocabulary

to inform about or explain the topic. W.5.2.e Provide a concluding statement or section related to the information or explanation presented. W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. W.5.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. Speaking and Listening SL.5.1.b Follow agreed-upon rules for discussions and carry out assigned roles. SL.5.1.d Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

Overview

Students will learn how to calculate costs and profits within the business of the garden. Students will learn how to define cost, profit, loss, expense, budget, producers and consumers, know what a sustainable garden looks like, explain how to make a profit and project future earnings, discuss how to set prices for profit, keep a record of all expenses, profits, and losses.

Food Justice Lesson 2: - Where does our food come from? Part 2

Objectives

NV Standards: (5) 1.4 Draw conclusions from scientific evidence. [N.5.A.3] (5) 4.8 Investigate and describe how organisms, including humans, can cause changes in their environments. [N.5.B.2, L.5.C.4]

Next Generation Standards: 5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. ESS3.C Human Impacts on Earth Systems Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments (5-ESS3-1).

Common Core Standards: English Language Arts CCSS.ELA-Literacy.RL.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

Overview

Students will explore the various types of farming. Students will be able to define, compare, and contrast permaculture and native farming practices of the Mojave Desert.

NOVEMBER

Farmers' Market Lesson 3 - Persuasive Writing and Creating a Successful Advertising Campaign

Objectives

NV Standards: (5) 1.1 Use evidence recorded in a science notebook to develop descriptions, models, explanations, and predictions.
Next Generation Standards: 3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
Common Core Standards: Reading Informational Text: RI.5.8 Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s). RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. Writing: W.5.2.d Use precise language and domain-specific vocabulary to inform about or explain the topic. W.5.2.e Provide a concluding statement or section related to the information or explanation presented. W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. W.5.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. Speaking and Listening: SL.5.1.b Follow agreed-upon rules for discussions and carry out assigned roles. SL.5.1.d Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions. SL.5.4 Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

Overview

Students will learn the basics of advertising for business. Students will learn various ways of advertising their farmers market to generate and sustain business. Students will learn how to recognize market opportunity (know your product, know your customer), assess the demand for products (market survey), and advertise the market (how and why) along with other aspects of business expansion and marketing techniques.

Food Justice Lesson 3 - Pesticides

Objectives

NV Standards: (5) 1.11 Describe the positive and negative impacts of technologies (dams, agriculture, using natural resources) on society and the environment. [N.5.B.2, E.5.C.3, L.5.C.3, L.5.C.4]. (5) 4.8 Investigate and describe how organisms, including humans, can cause changes in their environments. [N.5.B.2, L.5.C.4]

Next Generation Standards: LS2.B Cycles of Matter and Energy Transfer in Ecosystems Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment (5-LS2-1). ESS3.C Human Impacts on Earth Systems Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments (5-ESS3-1).
Common Core Standards: English Language Arts CCSS.ELA-Literacy. W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

Overview

Students will explore and investigate the use of pesticides in agriculture, including the effects to our health and the environment. Students will interpret, analyze, and evaluate the use of pesticides on fruits and vegetables.

DECEMBER

1st Farmers' Market run by the students
Food Justice Lesson 4 - GMOs

Objectives

Nevada State Standards: Cause and effect relationships are routinely identified, tested, and used to explain change. (5-PS1-4) Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2) (5) 1.11 Describe the positive and negative impacts of technologies (dams, agriculture, using natural resources) on society and the environment. [N.5.B.2, E.5.C.3, L.5.C.3, L.5.C.4] (5) 4.8 Investigate and describe how organisms, including humans, can cause changes in their environments. [N.5.B.2, L.5.C.4]

Next Generation Standards: 5.NBT.A.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

Overview

Students will explore the pros and cons of Genetically Modified Organisms (GMO). Students will identify, evaluate, and compare and contrast arguments for and against GMOs. In order to provide an alternative to creating and requiring GMO seeds, students will calculate the amount of seeds that could potentially be saved from one plant using exponents.

JANUARY

Repeat Farmers' Market Lesson 1 - Starting a New Business
Food Justice Lesson 5 - Examining the Impact of Pesticides and GMOs on Sweet Potatoes

Objectives

Nevada State Standards: (5) 1.3 Replicate investigations conducted by others and compare results. [N.5.A.2, N.5.B.3] (5) 1.4 Draw conclusions from scientific evidence. [N.5.A.3] (5) 1.5 Create and use labeled illustrations, graphs (tables, line plots, stem and leaf plots, scatter plots, histograms), and charts to convey ideas, record observations, and make predictions. [N.5.A.1, N.5.A.4] (5) 1.1 Use evidence recorded in a science notebook to develop descriptions, models, explanations, and predictions. [N.5.A.1] (5) 4.8 Investigate and describe how organisms, including humans, can cause changes in their environments. [N.5.B.2, L.5.C.4]

Next Generation Standards: ESS3.C: Human Impacts on Earth Systems. Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1) Describe and graph quantities such as area and volume to address scientific questions. (5-ESS2-2) Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3)

Overview

Students will continue to study the effects and impact of pesticides and GMOs on our food. Students will conduct an experiment to evaluate the impact of pesticides and GMOs on sweet potatoes.

FEBRUARY

Repeat Farmers' Market Lesson 2 - Cost and Profit
Food Justice Lesson 6 - Food Justice Simulation

Objectives

Nevada State Standards: CCSD K-5 Health Curriculum Standards Discuss how community resources assist with making other personal health decisions [NS. 6.5.3] CC 5.SL.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
Next Generation Standards: 5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. 5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Common Core Standards: CCSS.Math.Content.5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (See assessment b)

Overview

Students will examine food systems. Students will experience and evaluate the food system based on accessibility within different communities.

MARCH

Repeat Farmers' Market Lesson 3 - Persuasive Writing and Creating a Successful Advertising Campaign
Food Justice Lesson 7 - Food Bill of Rights

Objectives

Nevada State Standards: CCSD K-5 Health Curriculum Standards: Discuss how community resources assist with making other personal health decisions [NS. 6.5.3] CC: 5.SL.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' idea and expressing their own clearly.
Next Generation Standards: 5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
3-5-ETS1-1-3 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Overview

Students will examine food systems in different communities. Students will experience and evaluate the food system based on accessibility within different communities.

APRIL

2nd Farmers' Market run by students
Food Justice Lesson 8 - Graphing Data on Food Deserts

Objectives

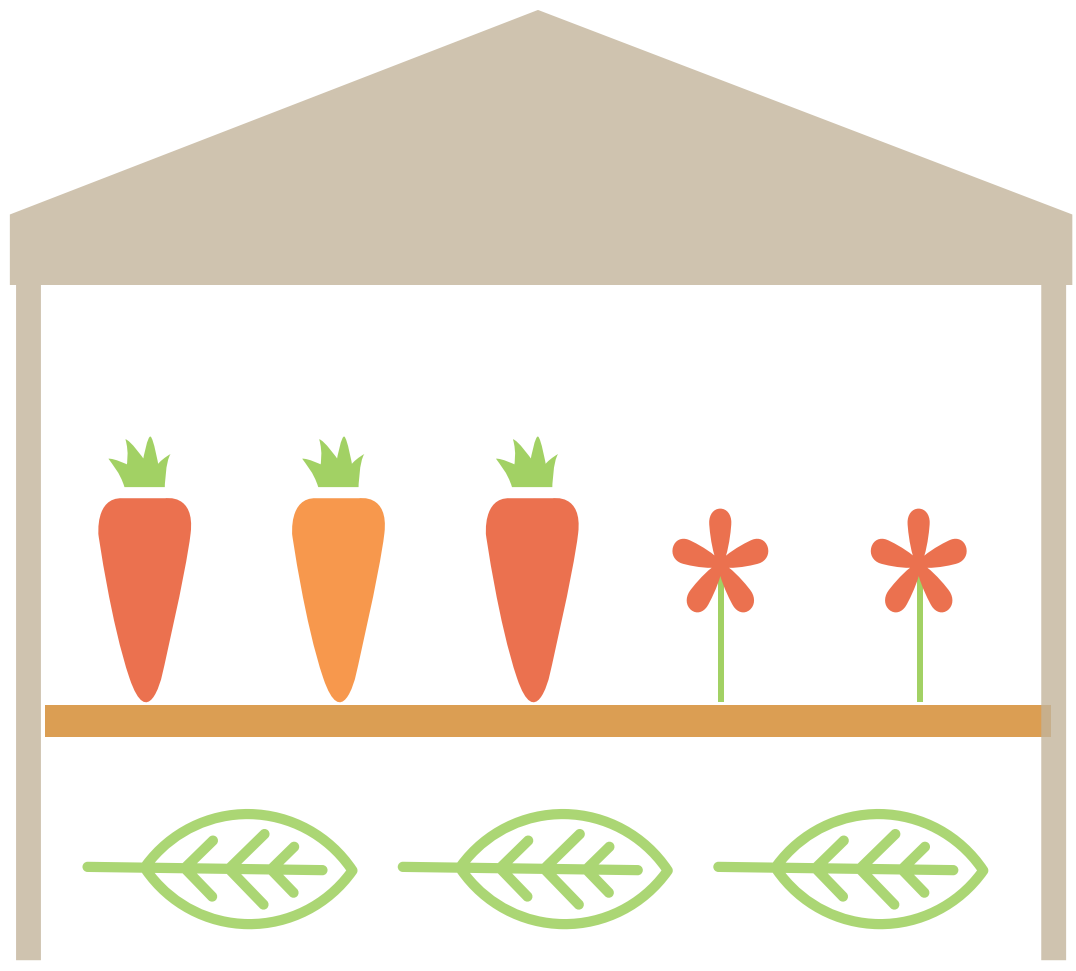
Nevada State Standards: (5)1.4 Draw conclusions from scientific evidence. [N.5.A.3] (5)1.5 Create and use labeled illustrations, graphs (tables, line plots, stem and leaf plots, scatter plots, histograms), and charts to convey ideas, record observations, and make predictions. [N.5.A.1, N.5.A.4]
Next Generation Standards: ESS3.C Human Impacts on Earth Systems Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1) Represent data in graphical displays (bar graphs, pictographs

and/or pie charts) to reveal patterns that indicate relationships. (5-ESS1-2) People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1)
CCSD K-5 Health Curriculum Standards: Discuss how community resources assist with making other personal health decisions. [NS. 6.5.3]
Common Core: Speaking and Listening 5.SL.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly. Math Review: Graph data using a variety of graphs to review maximum, minimum, and mode.

Overview
Students will graph data about their communities' access to healthy and fresh food.

MAY

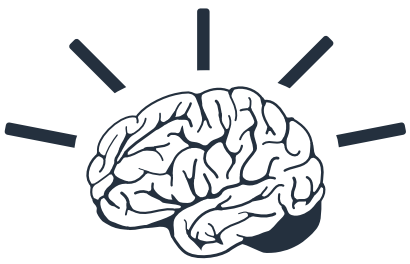
3rd Farmers' Market run by students



Farmers' Market

Lesson One

Starting a Business



BRAIN BREAKS!

1. Plant Partners Teacher will give class a plant part (seed, root, stem, leaves, flower). Students turn to a partner and go back and forth naming vegetables harvested from that part of the plant. Repeat until partners can no longer name vegetables from that plant part.

2. Apple, Watermelon, Banana (rock, paper, scissors) Students play rock, paper, scissors replacing rock with apple, paper with watermelon and scissors with bananas. Play as many rounds as possible in given time frame.

3. Garden Taboo Teacher plays music. When music stops students pair up. Teacher calls out a garden topic such as fruit. Partner A has to describe any fruit they want to their partner without saying the name. Partner B has to try and guess what their partner is describing.

4. Syllable Snacks Teacher will call out a number (1-4). Students work with a partner to come up with garden vocabulary words that contain that number of syllables. Partner A will begin by naming a vocabulary word with the given number of syllables; partner B will go next. They will alternate until one partner can no longer name a vocabulary word with the given number of syllables.

5. Fruit/Veggie Knock Students will work with a partner and touch knuckle to knuckle (veggie) and palm to palm (fruit) in a given sequence. Teacher will name the sequence to the class (Ex: veggie, veggie, fruit) and students will have to use the given hand gestures to complete the sequence. Teacher will increases the number of movements with each round (Ex: Round 1-veggie, veggie, fruit. Round 2-fruit, veggie, veggie, fruit).

6. Fruit/Veggie Match Students will stand. Teacher will name a fruit or vegetable and students will have to touch that part of the body corresponding to the part of the plant that the fruit or vegetable grows from (roots-feet, stem-legs, leaves-body, flowers-head). Teacher will call out and play the game “Simon says” going a little faster with each round.

7. Plant Part Finger Hop Students touch thumb to thumb, pointer to pointer, middle to middle, ring to ring, pinkie to pinkie as they say the plant part finger hop chant (seeds, roots, stems, leaves, flowers). Teacher will randomly call out a plant part, students will have to touch the corresponding fingers. Teacher will repeat, increasing the pace with each round.

8. The Harvester Students will stand and squat (harvest) with a shovel in hand. They will shovel the dirt over alternating shoulders like a farmer. Students will work at their own pace “harvesting” for the given time frame.

9. Apple Squat Students will stand and begin by squatting. They will then stand up on one foot, hop twice saying “apple, apple” then return to a squat. Repeat with increasing speed each round and alternating feet.

10. Fruit Freeze Teacher will randomly call out different fruits and vegetables. If the teacher calls out a veggie, students have to jog (or march) in place, if teacher calls out a fruit, students have to freeze.

11. Garden Guess Students will work with a partner. Partner A will silently think of a fruit or vegetable. Partner B can ask three questions about what their partner is thinking. After three questions, partner B has to guess the fruit or vegetable. They will then switch roles, and partner B will silently think of a fruit or vegetable and partner A gets to ask questions and guess. Repeat as many times as possible in the given time frame.

OVERVIEW

Students will learn the basics of starting their own business.

OBJECTIVES

▶ Students will be introduced to the idea of starting and running a farmers' market centered on their own school garden. Big or small it all starts with an idea. This lesson is all about the big idea and the basic need-to-knows of starting a business.

▶ Students will be able to:

- Define 'entrepreneur'
- Work through the steps for starting a business
- Explain how to make a profit
- Discuss how to set prices for profit

STANDARDS

Nevada State Standards

(5)1.1 Use evidence recorded in a science notebook to develop descriptions, models, explanations, and predictions. N.5.A.1

Next Generation Standards

3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

Common Core Standards

Writing

W.5.2.b Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.

W.5.2.d Use precise language and domain-specific vocabulary to inform about or explain the topic.

W.5.2.e Provide a concluding statement or section related to the information or explanation presented.

W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

W.5.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Speaking and Listening

SL.5.1.b Follow agreed-upon rules for discussions and carry out assigned roles.

SL.5.1.d Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

TIME

6 one hour classes done over a series of a period of time: daily or over a couple of weeks.

MATERIALS

- Handout: KIQ Chart
- Handout: Four Square Concept Map
- Handout: I Chart
- Pencil/pen
- Garden Journal (any format of bound lined paper will work)
- Chart paper or whiteboard to record class thinking
- YouTube access or prior download of CNN video
- Computers with internet access for research

PROCEDURES

(Students may record thinking in garden journal)

- ENGAGE Day 1

1. Watch the YouTube CNN video (3:26): https://www.youtube.com/watch?v=5li1WpjOtd0&list=PLPGrqA6pNgmyNs2FE19sd0ioQN2Mmc6sR

2. Handout: KIQ Chart. Student will fill out chart independently and quietly. Allow for all students to finish.

3. In small groups (2-4), have students share their thinking for each color. They can add new ideas as they share.

4. In large group share the general ideas for each column. Record on chart or whiteboard and keep posted in room for future reference.

- EXPLORE Day 2

1. Look at the EQs listed below and compare to KIQ chart. Use the questions and create your own that focus the direction of thinking towards business. Use the video to prompt thinking if needed.

Essential Questions:

- What skills are needed to run a business?
- Who are your customers? What needs do they have that are unmet?
- How will your customers benefit and can you quantify those benefits?

- How will your business make money?
- How big is your total addressable market?
- Who are your competitors and how do you compare with them?
- Can your business generate sustainably high profits?

2. Have students free write about their expectations for starting up a business around the garden and what it will produce. What are their expectations? Will it be easy or hard? Have them explain in as much detail as they can about what they feel, want, and expect. If any students would like to share with the whole group, let them or have them share in smaller groups.

▶ EXPLAIN Day 3

1. Have the students work together to research and find and explain in their own words each of the vocabulary words below. Add any words that they would think might apply to the topic of business.

Vocabulary:

- Entrepreneur
- Sustainability
- Profit
- Costs
- Market survey

2. The whole group shares and records final class definitions for each word.

3. Once the vocabulary is recorded have students work together to research and answer the following question: What are the steps for starting a business?

4. Below are some possible directions for discussion. Allow for diverse ideas.

- Determine your offering (how much will your garden produce for a market) and market demand (what will people most likely buy)
- Determine your pricing (compare to local markets)
- Determine your marketing (advertising)
- Learn how to sell (customer service)
- What is the estimated profit?

5. Share the ideas with the whole group. Chart the ones your class likes best and determine the business plan steps your class will take. Post these in the order they think is most important and follow steps throughout unit. (Allow for adjustments as the year progresses with each market. Needs may change).

▶ ELABORATE Day 4/5

1. Handout: Four Square Concept Map; the students will work in small groups to complete this map.

2. *Concept*- Farmers' Market. Allow students to collaboratively fill this out, and then share with the whole group.

3. They will be starting a business with the garden at school. How will they do it? What should be done first? Have students write out each of the steps for running their business.

4. As a class, have students vote for the order that they will follow.

5. Continue and complete the class business plan. Chart and record thinking.

6. Below is an adaptation for entire grade level collaboration for the garden and the market. Adjust according to participation of classes. Prior to having this grade level meeting, one teacher from the grade level should make a large poster with each of the classes' *common ideas/steps*.

7. Once your class has a business plan, it must be shared with the rest of your grade level team. Plan on using the multipurpose room at your school so all grade level classes can meet. Have 3-4 student representatives from your class present your business plan chart. In order to keep the students moving, you can post the charts at different locations around the room. Have student turn /adjust for each presentation.

8. After all presentations are in, allow students to get up and walk/talk/look at each of the plans (10 minutes).

9. Put up the *common ideas/steps* poster for grade level to see. Begin the process of putting the ideas in order of use. Some may be tossed completely. Have students vote through majority rules.

10. The final chart will be what the grade level will follow for the first big market day in November.

▶ EVALUATE Day 6

(See assessment)

ASSESSMENT

Observational assessment until the EVALUATE stage. At this point, have the students self-assess their understanding with the Handout: I Chart. Expect complete thoughts/sentences for each box on the chart.

Summative assessment: A brief summary paragraph of what they learned from this lesson. Post all the vocabulary words on the board as a word bank to be used correctly in their summary.

ADAPTATIONS

Ted Talk Green Bronx Machine (14:41)
https://www.youtube.com/watch?v=lcSL2yN39JM&list=PLPGrqA6pNgmyNs2FE19sd0ioQN2Mmc6sR

Biz Kids: http://bizkids.com/

Be Your Own Boss: http://pbskids.org/itsmylife/games/boss/

DIGGING DEEPER

- Field trip to local farmers market
- Field trip to local farm
- Field trip to Three Square Foodbank
- Take close-up photos of leaves and roots and see if students know which vegetable or fruit they belong to.

DID YOU KNOW?

- When you eat a carrot/radish/beet you are actually eating a root. Read the book *Tops and Bottoms*.
- Dried cacao beans were currency in Latin America. Sweet potatoes are currency in PNG Screw bean mesquite was used as currency in the Great Basin by indigenous people.
- The word salary comes from sal in Latin – meaning salt because it was so important.

KIQ Chart

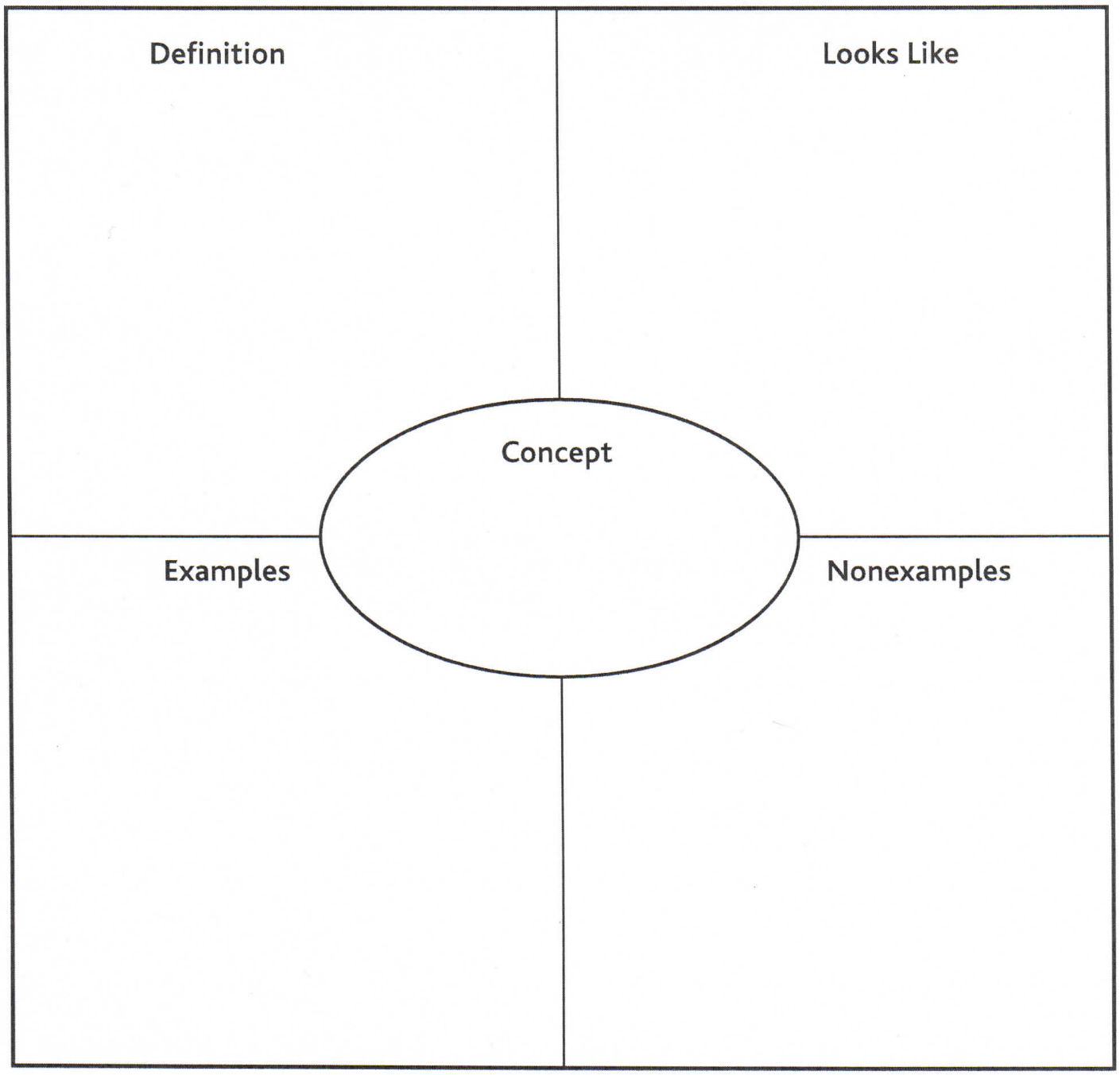
What I KNOW about this topic	What I find INTERESTING about this topic	What I QUESTION or don't know about this topic

Four Square Concept Map

Directions:

1. Write the concept in the middle circle.
2. In the upper left box, write a definition of the concept.
3. In the upper right box, draw a picture of what the concept looks like.
4. In the lower left box, give examples of the concept.
5. In the lower right box, write or draw examples of what the concept is *not*.

Four Square Concept Map



I Chart

I wonder	I discovered
I think	I question
I believe	I plan
I connected	I learned

Student Reflection Log

Name:

Date:

Topic:

What I **know** about this topic:

What I **wonder** about this topic:

What I **learned** about this topic:

What I **want to learn more** about related to this topic:

I liked:

I did not like:

I did not understand:

I'd like the lesson more if:

3–2–1 Exit Slip/Entrance Ticket

Directions:

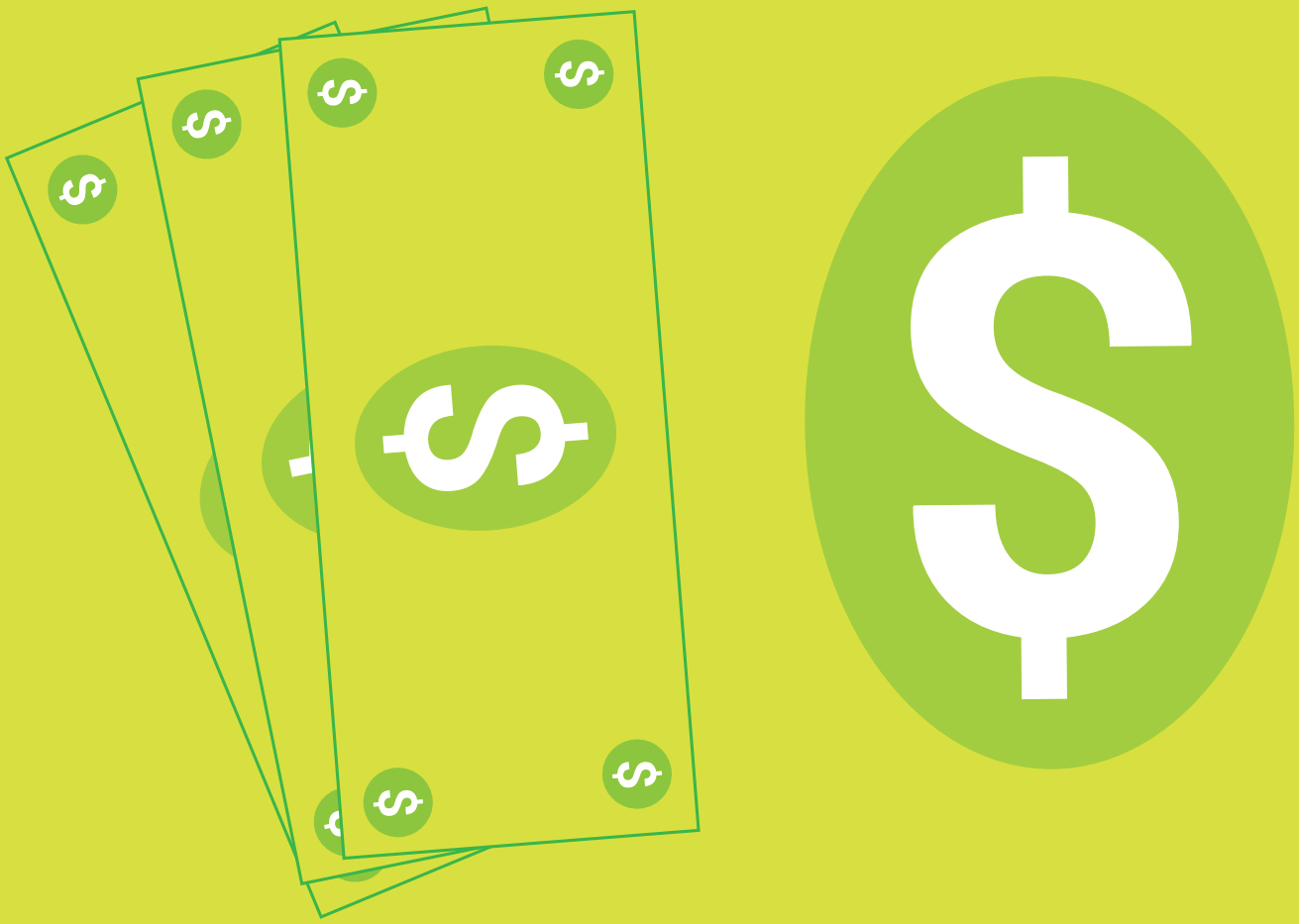
Prior to the end of a class session (as an exit slip) or as homework (as an entrance ticket), have students write in the boxes:

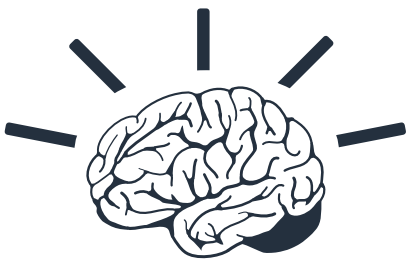
3 ideas or things you know or remember from the class session
2 connections you can make to other subject areas or topics you know something about
1 question that you still have or would like to ask in the next class session

3 Things you know about this topic			
2 Ways this topic connects to other topics			
1 Question you have about this topic			

Lesson Two

Cost and Profit





BRAIN BREAKS!

1. Plant Partners Teacher will give class a plant part (seed, root, stem, leaves, flower). Students turn to a partner and go back and forth naming vegetables harvested from that part of the plant. Repeat until partners can no longer name vegetables from that plant part.

2. Apple, Watermelon, Banana (rock, paper, scissors) Students play rock, paper, scissors replacing rock with apple, paper with watermelon and scissors with bananas. Play as many rounds as possible in given time frame.

3. Garden Taboo Teacher plays music. When music stops students pair up. Teacher calls out a garden topic such as fruit. Partner A has to describe any fruit they want to their partner without saying the name. Partner B has to try and guess what their partner is describing.

4. Syllable Snacks Teacher will call out a number (1-4). Students work with a partner to come up with garden vocabulary words that contain that number of syllables. Partner A will begin by naming a vocabulary word with the given number of syllables; partner B will go next. They will alternate until one partner can no longer name a vocabulary word with the given number of syllables.

5. Fruit/Veggie Knock Students will work with a partner and touch knuckle to knuckle (veggie) and palm to palm (fruit) in a given sequence. Teacher will name the sequence to the class (Ex: veggie, veggie, fruit) and students will have to use the given hand gestures to complete the sequence. Teacher will increases the number of movements with each round (Ex: Round 1-veggie, veggie, fruit. Round 2-fruit, veggie, veggie, fruit).

6. Fruit/Veggie Match Students will stand. Teacher will name a fruit or vegetable and students will have to touch that part of the body corresponding to the part of the plant that the fruit or vegetable grows from (roots-feet, stem-legs, leaves-body, flowers-head). Teacher will call out and play the game “Simon says” going a little faster with each round.

7. Plant Part Finger Hop Students touch thumb to thumb, pointer to pointer, middle to middle, ring to ring, pinkie to pinkie as they say the plant part finger hop chant (seeds, roots, stems, leaves, flowers). Teacher will randomly call out a plant part, students will have to touch the corresponding fingers. Teacher will repeat, increasing the pace with each round.

8. The Harvester Students will stand and squat (harvest) with a shovel in hand. They will shovel the dirt over alternating shoulders like a farmer. Students will work at their own pace “harvesting” for the given time frame.

9. Apple Squat Students will stand and begin by squatting. They will then stand up on one foot, hop twice saying “apple, apple” then return to a squat. Repeat with increasing speed each round and alternating feet.

10. Fruit Freeze Teacher will randomly call out different fruits and vegetables. If the teacher calls out a veggie, students have to jog (or march) in place, if teacher calls out a fruit, students have to freeze.

11. Garden Guess Students will work with a partner. Partner A will silently think of a fruit or vegetable. Partner B can ask three questions about what their partner is thinking. After three questions, partner B has to guess the fruit or vegetable. They will then switch roles, and partner B will silently think of a fruit or vegetable and partner A gets to ask questions and guess. Repeat as many times as possible in the given time frame.

OVERVIEW

Students will learn the basics of knowing what your business costs are and how to calculate profit.

OBJECTIVES

▶ Students will learn how to calculate costs and profits within the business of the garden.

▶ Students will be able to:

- Define cost, profit, loss, expense, budget, producers and consumers
- Know what a sustainable garden looks like
- Explain how to make a profit and project future earnings
- Discuss how to set prices for profit
- Keep record of all expenses, profits, and loses

STANDARDS

Nevada State Standards

(5)1.1 Use evidence recorded in a science notebook to develop descriptions, models, explanations, and predictions.

Next Generation Standards

3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Common Core Standards

Reading Informational Text

RI.5.3 Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

Math

5.NBT.A.3 Read, write, and compare decimals to thousandths.

5.NBT.B.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Writing

W.5.2.d Use precise language and domain-specific vocabulary to inform about or explain the topic.

W.5.2.e Provide a concluding statement or section related to the information or explanation presented.

W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

W.5.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Speaking and Listening

SL.5.1.b Follow agreed-upon rules for discussions and carry out assigned roles.

SL.5.1.d Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

TIME

6 1-hour lessons that can be done on a daily basis or once a week for six weeks

QUESTIONS

- See questions that are presented for each day.

MATERIALS

- Handout: Making a Profit sheet
- Handout: Different Ways to Earn a Profit in the Garden sheet
- Handout: Garden Market Survey
- Handout: Garden Record Keeping Sheet
- Handout: Garden Expense Ledger (Month-by-month)
- Handout: Installing a Garden Expense Sheet
- Handout: I Chart
- Handout: Four Square Concept Map
- Pencil/pen
- Garden Journal (any format of bound lined paper will work)
- Chart paper or whiteboard to record class thinking

- Computers with internet access for research
- Access to YouTube or download video prior to lesson

PROCEDURES

(Students may record thinking in garden journal)

- ENGAGE Day 1

1. Watch September 4, Kids In Action; Farmers Market (1:51)
   http://www.youtube.com/watch?v=ZmKamtl74ts

2. Some questions to discuss before and after watching the video:
   - What were some of the ideas that stand out for you? Why?
   - What did you notice going on in the background?
   - What kind of math were the kids using?
   - What kind of math were the sellers using?
   - How would you know if your business made any money?
3. In a large group, share the general ideas generated from this video. Record on chart or whiteboard and keep posted in room for future reference. Add to this list as needed.
4. The dictionary says an entrepreneur is, “A person who organizes and manages a business, assuming the risk for the sake of profit.” In short, an entrepreneur is a businessperson who does these things:
   - Sees an opportunity for making money
   - Makes a plan
   - Starts the business
   - Manages the business
   - Receives the profit

- EXPLORE Day 2

1. Use the questions to begin the discussion of running your business for profit. Use the video to prompt thinking if needed. You may need to research online for some of the EQ’s below.

Essential Questions:

- What are the price differences between organically grown produce and supermarket produce? Why do you think there is a difference?
- How far away is the local farmers’ market from your neighborhood?
- How could you generate more business besides selling the produce?
- How will taking a market survey help decide your prices for each product?
- Why would the scarcity of a product affect its value?

2. Have student's free write about their expectations for starting up a business around the garden and what it will produce. What are their expectations? Will it be easy or hard? Allow them to discuss in small groups before they begin writing. Have them explain in as much detail as they can about what they feel, want, and expect. If any students would like to share whole group, let them or have them share in smaller groups.

▶ EXPLAIN Day 3

1. Have the students work together to research and explain in their own words each of the vocabulary words below. Add any words that they would think might apply to the topic of business.

Vocabulary:

- profit
- revenue
- loss
- expenses
- budget
- sustainable
- producers and consumers
- scarcity
- survey

2. Have the whole group engage in a class discussion and record final class definitions for each vocabulary word.
3. Once the vocabulary is recorded, have students work together to research and answer the following question: What are the steps for determining the prices for each item in the market?

4. Below are some possible directions for discussion. Allow for diverse ideas.

   - What are the items you will be selling? How much of each item will you have?
   - Do you have any expenses prior to the market opening? What is your necessary profit?
   - How will scarcity of any items affect the price of them?
   - What is the 'at-the-market' cost of the items? Is there a difference between stores and produce types (organic/non-organic)?
   - How can your market be a sustainable entity over a long period of time?

5. The whole group shares ideas. Chart the ones your class likes best and determine the business plan steps your class will take. Post these in the order they think is most important and follow steps throughout unit. (Allow for adjustments as the year progresses with each market. Needs may change).

▶ ELABORATE Day 4/5

- Watch Farmer's Market: Product and Pricing (4:07) http://www.youtube.com/watch?v=XXFjoi9n3dQ

- Handout: Four Square Concept Map; the students will work in small groups to complete this map.
- *Concept*- Profit and Costs. Allow students to collaboratively fill this out, then share as one big group.
- Watch/interact Econedlink: Profit: http://www.econedlink.org/interactives/index. php?iid=219&type=educator

1. They will be running a business at their school based on what their garden produces. What will they expect to sell and when? How much profit can they raise over the course of the school year? (future profit) How will they promote their market?

   - Handout: Garden Record Keeping Sheet
   - Handout: Garden Expense Ledger

2. Allow all students to practice with various scenarios in order to learn how these sheets work with the business. Next, elect room treasurers to be in charge of maintaining the record books. They will report monthly to the class.

   - Handout: Installing a Garden Expense Sheet

▶ EVALUATE Day 6

(See assessment)

ASSESSMENT

Observational assessment until the EVALUATE stage. At this point, have students self-assess their understanding with the Handout: I Chart. Expect complete thoughts/sentences for each box on the chart.

Summative assessment: A brief summary paragraph of what they learned from this lesson. Post all the vocabulary words on the board as a word bank to be used correctly in their summary.

ADAPTATIONS

Oakwood Farmers market Leeds (14:28) http://www.youtube.com/watch?v=-hJQMKWJFLY

Fresh Truck in Boston (3:50) https://www.kickstarter.com/projects/1530126668/fresh-truck-mobile-farmers-market

DIGGING DEEPER

- Field trip to local supermarket to examine produce.
- If can't take field trip get students to write up questionnaires and e-mail or call local supermarket, local farm or farmers market.

DID YOU KNOW?

- The first market in the history of the United States was in the English colonies in 1634 under Governor John Winthrop of Boston. Twenty-eight years later, the city built a wooden building for the market to create a more permanent thoroughfare.

HANDOUT: MAKING A PROFIT

Name: _____ Date: _____

Practice calculating profit and loss for each of these garden ideas.

Key: Revenue - Expenses = Profit or loss

1. **Seedling Cups.** You paid $15 for seeds, soil, and cups. You sell 12 seedling cups for $2.00 each.

_____ - _____ =_____

Profit_____ or Loss_____

2. **Terrariums.** You sell 25 glass terrariums for $4.00 each. You spent $20 on the glass jars, $15 on soil, stones and moss, and $25 on charcoal for filtering.

_____ - _____ =_____

Profit_____ or Loss_____

3. **Composting.** You want to start composting at your school garden and sell the compost at your farmers' market. You paid $100 for the composting barrel and $25 for 60 5-pound bags to put the compost in for selling at the market. You sell all 16 bags for $8.00.

_____ - _____ =_____

Profit_____ or Loss_____

4. **Fresh produce.** You harvest 65 pounds of fresh organic produce to sell at the market. You buy baskets, tablecloths, and some ribbon for $30. Your average price for your produce is $2.00 a pound.

_____ - _____ =_____

Profit_____ or Loss_____

5. Which idea has the most revenue? _____

6. Which idea has the least revenue? _____

7. Which has the most expenses? _____

8. Which has the least expenses? _____

9. Which earns the most profit? _____

10. Which has the least profit? _____

11. What idea loses money? _____

HANDOUT: MAKING A PROFIT ANSWER KEY

Key: Revenue - Expenses = Profit or loss

1. **Seedling Cups.** You paid $15 for seeds, soil, and cups. You sell 12 seedling cups for $2.00 each.

$24.00 - $15.00 = $9.00

Profit X or Loss_____

2. **Terrariums.** You sell 25 glass terrariums for $4.00 each. You spent $20 on the glass jars, $15 on soil, stones and moss, and $25 on charcoal for filtering.

$100.00 - $60.00 = $40.00

Profit X or Loss_____

3. **Composting.** You want to start composting at your school garden and sell the compost at your farmers' market. You paid $100 for the composting barrel and $25 for 60 5-pound bags to put the compost in for selling at the market. You sell 12 bags for $8.00.

$96.00 - $125.00 = -($29.00)

Profit _____ or Loss X

4. **Fresh produce.** You harvest 65 pounds of fresh organic produce to sell at the market. You buy baskets, tablecloths, and some ribbon for $30. Your average price for your produce is $2.00 a pound.

$130.00 - $30.00 = $100.00

Profit X or Loss_____

5. Which idea has the most revenue? FRESH PRODUCE

6. Which idea has the least revenue? SEEDLING CUPS

7. Which has the most expenses? COMPOSTING

8. Which has the least expenses? SEEDLING CUPS

9. Which earns the most profit? FRESH PRODUCE

10. Which has the least profit? SEEDLING CUPS AND COMPOSTING

11. What idea loses money? COMPOSTING

GARDEN RECORD-KEEPING SHEET

Name of Garden Business: _____Treasurer: _____

Market #_____ Date: _____ **MONEY RECEIVED**: $_____ **LESS *EXPENSES**: $_____ **EQUALS** **TOTAL PROFIT** $_____ **OR TOTAL LOSS** $_____	**Market #_____ Date: _____** **MONEY RECEIVED**: $_____ **LESS *EXPENSES**: $_____ **EQUALS** **TOTAL PROFIT** $_____ **OR TOTAL LOSS** $_____
Market #_____ Date: _____ **MONEY RECEIVED**: $_____ **LESS *EXPENSES**: $_____ **EQUALS** **TOTAL PROFIT** $_____ **OR TOTAL LOSS** $_____	**Market #_____ Date: _____** **MONEY RECEIVED**: $_____ **LESS *EXPENSES**: $_____ **EQUALS** **TOTAL PROFIT** $_____ **OR TOTAL LOSS** $_____
Market #_____ Date: _____ **MONEY RECEIVED**: $_____ **LESS *EXPENSES**: $_____ **EQUALS** **TOTAL PROFIT** $_____ **OR TOTAL LOSS** $_____	**Market #_____ Date: _____** **MONEY RECEIVED**: $_____ **LESS *EXPENSES**: $_____ **EQUALS** **TOTAL PROFIT** $_____ **OR TOTAL LOSS** $_____
Market #_____ Date: _____ **MONEY RECEIVED**: $_____ **LESS *EXPENSES**: $_____ **EQUALS** **TOTAL PROFIT** $_____ **OR TOTAL LOSS** $_____	**Market #_____ Date: _____** **MONEY RECEIVED**: $_____ **LESS *EXPENSES**: $_____ **EQUALS** **TOTAL PROFIT** $_____ **OR TOTAL LOSS** $_____
Market #_____ Date: _____ **MONEY RECEIVED**: $_____ **LESS *EXPENSES**: $_____ **EQUALS** **TOTAL PROFIT** $_____ **OR TOTAL LOSS** $_____	**Market #_____ Date: _____** **MONEY RECEIVED**: $_____ **LESS *EXPENSES**: $_____ **EQUALS** **TOTAL PROFIT** $_____ **OR TOTAL LOSS** $_____

*Expenses: maintenance fees, materials, other.

GARDEN EXPENSE LEDGER

Month: _____

Maintenance fees: $ _____ From: _____

Materials/supplies: $ _____

List all items purchased:

_____

_____

_____

_____

Other: $ _____

_____

_____

_____

_____

Grants/Donations: $ _____

From: _____ Thank You sent: YES _____NO _____

From: _____ Thank You sent: YES _____NO _____

From: _____ Thank You sent: YES _____NO _____

From: _____ Thank You sent: YES _____NO _____

Notes: _____

_____

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_____

INSTALLING A GARDEN EXPENSE SHEET - GARDEN AND FARMERS' MARKET BUDGET

Use this template to answer the question: **Is your garden sustainable?** If not, consider other resources to help your school sustain the garden.

Expenses

1. **Gardening Areas** - Since the most common gardening areas are garden beds, we will use this to calculate cost. We recommend that your school also consider additional methods to garden. This might help reduce cost and energy resources (such as water).

   One 4ft x 8ft garden bed typically costs between $900-$1,000. This includes soil, installation, and irrigation system. This is usually a one-time fee. Maintenance might be required.

   Find out how much your gardening area will cost:
   Select the appropriate operation: +, -, x, ÷

   - Number of beds ☐ $900 = Total cost of gardening area

Keep in mind that these costs are for the first year only! Once your beds are built and you have soil and irrigation system installed, you will not need to pay this amount every year.

2. **Irrigation System** - Farmers recommend using a drip irrigation system that is delivered through plastic tubing with small holes called emitters. Emitters require 6 inch spacing.

   - Each emitter has the potential to release ½ of a gallon per hour. How much water will be emitted in 20 minutes? (Hint: 1 hour = 60 minutes)

   - If each garden bed has 5 loops and each loop has 18 emitters, how many total emitters are there in one garden bed?

     Select the appropriate operation: +, -, x, ÷

     5 loops ☐ 18 emitters = Total number of emitters

   - Now take the total water emitted from part A and the number of emitters from part B to determine how many gallons per day is used for each garden bed.

- Lastly, find out how much water your entire garden uses daily.
  Select the appropriate operation: +, -, x, ÷

  Gallons per day per bed ☐ Number of beds in your garden = Total amount of gallons of water used per day

- Lastly, calculate how much your school spends on water per month. Water rates vary throughout the Las Vegas Valley. On average, non-residential users are charged 0.00116 cents/gallon.
  Select the appropriate operation: +, -, x, ÷

  Gallons of water per day ☐ Your water rate

Different seasons require different watering schedules. For example, during the winter you will not need to water every day. The calculation above is a general idea of how much you may spend on water in a year. If you are interested in your exact bill, multiply the number of days for each month that you water by the amount above.

*** Keep in mind that the cost of irrigation is included in your school's monthly water bill which is typically paid by your School Generated Funds account. Your School Garden Committee will not be responsible to pay for the water, but it is highly recommended you keep in mind the total amount of irrigation because it's a desert out there! ***

3. **Compost or Fertilizer** - On average, each garden bed uses approximately ¼ gallon of compost per year. Your school can also consider making your own fertilizer to sell at your Farmers' Markets.

   - How many gallons will your school garden need?
     Select the appropriate operation: +, -, x, ÷

     ¼ Gallons per bed ☐ Number of beds in your garden = Total amount of compost needed per year

   - One gallon of compost costs, on average, $10. How much will it cost?
     Select the appropriate operation: +, -, x, ÷

     Total number of gallons of compost needed ☐ $10 = Total cost of compost

4. **Seeds** - Each garden bed will require approximately $10 of seeds per season. If there are four seasons, how much will is cost for an entire year per bed?

   - Select the appropriate operation: +, -, x, ÷

   $10 of seeds per garden bed ☐ Number of beds in your garden

   ☐ Number of seasons per year = Total cost of seeds per year

   - How could you reduce costs for seeds?

5. **People Power** - Gardening is hard work! If your school chooses to work with a farmer, you will need to calculate a budget for their services. Typically, their services include the necessary knowledge to plant, maintain, harvest, and solve many problems. They help with pest management, fertilizing properly, planting by season, managing the garden, and troubleshooting in case of problems. Many schools recommend that school gardens partner with a farmer to ensure success.

   On average, the cost for 1 hour per week with a farmer ranges from $40- $50. Keep in mind that most farmers include materials, irrigation set up, natural pest management, soil maintenance, seeds, gas, and other expenses included within their fee.

   - Calculate the total price of having a farmer per month. Remember that if your school partners with a farmer, many materials are included in the price. This means you will most likely not have to pay for seeds, irrigation, compost, or soil after the initial installation.

   - How will you ensure you have enough people power to keep your garden sustainable?

Keep in mind that your school garden will still need volunteer students, volunteer teachers, volunteer parents, and volunteer community members to keep it going

6. **Tools** - Research what tools you will need and find supplies already available at your school. Ask teachers and parents if they have unused tools at home that they can donate. If not, investigate prices for tools. We have provided a sample list of tools your school garden could need.

   - shovels
   - pruners
   - trowels
   - buckets
   - storage space
   - bags or containers to sell the produce
   - twine
   - plant markers

   Total Cost: _____

7. **Additional Expenses** - Each school garden is unique. Some schools have tortoise habitats that require special care. Other schools have composting sites. Make sure to factor in your school's additional expenses here:

ESTIMATED EXPENSE LOG

1. Gardening Area $ _____

2. Irrigation $ _____

(If your school works with a Farmer, do not calculate compost or seeds)

3. Compost $ _____

4. Seeds $ _____

5. People Power

   Farmer Services $ _____

   Other $ _____

6. Tools $ _____

7. Additional Expenses $ _____

Total Cost For One Year $ _____

SAMPLE ANSWER SHEET

Expenses

1. **Gardening Areas** - Since the most common gardening areas are garden beds, we will use this to calculate cost. We recommend that your school also consider additional methods to garden. This might help reduce cost and energy resources (such as water).

   One 4ft x 8ft garden bed typically costs between $900-$1,000. This includes soil, installation, and an irrigation system. This is usually a one-time fee. Maintenance might be required.

   Now, find out how much your gardening area will cost:
   Select the appropriate operation: +, -, x, ÷

   - Number of beds ☐ $900 = Total cost of gardening area

     4 Garden Beds x $900 = $3,600

Keep in mind that these costs are for the first year only! Once your beds are built and you have soil and irrigation system installed, you will not need to pay this amount every year.

2. **Irrigation System** - Farmers recommend using a drip irrigation system that is delivered through plastic tubing with small holes called emitters. Emitters require 6 inch spacing.

   - Each emitter has the potential to release ½ of a gallon per hour. How much water will be emitted in 20 minutes? (Hint: 1 hour = 60 minutes)

     1/6 of a gallon will be emitted in 20 minutes.

   - If each garden bed has 5 loops and each loop has 18 emitters, how many total emitters are there in one garden bed?

     Select the appropriate operation: +, -, x, ÷

     5 loops ☐ 18 emitters = Total number of emitters

     5 x 18 = 90 emitters

   - Now take the total water emitted from part A and the number of emitters from part B to determine how many gallons per day is used for each garden bed.

     90 emitters x 1/6 = 15 gallons

- Lastly, find out how much water your entire garden uses daily.
  Select the appropriate operation: +, -, x, ÷

  Gallons per day per bed. ☐ Number of beds in your garden = Total amount of gallons of water used per day

  15 gallons x 4 Garden Beds = 60 gallons of water per day

- Lastly, calculate how much your school spends on water per month. Water rates vary throughout the Las Vegas Valley. On average, non-residential users are charged 0.00116 cents/gallon.
  Select the appropriate operation: +, -, x, ÷

  Gallons of water per day ☐ Your water rate

  60 gallons of water per day x 0.00116 cents/per gallon = 0.0696 cents per day

Different seasons require different watering schedules. For example, during the winter you will not need to water every day. The calculation above is a general idea of how much you may spend on water in a year. If you are interested in your exact bill, multiply the number of days for each month that you water by the amount above.

0.0696 cents per day x 365 = approx. $25.40

*** Keep in mind that the cost of irrigation is included in your school's monthly water bill which is typically paid by your School Generated Funds account. Your School Garden Committee will not be responsible to pay for the water, but it is highly recommended you keep in mind the total amount of irrigation because it's a desert out there! ***

3. **Compost or Fertilizer** - On average, each garden bed uses approximately ¼ gallon of compost per year. Your school can also consider making your own fertilizer to sell at your Farmers' Markets.

   - How many gallons will your school garden need?
     Select the appropriate operation: +, -, x, ÷

     ¼ Gallons per bed ☐ Number of beds in your garden = Total amount of compost needed per year

     ¼ Gallons x 4 Garden Beds = 1 gallon of compost per year

   - One gallon of compost costs, on average, $10. How much will it cost?
     Select the appropriate operation: +, -, x, ÷

     Total number of gallons of compost needed ☐ $10 = Total cost of compost

     1 gallon of compost per year x $10 = $10 dollars

4. **Seeds** - Each garden bed will require approximately $10 of seeds per season. If there are four seasons, how much will is cost for an entire year per bed?

   - Select the appropriate operation: +, -, x, ÷

   $10 of seeds per garden bed ☐ Number of beds in your garden ☐ Number of seasons per year = Total cost of seeds per year

   $10 dollars x 4 Garden Beds x 4 Seasons = $160 dollars for seeds per year

   - How could you reduce costs for seeds?

   The easiest way is to save seed or participate in a seed exchange.

5. **People Power** - Gardening is hard work! If your school choses to work with a farmer, you will need to calculate a budget for their services. Typically, their services include the necessary knowledge to plant, maintain, harvest, and solve many problems. They help with pest management, fertilizing properly, planting by season, managing the garden, and troubleshooting in case of problems. Many schools recommend that school gardens partner with a farmer to ensure success.

   On average, the cost for 1 hour per week with a farmer ranges from $40- $50. Keep in mind that most farmers include materials, irrigation set up, natural pest management, soil maintenance, seeds, gas, and other expenses included within their fee.

   - Calculate the total price of having a farmer per month. Remember that if your school partners with a farmer, many materials are included in the price. This means you will most likely not have to pay for seeds, irrigation, compost, or soil after the initial installation.

     $40 per week x 4 weeks = $160 per month

     9 months for the academic school year x $160 = $1,440

     12 months for the calendar year x $160 = $1,920

   - How will you ensure you have enough people power to keep your garden sustainable?

     Answers will vary. Consider having a Garden Club and/or a Parent Gardening Club too. Implementing this garden curriculum can also ensure the K-5 is involved in maintaining the garden.

Keep in mind that your school garden will still need volunteer students, volunteer teachers, volunteer parents, and volunteer community members to keep it going

6. **Tools** - Research what tools you will need and find supplies already available at your school. Ask teachers and parents if they have unused tools at home that they can donate. If not, investigate prices for tools. We have provided a sample list of tools your school garden could need.

   - shovels
   - pruners
   - trowels
   - buckets
   - storage space
   - bags or containers to sell the produce
   - twine
   - plant markers

   Total Cost: _____

   Answers will vary.

7. **Additional Expenses** - Each school garden is unique. Some schools have tortoise habitats that require special care. Other schools have composting sites. Make sure to factor in your school's additional expenses here:

   Answers will vary.

ESTIMATED EXPENSE LOG

Based on a garden with four garden beds

1. Gardening Area $ __ 3,600__

2. Irrigation $ __ 25.40__

(If your school works with a farmer, do not calculate compost or seeds)

3. Compost $ __ 10_____

4. Seeds $ __ 160____

5. People Power

   Farmer Services $ __1,920___

   Other $ _____

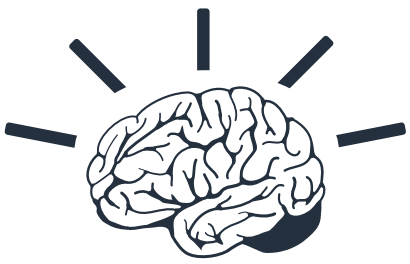
6. Tools $ _____

7. Additional Expenses $ _____

Total Cost For One Year $ _5,715.40_

Lesson Three

Advertising



BRAIN BREAKS!

1. Plant Partners Teacher will give class a plant part (seed, root, stem, leaves, flower). Students turn to a partner and go back and forth naming vegetables harvested from that part of the plant. Repeat until partners can no longer name vegetables from that plant part.

2. Apple, Watermelon, Banana (rock, paper, scissors) Students play rock, paper, scissors replacing rock with apple, paper with watermelon and scissors with bananas. Play as many rounds as possible in given time frame.

3. Garden Taboo Teacher plays music. When music stops students pair up. Teacher calls out a garden topic such as fruit. Partner A has to describe any fruit they want to their partner without saying the name. Partner B has to try and guess what their partner is describing.

4. Syllable Snacks Teacher will call out a number (1-4). Students work with a partner to come up with garden vocabulary words that contain that number of syllables. Partner A will begin by naming a vocabulary word with the given number of syllables; partner B will go next. They will alternate until one partner can no longer name a vocabulary word with the given number of syllables.

5. Fruit/Veggie Knock Students will work with a partner and touch knuckle to knuckle (veggie) and palm to palm (fruit) in a given sequence. Teacher will name the sequence to the class (Ex: veggie, veggie, fruit) and students will have to use the given hand gestures to complete the sequence. Teacher will increases the number of movements with each round (Ex: Round 1-veggie, veggie, fruit. Round 2-fruit, veggie, veggie, fruit).

6. Fruit/Veggie Match Students will stand. Teacher will name a fruit or vegetable and students will have to touch that part of the body corresponding to the part of the plant that the fruit or vegetable grows from (roots-feet, stem-legs, leaves-body, flowers-head). Teacher will call out and play the game “Simon says” going a little faster with each round.

7. Plant Part Finger Hop Students touch thumb to thumb, pointer to pointer, middle to middle, ring to ring, pinkie to pinkie as they say the plant part finger hop chant (seeds, roots, stems, leaves, flowers). Teacher will randomly call out a plant part, students will have to touch the corresponding fingers. Teacher will repeat, increasing the pace with each round.

8. The Harvester Students will stand and squat (harvest) with a shovel in hand. They will shovel the dirt over alternating shoulders like a farmer. Students will work at their own pace “harvesting” for the given time frame.

9. Apple Squat Students will stand and begin by squatting. They will then stand up on one foot, hop twice saying “apple, apple” then return to a squat. Repeat with increasing speed each round and alternating feet.

10. Fruit Freeze Teacher will randomly call out different fruits and vegetables. If the teacher calls out a veggie, students have to jog (or march) in place, if teacher calls out a fruit, students have to freeze.

11. Garden Guess Students will work with a partner. Partner A will silently think of a fruit or vegetable. Partner B can ask three questions about what their partner is thinking. After three questions, partner B has to guess the fruit or vegetable. They will then switch roles, and partner B will silently think of a fruit or vegetable and partner A gets to ask questions and guess. Repeat as many times as possible in the given time frame.

OVERVIEW

Students will learn the basics of advertising for business.

OBJECTIVES

- Students will learn various ways of advertising their farmers market to generate and sustain business.
- Students will be able to:
  - Recognize market opportunity (know your product, know your customer).
  - Assess the demand for products (market survey).
  - Advertise the market (how and why) along with other aspects of business expansion and marketing techniques.

STANDARDS

Nevada State Standards

(5)1.1 Use evidence recorded in a science notebook to develop descriptions, models, explanations, and predictions.

Next Generation Standards

3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Common Core Standards

Reading Informational Text

RI.5.8 Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).

RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

Writing

W.5.2.d Use precise language and domain-specific vocabulary to inform about or explain the topic.

W.5.2.e Provide a concluding statement or section related to the information or explanation presented.

W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

W.5.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Speaking and Listening

SL.5.1.b Follow agreed-upon rules for discussions and carry out assigned roles.

SL.5.1.d Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

SL.5.4 Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

TIME

6 1-hour lessons to be done on a daily/weekly basis

QUESTIONS

- See questions that are presented for each day.

MATERIALS

- Handout: Advertising Homework
- Handout: Anonymous Constructive Feedback
- Handout: My Ad Concept-Final Assessment
- Handout: I Chart
- Handout: Four Square Concept Map
- Pencil/pen
- Garden Journal (any format of bound lined paper will work)
- Chart paper or whiteboard to record class thinking
- Computers with internet access for research
- Access to YouTube or download videos prior to lesson

PROCEDURES

(Students may record thinking in garden journal)

- ENGAGE Day 1

1. Watch Tacoma Farmers Market-'Buying Local-TV Spot' (0:30) http://www.youtube.com/watch?v=D_57x9oe7YM

2. Some questions to discuss before and after watching the video:

- What did you notice about this ad?
- What did you think as you listened and watched the people in this ad? How did you feel?
- Was this a successful and persuasive ad? What else could they have done to make you want to buy from the local community?

3. In a large group share the ideas generated from this video. Record on chart or whiteboard and keep posted in room for future reference. Add to this list as needed.

▶ EXPLORE Day 2

1. Use the questions to begin the discussion of advertising your market from the Tacoma Farmers Market video (or any other video you may find about marketing a farmers market). You may need to research online for some of the EQ's below.

Essential Questions:

- What is the need in your community for locally grown and accessible food?
- How far do you need to travel to find local and fresh foods?
- How would your garden interact with the local neighborhood families?
- How will you advertise your market? What are the important factors that make your market and produce stand out from others in your community?

2. Have students discuss these questions in small groups and possible responses to the EQs. Then, watch this brief video from Michael Pollen: Why Eat Local http://www.youtube.com/watch?v=DhaG_Zi6izU

- Is there any truth to what Pollen is saying in terms of buying local? Explain your response.
- How can this information help you with marketing your own farmers' market?

3. Have students free write about their expectations for advertising the farmers' market and who the customers will be (students, families, and local neighbors). What are their expectations? Will it be accessible to all? How often will you have a market? Where, how, and when should you advertise your market?

4. Allow them to discuss in small groups before they begin writing. Have them explain in as much detail as they can about what they feel, want, and expect. If any students would like to share as a whole group, let them or have them share in smaller groups.

▶ EXPLAIN Day 3

1. Have the students work together to research, find and explain in their own words each of the vocabulary words below. Add any words that they would think might apply to the topic of advertising.

Vocabulary:

- Marketing/Advertising
- Bandwagon - *"everyone" is buying the product*
- Comparison - *shows that one product is better than another*
- Security - *use of the product makes you feel safe*
- Testimonial - *someone explains how effective she/he feels a product is*
- Celebrity testimonial - *famous person endorses a product*
- Health - *use of product will improve your health*

2. Whole group shares. Record final class definitions for each group.

3. Once the vocabulary is recorded, have students work together to research and answer the following question: What are the steps for creating an advertising campaign?

4. Watch this spot from Jamie Oliver: Try Something New http://www.youtube.com/watch?v=D3icQdIVsW0

   - What adverting methods is he using? How can you use his video to help you with your own campaign?

5. Below are some possible directions for discussion. Allow for diverse ideas.

   - Understand your customers-Who are they? Where do they come from? What do they want to buy?
   - Set your budget-Will your advertising cost any money? Where/what are your available resources?
   - Organize your campaign- How much advertising will you need? What kind will you use? Who will decide on your final ads? How far in advance do you market to your consumers?

6. Share the ideas as a big group. Chart the ones your class likes best and determine the business plan steps your class will take. Post these in the order they think is most important and follow steps throughout unit. (Allow for adjustments as the year progresses with each market. Needs may change).

***Handout: Advertising HOMEWORK*

*Directions: Watch at least 15 minutes of TV. In the chart below, write down the product being advertised and the advertising strategy. *Please keep product school appropriate.*

▶ ELABORATE Day 4/5

1. *Handout:* Four Square Concept Map; the students will work in small groups to complete this map.

2. *Concept* - Advertising Your Farmers Market. Allow students to collaboratively fill this out, then share as a whole group.

3. They will be creating an advertising campaign for their school garden. What is the yearlong strategy for sustaining interest and keeping consumers coming to each market?

4. Allow students to work individually or in teams to produce an advertisement for the market. Be open to all ideas and also keep in mind your customers. Should there be advertisements in other languages like Spanish? Type of products include (but are not limited to):

   - Posters
   - Brochures
   - Songs
   - Videos
   - Animations
   - Creative art

2. Next, have each student/team present each product. Use a secret voting ballot to constructively critique each ad. The next day post the results for group discussion.

3. Closure: Debrief on what worked well, what didn't, what would be done next time, etc. Let students know that they will each need to come up with a strong ad concept for their final assessment. This does NOT have to come out to a final product, but they will need to define their concept, target audience, type of product, time frame to produce it, materials needed, and any other needs.

▶ EVALUATE Day 6

(See assessment)

ASSESSMENT

Observational assessment until the EVALUATE stage. At this point, have student self-assess their understanding with the Handout: I Chart. Expect complete thoughts/sentences for each box on the chart.

Summative assessment: Students will produce an advertising campaign for school farmers markets. Use *Handout: My Ad Concept*. They must also include a brief summary paragraph of what they learned from this lesson. Post all the vocabulary words on the board as a word bank to be used correctly in their summary.

ADAPTATIONS

Oakwood Farmers market Leeds (14:28) http://www.youtube.com/watch?v=-hJQMKWJFLY

Fresh Truck in Boston (3:50) https://www.kickstarter.com/projects/1530126668/fresh-truck-mobile-farmers-market

ADAPTATIONS

Marketing Unhealthy Food to Children (5:41) http://www.youtube.com/watch?v=WdZ3NgKOLH8

- Use this video to spark deeper discussions about advertising and food choices.

Eating Healthy-Choose My Plate (6:20) http://www.youtube.com/watch?v=-Ln34jDTPh4

- This video can be used to generate more ideas for the marketing campaign. It has great examples of eating healthy.

DIGGING DEEPER

- Do a taste test with microgreens in the garden.

DID YOU KNOW?

- Lucky Charms makes Kellogg Cereal $259 million dollars every year and $15 million is spent in advertising just Lucky Charms.
- Restaurants often choose warm colors for advertising such as red and yellow because they are thought to increase a person's appetite. Many corporations choose cool colors because blues and greens are generally associated with knowledge and understanding.
- The first newspaper advertisement, an announcement seeking a buyer for an Oyster Bay, Long Island, estate, was published in 1704 in the Boston News-Letter.

GARDEN TIPS FOR A FARMERS' MARKET

- Wash the vegetables in water with a capful of vinegar to clean.
- Make sure to put food in cooler or refrigerator until food is ready for sale
- Place damp paper towel around the leafy greens such as lettuce, bok choy, swiss chard before refrigerating
- Place produce in plastic bags but leave the bags open in the refrigerator
- Make sure to cut leafy greens in the garden an inch above root line so that they sprout again.
- Put root crops including carrots, beets in water – cut off the greens first.

HANDOUT: ADVERTISING HOMEWORK

Name: _____Date: _____

Directions: Watch at least 15 minutes of TV. In the chart below, write down the product being advertised and the advertising strategy. Try to look for various methods. *Please keep product choices school appropriate.

- Bandwagon-“everyone” is buying the product
- Comparison-shows that one product is better than another
- Security-use of the product makes you feel safe
- Testimonial-someone explains how effective s/he feels a product is
- Celebrity testimonial-famous person endorses a product
- Health-use of product will improve your health

Product	Strategy

Which commercial was the best (meaning it appealed to you and made you want the product?) Explain why you liked it so much.

_____
_____
_____
_____

Do any of the commercials inspire you for creating a marketing campaign for the school farmers market? How? What will you try?

_____
_____
_____
_____

HANDOUT: ANONYMOUS CONSTRUCTIVE FEEDBACK

Team name or #: _____

Ad Method/s used:

_____ **Bandwagon** - *"everyone" is buying the product*

_____ **Comparison** - *shows that one product is better than another*

_____ **Security** - *use of the product makes you feel safe*

_____ **Testimonial** - *someone explains how effective she/he feels a product is*

_____ **Celebrity testimonial** - *famous person endorses a product*

_____ **Health** - *use of product will improve your health*

Type of product: Poster___Play___Song___Video___Animation___Creative Art___Other: _____

What did you like best about this ad?

What did you like least about this ad?

What advice would you give this team for improvement of the ad? (answer on back side of paper)

HANDOUT: ANONYMOUS CONSTRUCTIVE FEEDBACK

Team name or #: _____

Ad Method/s used:

_____ **Bandwagon** - *"everyone" is buying the product*

_____ **Comparison** - *shows that one product is better than another*

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Type of product: Poster___Play___Song___Video___Animation___Creative Art___Other: _____

What did you like best about this ad?

What did you like least about this ad?

What advice would you give this team for improvement of the ad?

HANDOUT: MY AD CONCEPT-FINAL ASSESSMENT

Name: _____Date: _____

Part I: Performance Task

You work at the local CCSD advertising department who specializes in school gardens and farmers markets. Come up with a strong ad concept for school gardens in the district. This does NOT have to come out to a final product, but you will need to define your concept, target audience, type of product, time frame to produce it, materials needed, and any other needs. This MUST be a complete idea that will generate business for markets all across the district. Use the various methods that are used in adverting to highlight your campaign.

1. What is your vision for your advertisement? Check all that apply

_____ **Bandwagon** - *"everyone" is buying the product*

_____ **Comparison** - *shows that one product is better than another*

_____ **Security** - *use of the product makes you feel safe*

_____ **Testimonial** - *someone explains how effective s/he feels a product is*

_____ **Celebrity testimonial** - *famous person endorses a product*

_____ **Health** - *use of product will improve your health*

2. What is your 'catch-phrase' that gets the attention of your audience and states your message?

_____

3. **Product and Materials.** What product will you use?

Type of product: Poster___Play___Song___Video___Animation___Creative Art___Other: _____

4. What materials/people will you need? (list all that apply)

_____

_____

5. Who is your target audience? Why this/these group(s)?

_____

_____

6. **Explain** how you will use one or more of these methods to get your message out. You must use complete sentences.

_____

_____

_____

_____

_____

_____

_____

_____

7. Create a storyboard that visually shows your idea/concept. You do not need to use all the squares.

8. **Timeline.** How long will it take to complete this product? What problems do you think you might have? How will you problem solve these issues?

_____
_____
_____
_____
_____
_____

Part II: Summary Statement of Learning

On a separate piece of paper write a brief summary paragraph of what you learned from this lesson. It should be in order, with complete sentences. Be sure to use the vocabulary words from this lesson.

Vocabulary Word Bank:

- Marketing/Advertising
- Bandwagon - *"everyone" is buying the product*
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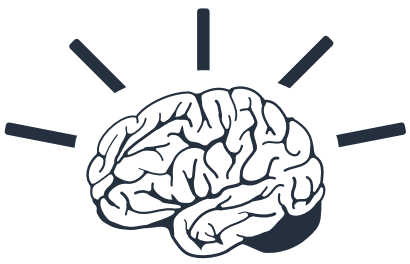
Food Justice

Lesson One

Where Does Our Food Come From?



BRAIN BREAKS!

1. Plant Partners Teacher will give class a plant part (seed, root, stem, leaves, flower). Students turn to a partner and go back and forth naming vegetables harvested from that part of the plant. Repeat until partners can no longer name vegetables from that plant part.

2. Apple, Watermelon, Banana (rock, paper, scissors) Students play rock, paper, scissors replacing rock with apple, paper with watermelon and scissors with bananas. Play as many rounds as possible in given time frame.

3. Garden Taboo Teacher plays music. When music stops students pair up. Teacher calls out a garden topic such as fruit. Partner A has to describe any fruit they want to their partner without saying the name. Partner B has to try and guess what their partner is describing.

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PART 1: INDUSTRIAL AND SUSTAINABLE FARMING

OVERVIEW

Students will read articles about different ways of farming in the modern United States and compare and contrast the methods.

OBJECTIVES

- Students will be able to define, compare, and contrast industrial and sustainable farming.

STANDARDS

Nevada State Standards

(5)1.1 Describe the positive and negative impacts of technologies (dams, agriculture, using natural resources) on society and the environment. [N.5.B.2, E.5.C.3, L.5.C.3, L.5.C.4]

(5)4.7 Investigate and describe how some environmental conditions are more favorable than others to living things. [L.5.C.3]

(5)4.8 Investigate and describe how organisms, including humans, can cause changes in their environments. [N.5.B.2, L.5.C.4]

Next Generation Standards

ESS3.C: Human Impacts on Earth Systems

Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. [5-ESS3-1]

(5)1.4 Draw conclusions from scientific evidence. [N.5.A.3]

(5)4.8 Investigate and describe how organisms, including humans, can cause changes in their environments. [N.5.B.2, L.5.C.4]

Common Core Standards

English Language Arts

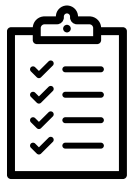
CCSS.ELA-Literacy.RL.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

MATERIALS

- Article, Farming Methods from Growing Food, Lesson 18: Comparing Farming Practices
- Venn diagram
- Worksheet

Out in the Garden

In order to prepare your students for this lesson it is important that they spend time in the garden observing. Allow the students to observe different methods of growing produce in the garden. Students will record various methods in their Garden Journal. Preview vocabulary while in the garden so that they have a visual of some of the words like monocropping and diversified farming. Students can describe parts of their garden in terms of the vocabulary presented in the article.



PROCEDURES

1. Divide the class in appropriate learning groups.
2. Help the students create a visual of farming. Discuss what experiences or prior knowledge they have about farming. Ask, “Are all farms the same?”
3. Preview the words: Industrial (base word: industry, meaning the commercial productions and sales of goods) and Sustainable (base word: sustain, meaning to keep in existence).
4. Hand out articles and Venn Diagrams to compare Industrial and Sustainable Farming.

ASSESSMENT

Student work on Venn Diagrams and answers to questions.

ADAPTATIONS

Work with students in small groups to read through article, identifying vocabulary in context. If the students are having difficulty visualizing/understanding farming competing against nature, consider reading excerpts or watching clips of “The Grapes of Wrath” to demonstrate how weather and economy can destroy industry.

DIGGING DEEPER

- Investigate and do a timeline on agriculture and when different methods of agriculture evolved.

DID YOU KNOW?

- The tractor was first used in 1901. The word tractor comes from the Latin word “trahere” which means to pull.

NUTRITION FACTS

- Compost enhances soil properties and contains three very important nutrients: Nitrogen (N), Phosphorous (P) and Potassium (K). Composts support plant growth and promote access to a balanced diet through human consumption of properly grown crops with key nutrients.

STANDARDS FOR LESSON 1: LESSON MAP

NG ESS3.C Human Impacts on Earth Systems

5-ESS3-1 Obtain and combine information about ways individual communities use scientific ideas to protect the Earth's resources and environment.

ESS3.C Human Impacts on Earth Systems
Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

ELA Reading By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 4-5 text complexity band independently and proficiently.

ELA Wrting Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

Lesson 1: Where Does Our Food Come From

Day 1

- Preview
- Vocabulary: industrial farming, sustainable farming
- Read article "Farming Methods from Growing Food"
- Revisit quadruple bubble map and add to as you discuss each type of farming (ongoing throughout lesson 1 and 2)

Day 2

- Venn Diagram to compare/contrast industrial and sustainable farming
- Answer questions about article on student activity evidence sheet

Day 3

- Close reading and discussion on types of farming

Day(s) ____

5.NBT.B.7 add, subtract, multiply and divide decimals to hundredths

Math Grade 5 Farmers' Market Lesson 2 Cost and profit Installing a Garden Expense sheet pages 12-21

Day(s) ____

Literacy Inference and quoting accurately from the article- "Farming Methods from Growing Food"

On student activity evidence sheet

Book Wump World

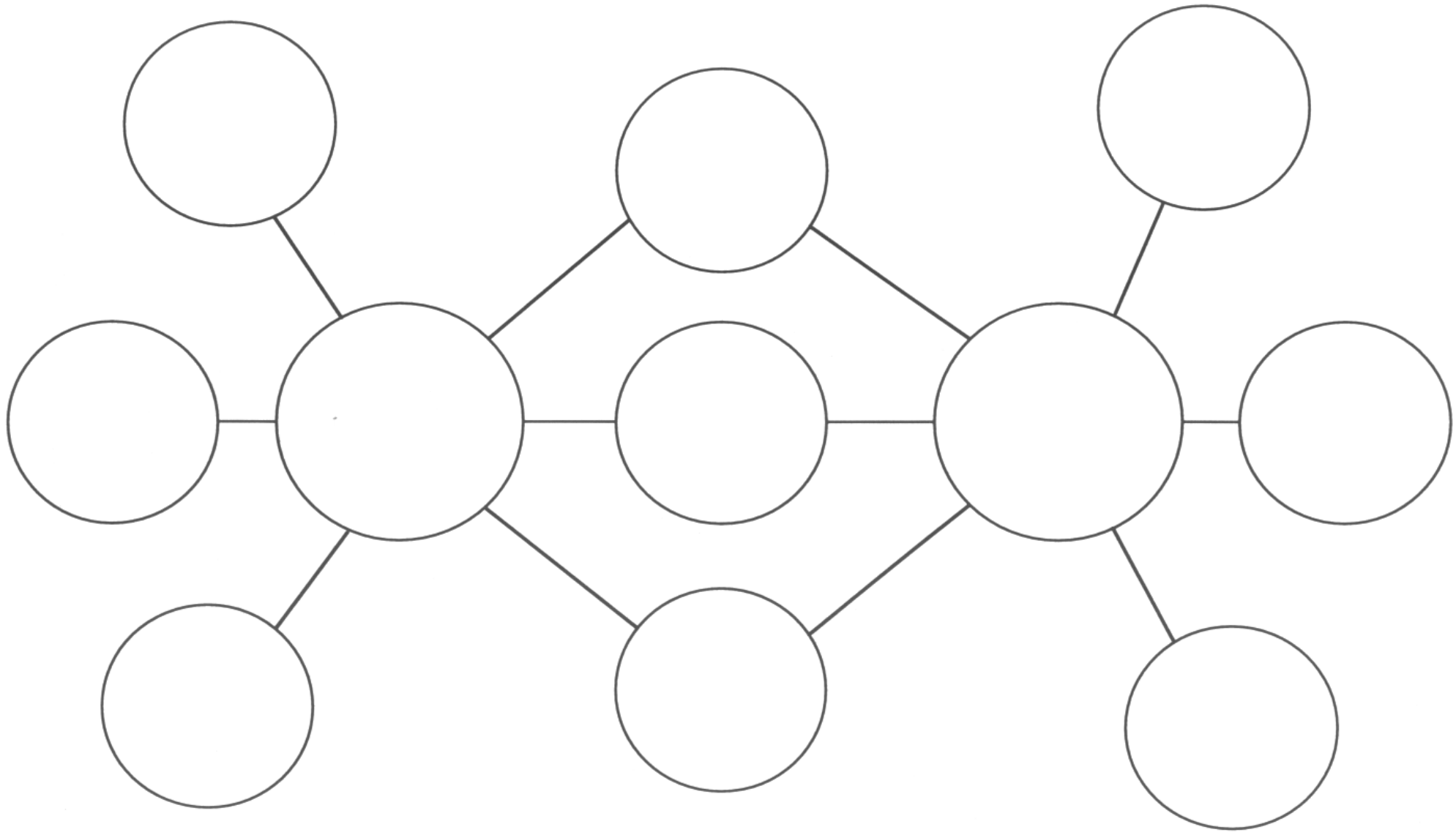
Day(s) ____

Science/Social Studies Extension

Observations and recording gardening methods

Double Bubble Map

Name _____



Double Bubble Map for Comparing (similarities) and Contrasting (differences)

2-17

STUDENT WORKSHEET: FARMING METHODS

Vocabulary (from Growing Food Text)

- **Industrial agriculture** - another term for agribusiness, in contrast to sustainable agriculture
- **Monocropping** - growing only one crop on the land.
- **Sustainable agriculture** - farming methods that provide a secure living for farm families; maintain the natural environment and resources; and support the rural community, from farm workers and consumers to the animals raised for food - in contrast to agribusiness.
- **Fertilizers** - any organic or inorganic material of natural or synthetic origin that is added to soil to supply one or more plant nutrients essential to the growth of plants.
- **Synthetic fertilizers** - A fertilizer made artificially by chemical reactions. They can greatly increase the productivity of soil but have high energy costs, since fossil fuels are required as a source of hydrogen, which is necessary to fix nitrogen in ammonia.
- **Profit** - value gained from selling a product (most often, money).
- **Diversified farming** - a method in which a farm grows a wide variety of crops and uses crop rotation. These farming techniques can make a farm more resilient (stronger) to severe weather conditions or crop disease. On a diversified farm, farmers also tend to use more ecologically friendly methods to fertilize crops and control pests.
- **Green manure** - crops that are grown with the specific intent of being plowed under, where they add nutrients and organic matter to the soil.
- **Sustainability** - the ability to provide for the needs of the present without compromising the ability of future generations to meet their own needs. For example, the ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time.

STUDENT WORKSHEET: FARMING METHODS

Directions Use a Venn Diagram to compare Industrial and Sustainable Agriculture by using the article provided.

1. What is the priority of each type of farm?

2. How does each farm interact or treat soil?

3. What are the long-term effects of each type of farm?

4. Is this type of farm saving money?

5. Is this farm considering ecosystem health? If so, how?

6. How many products are being produced in this type of farm? How does the amount of products impact the farm?

7. Which farm uses more human labor?

8. What model or design does each type of farm use? Where does it come from?

STUDENT WORKSHEET: PRACTICING INFERRING SKILLS

Use direct quotes from the text to support your answer.

1. What does the author mean in paragraph 2 when they state that industrial farmers think of themselves as competing against nature?

2. What does the author infer in the last paragraph? Explain how sustainable farmers still make a profit but not at the expense of the land.

Special Note If the students are having difficulty visualizing/understanding farming competing against nature, consider reading excerpts or watching clips of The Grapes of Wrath to demonstrate how weather and economy can destroy industry.

Name Date

Farming Methods

Guiding Questions

- *What are some of the differences between industrial agriculture and sustainable agriculture?*
- *Why do some farmers prefer to use the industrial method?*
- *Why do some farmers prefer to use sustainable practices?*
- *What are three key features farmers use with industrial agriculture?*
- *What are three key features farmers use with sustainable agriculture?*

In this lesson, you will learn about two different kinds of farming systems in the United States. Some farmers practice a method known as **industrial agriculture.** These are large farms that specialize in **monocropping,** or growing one crop. This type of farming concentrates on maximizing production to make the most profit. This approach sees nature as a competitor and tries to control it. The other, very different farming method is **sustainable agriculture.** This is often practiced on smaller farms that grow different kinds of crops that can be sold throughout the year. Sustainable farming practices are an attempt to try to work with nature. In this reading, you will learn about these two very different kinds of farming and some of the advantages and disadvantages of each method.

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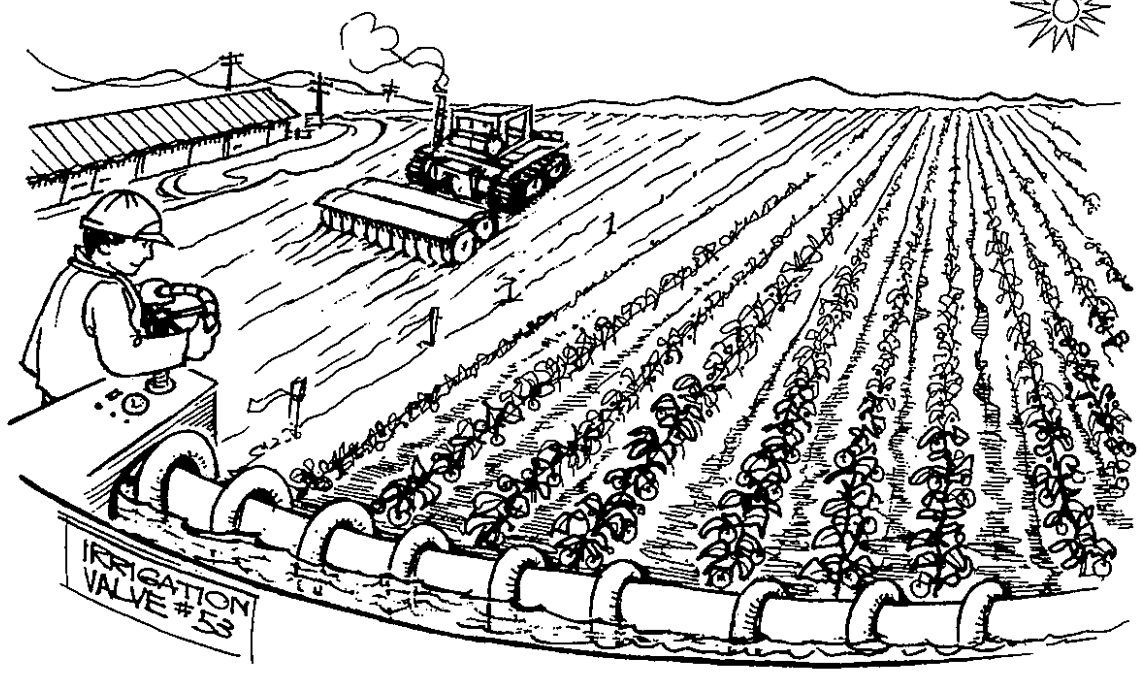
Name Date

Farming Methods



Industrial Farming

This drawing shows an example of industrial farming. Sometimes this approach is called **agribusiness.** Sometimes the people who own the farm do not live there and do not work on the farm. Often the owners consider this a business, and the product they make is food. This approach to farming uses all available technology in order to maximize harvests and minimize the costs of human labor. Three key features of industrial farming are the use of large farm machines, the use of synthetic fertilizers, and the use of synthetic pesticides.

People who use this approach to farming think of themselves as competing against nature. They use methods that help them control nature. Notice that the farm worker is using a large irrigation system to water a field that is planted with only one type of crop. The irrigation system is set up to work automatically, on a schedule. By automating some of the tasks, the owner can reduce the number of people who work on the field, which will increase his profits. Another farm worker is using a large tractor to work the field.

This method of farming is physically easier, since heavy machinery does much of the work. Farm workers don't have to use their own energy to prepare fields for planting, sowing seeds, watering crops, or harvesting them. One person can farm a larger area

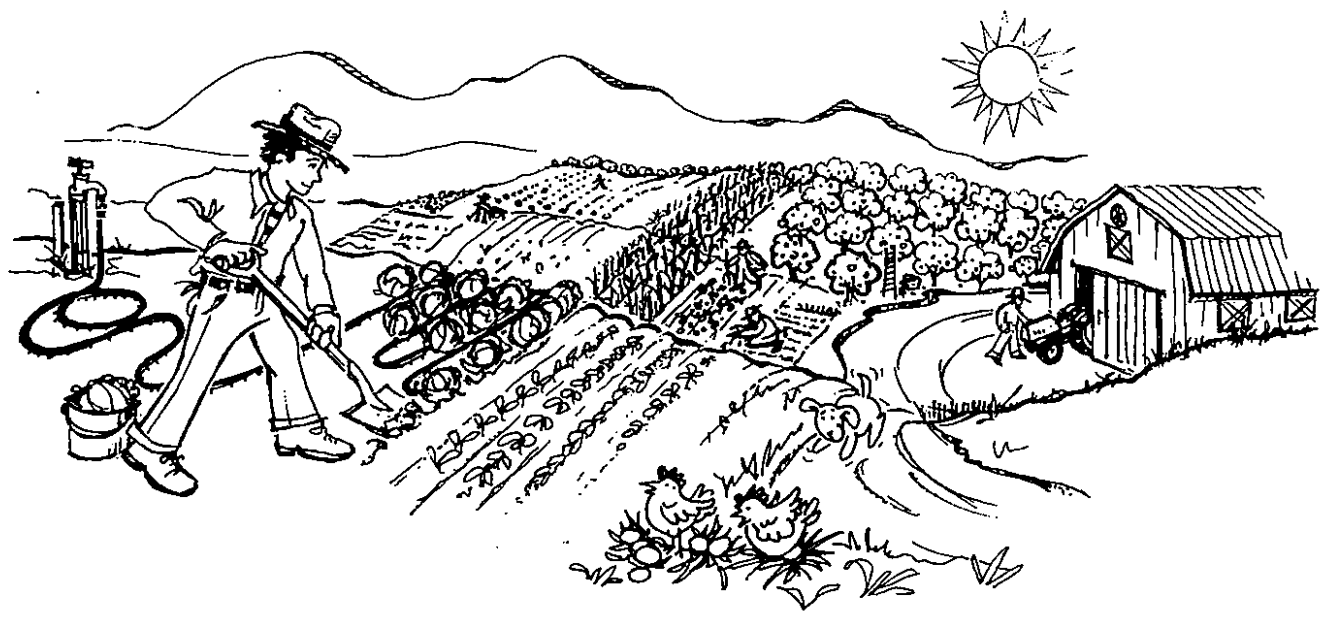
(continued on next page)

Name Date

Farming Methods

and produce more food for less money, which will increase his profits when he takes the food to market. Using synthetic fertilizers, the farm workers can make sure that plants are getting exactly the nutrients they want to give them, in exactly the amount the plant needs. Using synthetic pesticides means that the farm workers can reduce the crop damage due to pests, which will increase the farm owner's profits.

Food grown this way is often less expensive than food grown using sustainable practices. Industrial farming requires less farm labor, which reduces the cost of producing the food.



Sustainable Agriculture

This drawing shows an example of sustainable farming practices. This type of farming uses more human labor to produce food than industrial farming does. The farmers are growing crops in a way that helps support a healthy soil ecosystem and works with nature. The key features of this approach to farming are the use of small machines or people to do the work, the use of compost and manure as fertilizer, and the use of natural methods for pest control.

Notice that the farm family in the drawing is growing different kinds of crops, including a fruit orchard. This is called **diversified farming.** The reason for growing different crops is to support the farm family with a variety of crops so that it doesn't depend on

(continued on next page)

Name Date

Farming Methods

just one. This practice of growing more than one crop protects farmers if they have bad weather. For example, there may be too much rain or there may be not enough rain for a crop to produce a good harvest. Farmers can rely on other crops grown at other times to get them through the year. Planting different kinds of crops also mimics the diversity in nature's ecosystems and makes it easier to use natural methods as a way to control pests and fertilize crops.

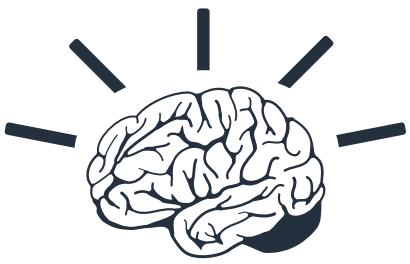
Sustainable agriculture also uses crop rotation. This means that different crops are planted on the same land in different years. For example, if a farmer plants tomato plants on a field one year, the next year he will plant a different kind of crop on that same field. This practice helps maintain good soil conditions and helps with pest control.

To support healthy soil, sustainable farming uses composting as an alternative to inorganic, synthetic fertilizers. Farmers also use **green manures,** which are crops that are grown with the specific purpose of turning them into the soil. Green manure adds nutrients and organic matter to keep the soil ecosystem healthy.

Sustainability means thinking about our children's children. It means meeting our needs today without compromising the ability of future generations to meet their needs. These practices try to preserve the environment. Farmers still make a profit, but not at the expense of the land.

Lesson Two

Permaculture and Native Farming Practices



BRAIN BREAKS!

1. Plant Partners Teacher will give class a plant part (seed, root, stem, leaves, flower). Students turn to a partner and go back and forth naming vegetables harvested from that part of the plant. Repeat until partners can no longer name vegetables from that plant part.

2. Apple, Watermelon, Banana (rock, paper, scissors) Students play rock, paper, scissors replacing rock with apple, paper with watermelon and scissors with bananas. Play as many rounds as possible in given time frame.

3. Garden Taboo Teacher plays music. When music stops students pair up. Teacher calls out a garden topic such as fruit. Partner A has to describe any fruit they want to their partner without saying the name. Partner B has to try and guess what their partner is describing.

4. Syllable Snacks Teacher will call out a number (1-4). Students work with a partner to come up with garden vocabulary words that contain that number of syllables. Partner A will begin by naming a vocabulary word with the given number of syllables; partner B will go next. They will alternate until one partner can no longer name a vocabulary word with the given number of syllables.

5 Fruit/Veggie Knock Students will work with a partner and touch knuckle to knuckle (veggie) and palm to palm (fruit) in a given sequence. Teacher will name the sequence to the class (Ex: veggie, veggie, fruit) and students will have to use the given hand gestures to complete the sequence. Teacher will increases the number of movements with each round (Ex: Round 1-veggie, veggie, fruit. Round 2-fruit, veggie, veggie, fruit).

6. Fruit/Veggie Match Students will stand. Teacher will name a fruit or vegetable and students will have to touch that part of the body corresponding to the part of the plant that the fruit or vegetable grows from (roots-feet, stem-legs, leaves-body, flowers-head). Teacher will call out and play the game “Simon says” going a little faster with each round.

7. Plant Part Finger Hop Students touch thumb to thumb, pointer to pointer, middle to middle, ring to ring, pinkie to pinkie as they say the plant part finger hop chant (seeds, roots, stems, leaves, flowers). Teacher will randomly call out a plant part, students will have to touch the corresponding fingers. Teacher will repeat, increasing the pace with each round.

8. The Harvester Students will stand and squat (harvest) with a shovel in hand. They will shovel the dirt over alternating shoulders like a farmer. Students will work at their own pace “harvesting” for the given time frame.

9. Apple Squat Students will stand and begin by squatting. They will then stand up on one foot, hop twice saying “apple, apple” then return to a squat. Repeat with increasing speed each round and alternating feet.

10. Fruit Freeze Teacher will randomly call out different fruits and vegetables. If the teacher calls out a veggie, students have to jog (or march) in place, if teacher calls out a fruit, students have to freeze.

11. Garden Guess Students will work with a partner. Partner A will silently think of a fruit or vegetable. Partner B can ask three questions about what their partner is thinking. After three questions, partner B has to guess the fruit or vegetable. They will then switch roles, and partner B will silently think of a fruit or vegetable and partner A gets to ask questions and guess. Repeat as many times as possible in the given time frame.

OVERVIEW

Students will explore the various types of farming.

OBJECTIVES

- Students will be able to define, compare, and contrast permaculture and native farming practices of the Mojave Desert.

STANDARDS

Nevada State Standards

(5) 1.4 Draw conclusions from scientific evidence. [N.5.A.3]

(5) 4.8 Investigate and describe how organisms, including humans, can cause changes in their environments. [N.5.B.2, L.5.C.4]

Next Generation Standards

5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

ESS3.C: Human Impacts on Earth Systems: Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)

Common Core Standards

English Language Arts

CCSS.ELA-Literacy.RL.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

TIME

3 one-hour sessions

QUESTIONS

- See questions that are presented for each day.

MATERIALS

- Articles: *Permaculture* from the *Sustainable Living PDF* and *The Paiutes* from *We Shall Remain*
- Venn Diagram

Out in the Garden

After completing the previous lesson about Industrial and Sustainable Farming, take your class back to the garden. Ask the students to consider if their school garden fits either model. Why or why not? Then give the students time to categorize examples from the garden that prove whether it is or it is not. Encourage the students to question the origin of the various methods. Then, inform the students that you will continue to study other methods of farming. One is permaculture, which observes nature and tries to imitate how nature uses energies such as water, sun, wind, etc. The other is Native Farming where people use local seeds, little transportation of goods, and nature's energies without machinery.

At the end of the lesson, return to the garden so that the students can find at least one example or one area of need where Native Farming and/or Permaculture can be incorporated.

PROCEDURES

1. Divide the class in appropriate learning groups.

2. Help the students create a visual of farming. Review Food Justice-Lesson 1 outcomes.

3. Hand out the student worksheet.

4. Hand out articles and Venn Diagrams to compare Permaculture and Paiute Farming Practices.

ASSESSMENT

Completed Venn Diagram

ADAPTATIONS

Work with students in a small group setting to read through the articles, highlighting important information as you read.

Ask students to identify different type of climates where food grows. Then, brainstorm the benefits and limitations of each climate. Finally, they can research creative farming techniques for that climate.

DIGGING DEEPER

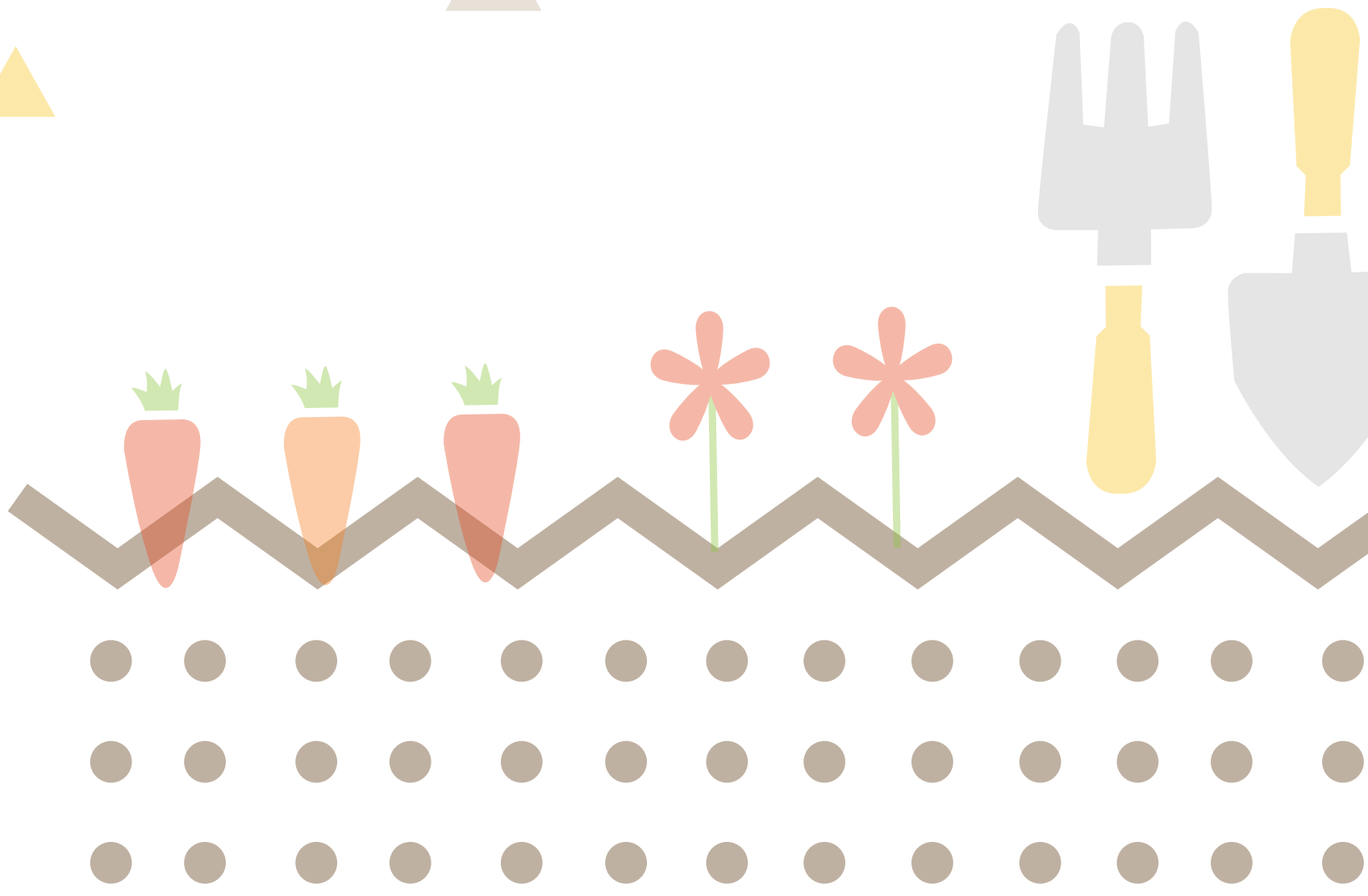
- Investigate where foods originated e.g tobacco, cacao, potatoes from South America.

DID YOU KNOW?

- That corn is the most domesticated crop and was created through cross-pollination with grasses. Historians think it was the Mayans who cultivated it first.

NUTRITION FACTS

- Eating organically produced food may have many health benefits, for people and the environment. Organic crop production aims to conserve natural resources and rely more on biological systems within the soil to recycle and release nutrients.



STANDARDS FOR LESSON 2: LESSON MAP

NG ESS3 Earth and Human Activity

5-ESS3-1 Obtain and combine information about ways individual communities use scientific ideas to protect the Earth's resources and environment.

ESS3.C Human Impacts on Earth Systems
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ELA Reading By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 4-5 text complexity band independently and proficiently.

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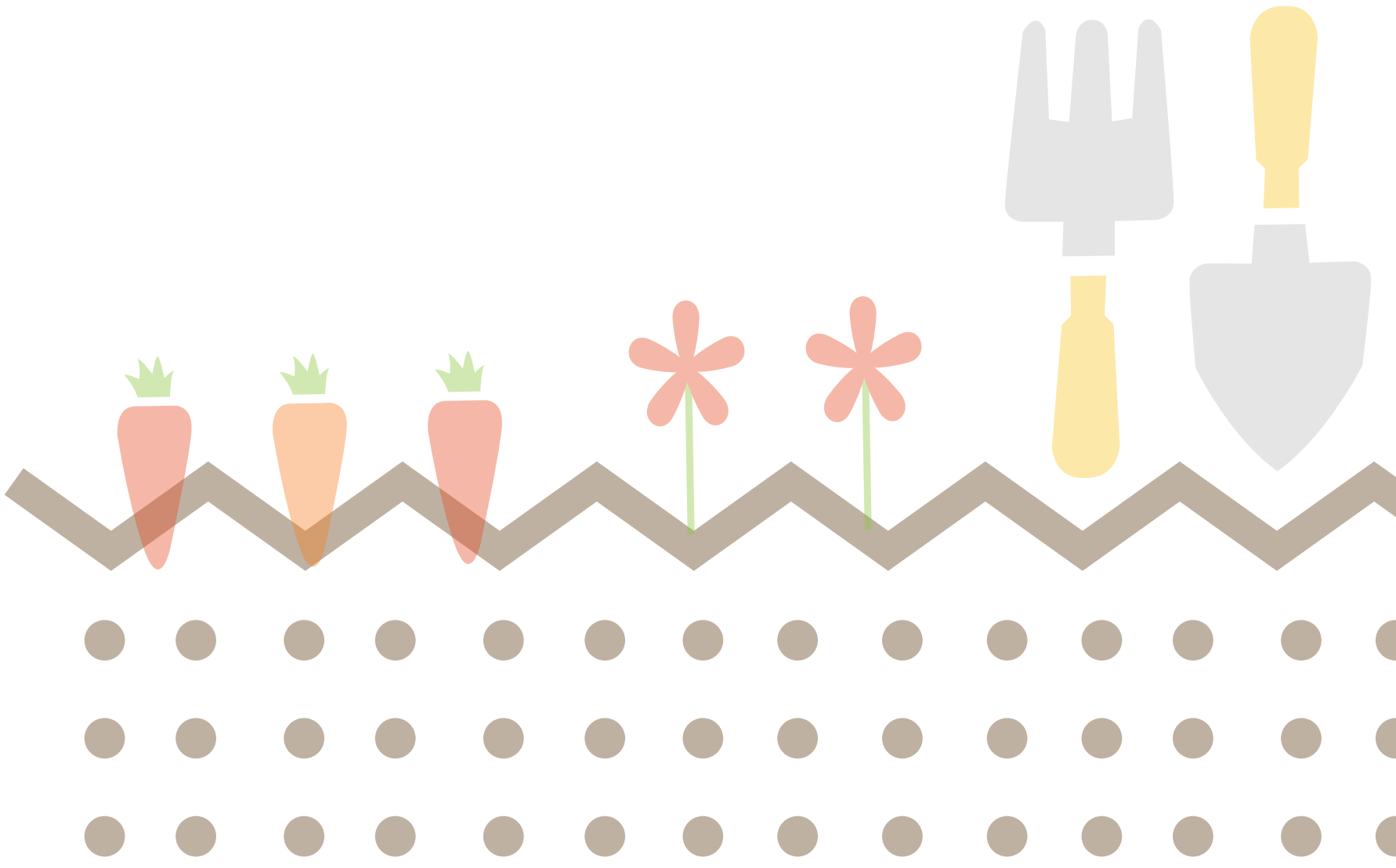


LESSON 2: LESSON MAP

Lesson 2: Permaculture and Native Farming Practices

Day 1

- Preview
- Vocabulary: Permaculture and Paiute Farming Practices
- Revisit quadruple bubble map and add to as you discuss each type of farming (on-going throughout lesson 1 and 2)
- Read article #1: "Permaculture"

Day 2

- Finish article #1 Permaculture, add notes to double bubble on permaculture

Day 3

- Class wrap up and discussion on article #1

Day 4

- Work on student activity evidence sheet for article #1

Day 5

- Work on student activity evidence sheet for article #1

Day 6

- Finish student activity evidence sheet for article #1

Day 7

- Start article #2 "The Paiutes," add notes to double bubble

Day 8

- Finish article #2 and finish double bubble that compares and contrasts Permaculture with other types of farming

Day 9

- Work on student activity evidence sheet for article #2

Day 10

- Finish student activity evidence sheet for article #2

Day(s) ____

Math Grade 5 Farmers' Market Lesson 2: Cost and Profit

Installing a Garden Expense sheet pages 12-21

(Lessons 1 and 2)

Day(s) ____

Literacy Inference and quoting accurately from article #1 and #2

On student activity evidence sheet

Book SFA book "Pollution and Waste"

Day(s) ____

Science/Social Studies Extension

Observations and recording gardening methods and food origination including effects of different climates

Student Worksheet

Name: _____

Part 1:

Permaculture comes from combining the words permanent and agriculture. Agriculture comes from the suffix, *agri* meaning “field” and the base word, *culture* meaning growth or cultivation. Permaculture is a lifestyle and philosophy that produces food in a sustainable way. It tries to create a living environment where people use design to make sure waste is as limited as possible. Read the pamphlet, “What is Permaculture?” and respond to the following.

1. Define Permanent Agriculture. Define Permanent Culture.

2. The article defines some problems in the world. What are some problems you also see within your environment?

3. The article states, “Permaculture ethics and principles provide a guide to being more responsible for own lives, environment, and future.” Restate this phrase in your own words and write one example of how you might do this. For example, I can be more responsible and save water by shutting the faucet off while I brush my teeth.

4. Ethics of Permaculture. Ethics are defined as ideas of right and wrong that determine a group’s or individual’s behavior. Summarize the three ethics of Permaculture:

   - a. Earth Care:

   - b. People Care:

   - c. Care for the Future:

5. **Extra Credit:** Read the extension, “Principals of Permaculture.” Identify two principals, or fundamental truths or rules that you can implement in your school garden. Please explain how you would do so.

   - Example: Multiple Functions. In our school garden, we can plant Mammoth Sunflowers to help the Snap Peas grow. The Snap Peas have vines that need to attach themselves onto a structure. The Sunflowers can help hold up the Snap Peas. We can also plant Sweet Bell Peppers underneath the shade of the Sunflowers since the peppers need shade and the Sunflowers have big leaves that cast shade. The Sunflowers are also great for seed collecting, attracting pollinators, and making the garden beautiful.

     - 1.

     - 2.

Part 2: Paiute Farming Practices

People have been producing their own food in Nevada for thousands of years before the use of machinery or chemicals. The Paiute People have been living in the Las Vegas Region for a very long time because they have developed systems to produce food. Now read the article, “The Paiutes at a Glance.” This article focuses on the Native American Tribe, the Southern Paiutes that live in Nevada, California, and Utah. Look at the map below.

http://www.nps.gov/pisp/planyourvisit/tribal-contacts.htm

1. How do the Paiutes overcome the dry landscape of the Mojave Desert in order to produce food? Give specific examples.

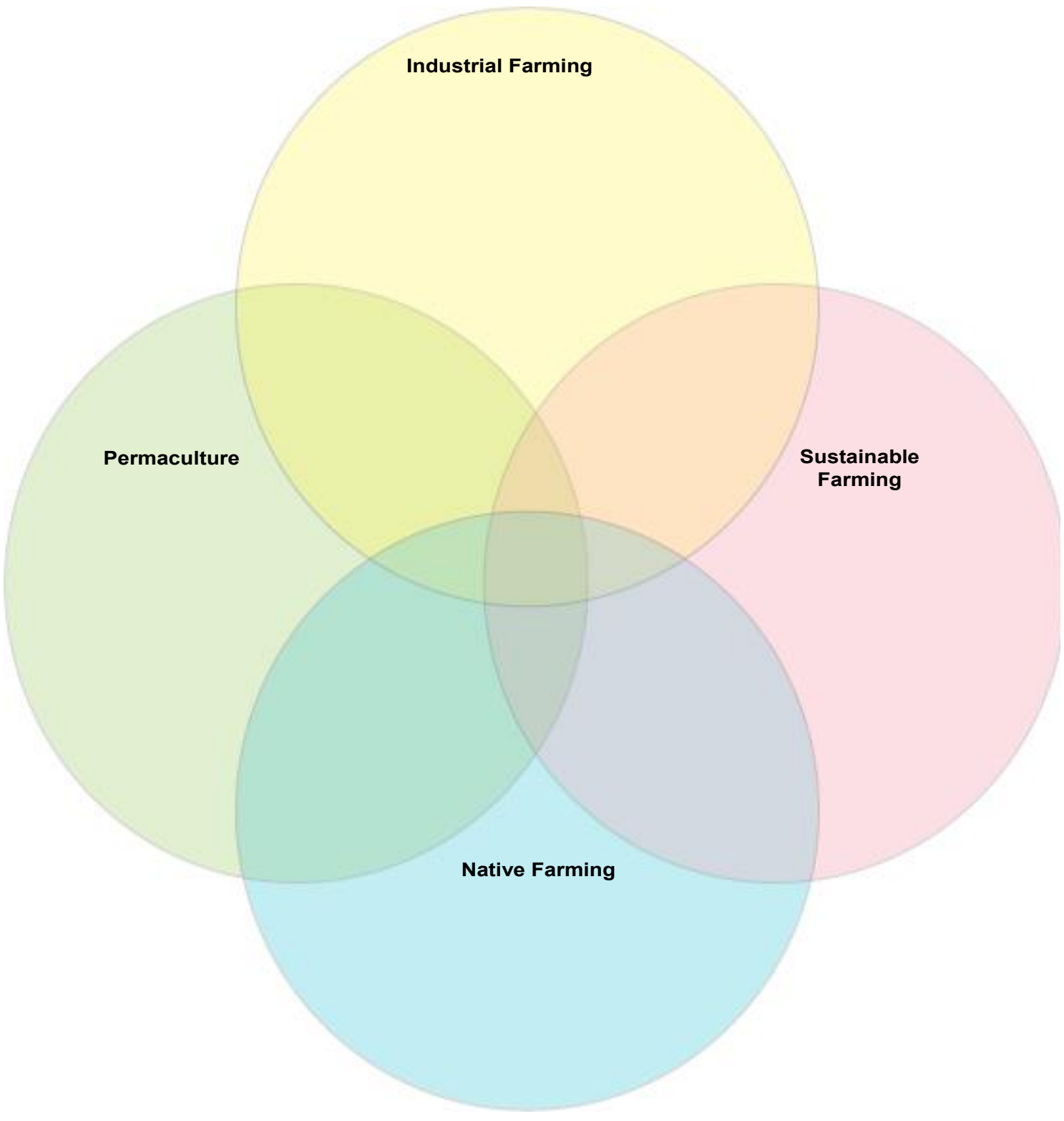
2. Give examples of how the Paiutes are skilled botanists.

3.Do you think Native American farming influences permaculture? Why or Why not?

Part 3

Use a Venn diagram to compare Permaculture and Paiute Native Farming.

Discuss and compare this Venn Diagram to the Venn Diagram comparing Industrial and Sustainable Farming from Food Justice-Lesson 1.



Vocabulary From *Permaculture*:

- 1. Permanent - lasting or continuing for a very long time
- 2. Agriculture - the science or occupation of farming
- 3. Management - the act or skill of controlling and making decisions
- 4. Sustainable - involving methods that do not completely use up or destroy natural resources
- 5. Conserve - to use (something) carefully in order to prevent loss or waste
- 6. Competition - the act or process of trying to get or win something (such as a prize or a higher level of success) that someone else is also trying to get or win
- 7. Harmonic - a pleasing combination or arrangement of different things
- 8. Urban - of or relating to cities and the people who live in them
- 9. Rural - of or relating to the country and the people who live there instead of the city
- 10. Holistic - relating to or concerned with complete systems rather than with individual parts
- 11. Polluted - to make unfit for or harmful to living things, especially by the addition of waste matter.
- 12. Extinct - no longer active
- 13. Generation - a group of people born and living during the same time
- 14. Cooperation - a situation in which people work together to do something

Vocabulary From *The Paiutes*:

- 1. Ancestral- of, relating to, or inherited from a person who was in someone's family in past times
- 2. Abundant- existing or occurring in large amounts
- 3. Diverted- to change the direction or use of (something)
- 4. Network- a group of people or organizations that are closely connected and that work with each other
- 5. Botanist- people who study the branch of science that deals with plant life
- 6. Edible- suitable or safe to eat
- 7. Inventive- having or showing an ability to think of new ideas and methods: creative or imaginative
- 8. Irrigation- artificial supply of water to land, to maintain or increase yields of food crops, a critical element of modern agriculture.
- 9. Tilling soil- raking over an area to prepare it or disturb weed growth
- 10. Prodigious- amazing or wonderful: very impressive
- 11. Preserve- to keep (something) safe from harm or loss

*definitions from Webster's Dictionary

Permaculture can be defined as:

PERMAnent AgriCULTURE and PERMAnent CULTURE

Permanent Agriculture: Is agriculture and animal management which improves the quality of land, provides income and produce, and is sustainable now and in the future.

Permanent Culture: Means conserving, supporting and working together with the local culture, while at the same time moving forward. Working with nature and people, as well as learning from them, and not working against or in competition with them.

Permaculture helps us to understand and to create harmonic integrations between nature and people in the most sustainable way. Permaculture is appropriate for use in urban or rural locations, as well as for all scales of projects. Permaculture introduces traditional practices of nature management, integrated with appropriate modern technology. This is a holistic, kind, and environment friendly way for designing and building our natural living environment, as well as improving living standards, including housing, water supply, health, waste management, farming, energy, aquaculture, rivers, forests, livestock and much more.

The term Permaculture was coined by Bill Mollison and David Holmgren in the 70s, and now is in practice in over 100 countries by thousands of Permaculture Design graduates.

At this time there are many problems in the world, such as:

- Damaged natural environments
- Depleted and damaged farm land world wide
- Polluted rivers, lakes, land, air and oceans
- People, animals and plants are also becoming polluted, and many species are becoming extinct
- Most of the worlds population consists of very poor people, only a small percentage are very wealthy

People have created all of these problems, and it is people who must change their ways for the earth to become healthy again. Action and change must come from all levels of society, including governments, businesses, workers, farmers, community groups, families, men, women, children, everyone! Future generations depend on this.

Permaculture offers techniques and ideas which help in directing us toward a healthier environment, cultures and people. This is based on certain ethics and principles. Permaculture ethics and principles provide a guide to being more responsible for our own lives, environment and future. As well as helping us to prepare a safe future for our families, culture, and natural environment.

Ethics of Permaculture

The ethics of Permaculture are:

1. Care for the land
2. Care for the people
3. Care for the future

These ethics are explained as follows:

1. Care for the Land

Caring for the land means caring for our natural resources. Any action that damages, pollutes or destroys the environment or nature of Indonesia is also a loss for the people of Indonesia. Our natural environment must be protected and improved, this natural environment plays a key role in future of Indonesia.

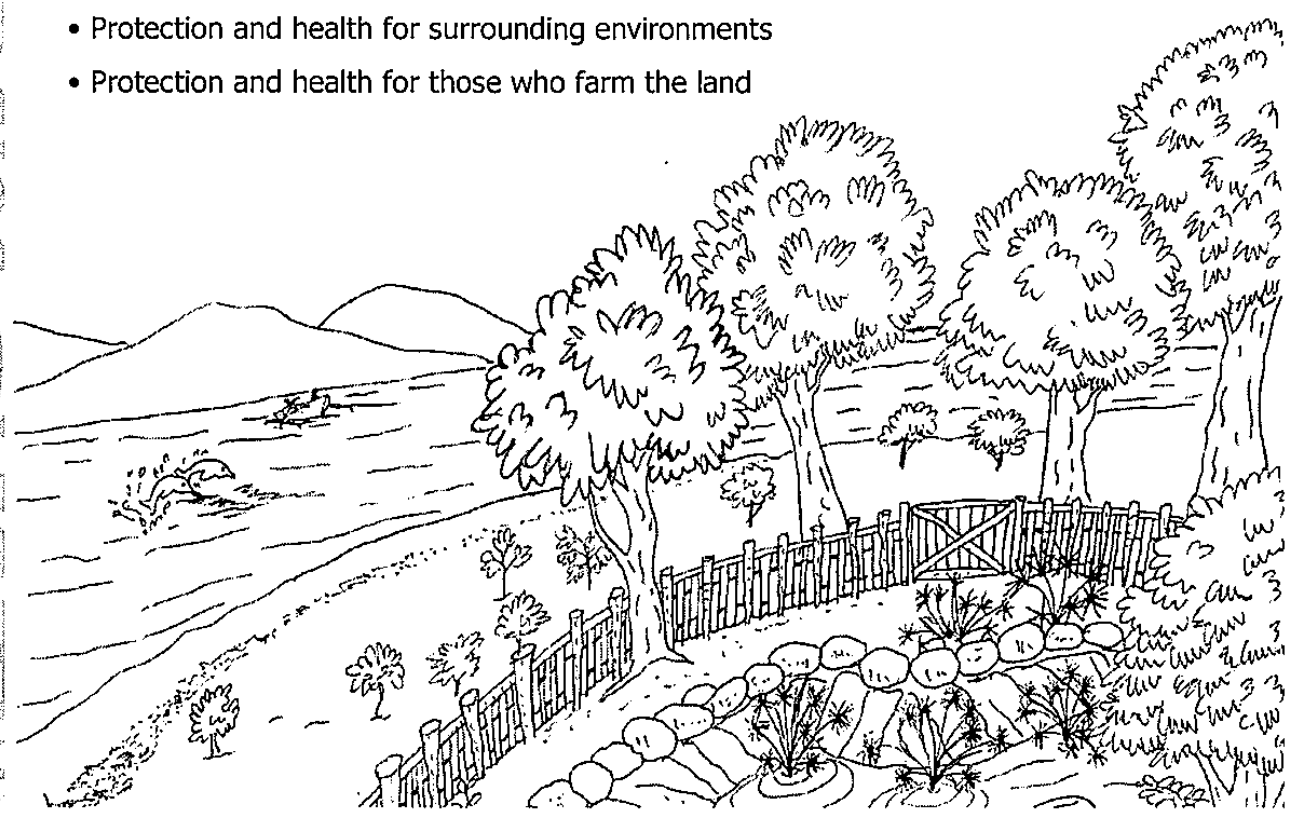
Natural resources include:

- Air
- Flora: forests and plants
- Fauna: wild animals, birds, etc
- Water: lakes, rivers, springs, etc
- Sea: beaches, coral reefs, marine life, etc
- Land: farm land, including forests and land for animal grazing

If our land is managed in a sustainable way and slowly improved, productivity (Indonesia's wealth) will also improve.

This will provide:

- Long term productivity for farmers and their children
- Protection and health for surrounding environments
- Protection and health for those who farm the land



2. Care for the People

Caring for the people means preparing a healthy and safe future for everyone. Permaculture is about improving our opportunities, living environment, food supply, health and wellbeing.

Sharing knowledge and assets will help us to:

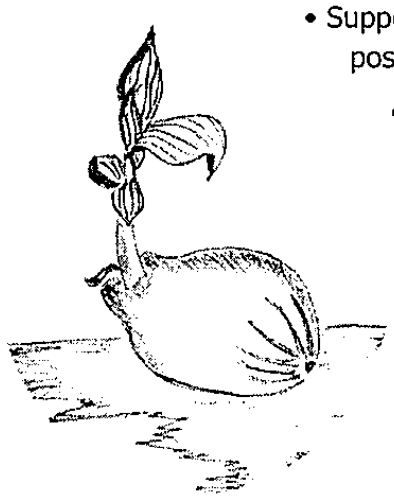
- Improve production, variety and quality of produce, as well food preservation and storage
- Improve health and nutrition, including encouraging the use of effective natural medicines
- Improve house health and hygiene, especially kitchens, air quality, toilets and waste management
- Develop equal rights and opportunities for every individual; men, women and children
- Improve livelihoods and work opportunities
- Reduce daily hard work, such as carrying water, firewood, etc
- Educate future generations in tradition, beliefs and knowledge, and in combining modern techniques with traditional culture

3. Care for the Future

What we do now affects the future. Caring for the future means always considering and planning for the future, not just 10 years, but 20, 50, 100 years in the future! For our grandchildren, and their children, are dependant on us to provide the best possible place for them to live. These ethic should be implemented by all levels of society, from governments and community groups, to families and individuals.

This can be implemented in ways such as:

- Protecting, distributing and marketing available resources
- Cooperation, not competition
- Supporting local economies by using local resources whenever possible
- Protecting Indonesia's natural environment, by using renewable resources
- Reducing waste, by reusing and recycling
- Using less unsustainable materials
- Using renewable energy sources, such as solar power, hydroelectricity, biogas and wind power
- Managing population growth



Principles of Permaculture

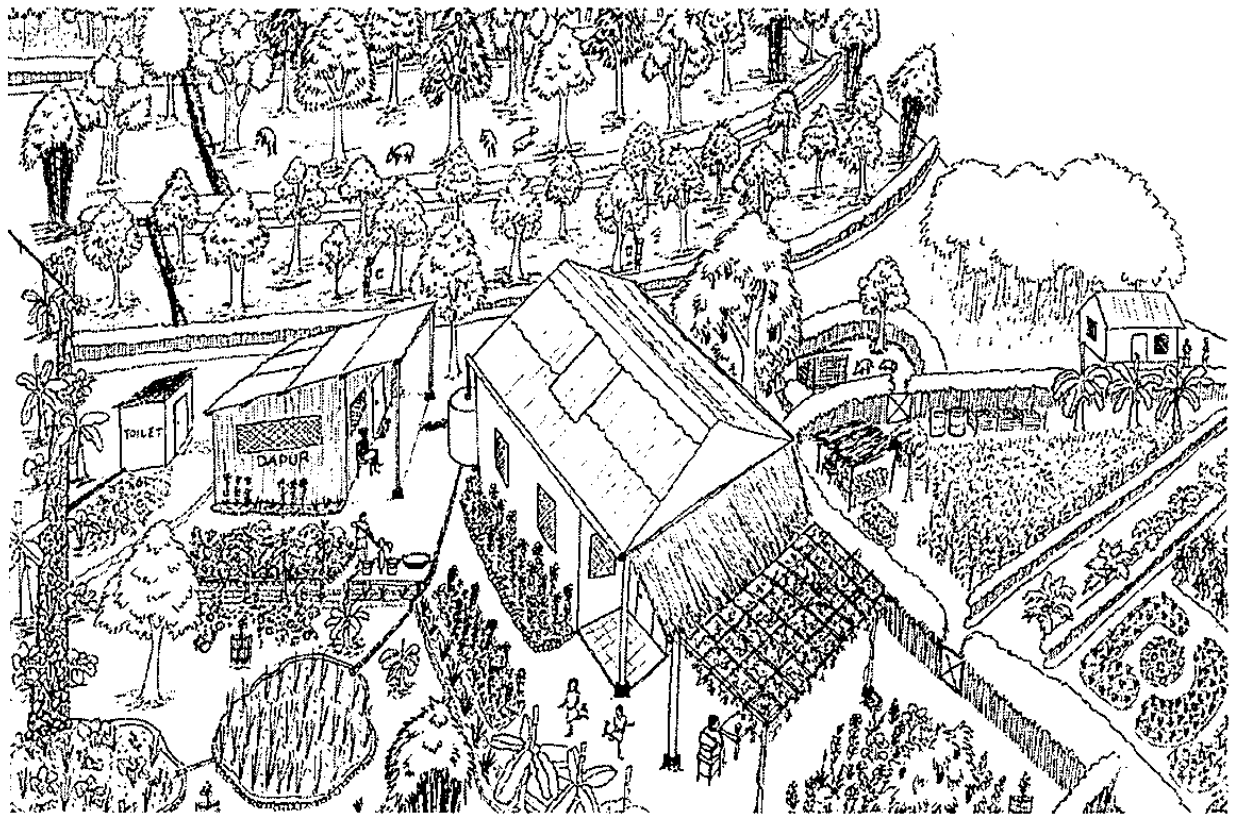
The principles of Permaculture should be implemented in every sustainable community design. These principles are an important guide for implementing Permaculture techniques. These principles also help to maximize efficiency and production in the most sustainable way, protect the soil, land, environment and people.

Permaculture principles encourage creativity and maximise results. Every place is different, every situation and every family is also different. Therefore plans, techniques, plants, animals and building materials will be different each time. However, for every place and every activity, the same principles apply.

Diversity: Aims to integrate a variety of beneficial types of food, plants and animals into a design. This builds a stable interactive polyculture which provides for human needs, and other species needs as well.

Edge effect: In general, there is more energy and more diversity of life in the space where two systems overlap. The edge effect happens in this space because it receives benefits from both sides. Using the edge effect and other natural patterns creates the best effect.

Energy planning: Place elements within your design in a way that will conserve the most energy (this includes fertilizers, water and even human labour). Utilize the energy and resources that you have, first on site and later from the outside of the system, to save energy and money. Energy sources around us include natural energy forces, like gravity, wind power and water power.



Energy cycling: In a natural system there is no waste or pollution. The output from one natural process becomes the resource for another process. Recycle and reuse resources as much as possible and as many times as possible.

Scale: Create human scale systems. Choose simple, appropriate technologies for use in designs. Create systems that are manageable, start small and take achievable steps towards and ideal goal.

Biological resources: Use natural methods and processes to achieve all tasks. Find materials in nature (plants, animals, bacteria) which support the system design and conserve the need for energy from outside the system.

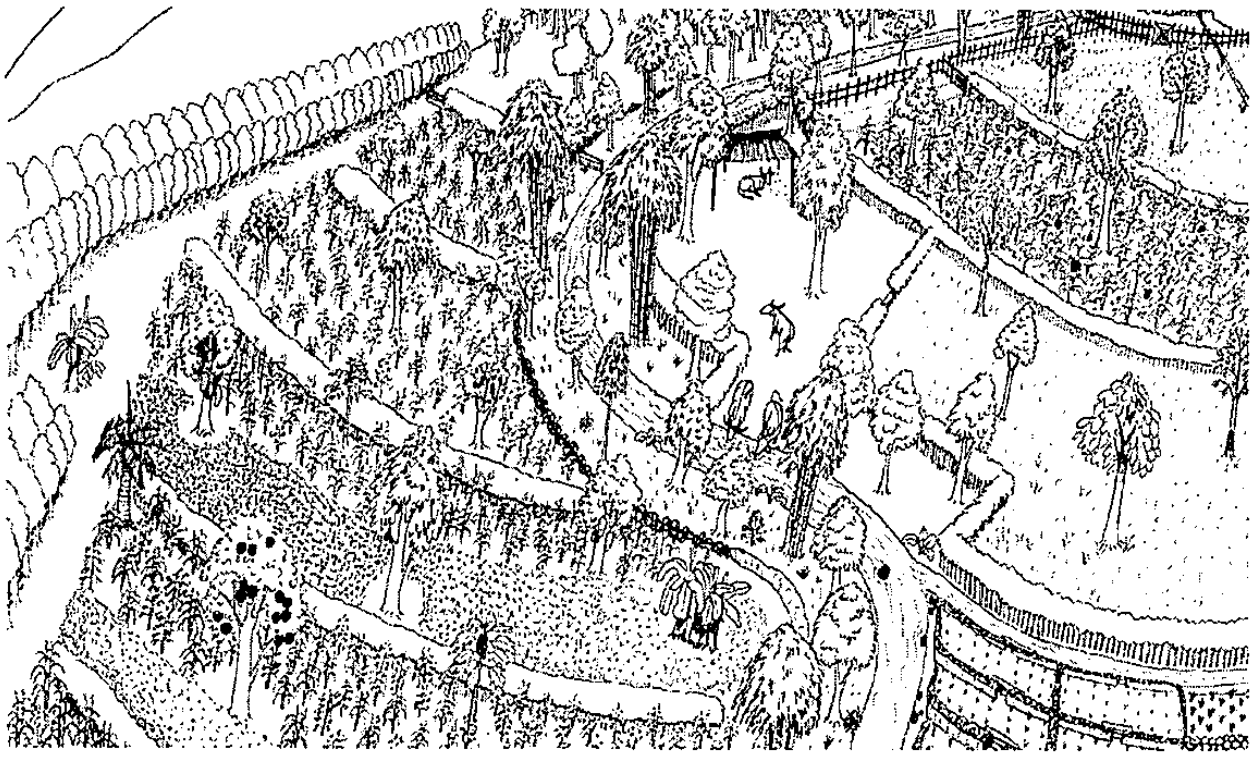
Multiple elements: Support each vital and essential function in more than one way, so that if one element fails, it will not stop other elements in the process from functioning. Also, recognize that there is almost always more than one way to manage any process.

Multiple functions: Most things can be used in a variety of ways and for a variety of functions. One main rule in Permaculture is to try to design at least three uses for every element in a system. This will save space, time and money.

Natural succession: Work with nature and natural processes. Anticipate future developments through research and observation whenever necessary.

Relative location: Place every element of your design in relationships so that they can receive benefits from each other. For example, store tools near to the place where they will be used.

Personal responsibility: Our actions affect our own lives, our families' lives, our friends' lives and anyone else who has direct or indirect contact with us. Any constructive sustainable actions that we do will create benefits for many. The same is true of destructive actions, their affects will be felt far and wide.



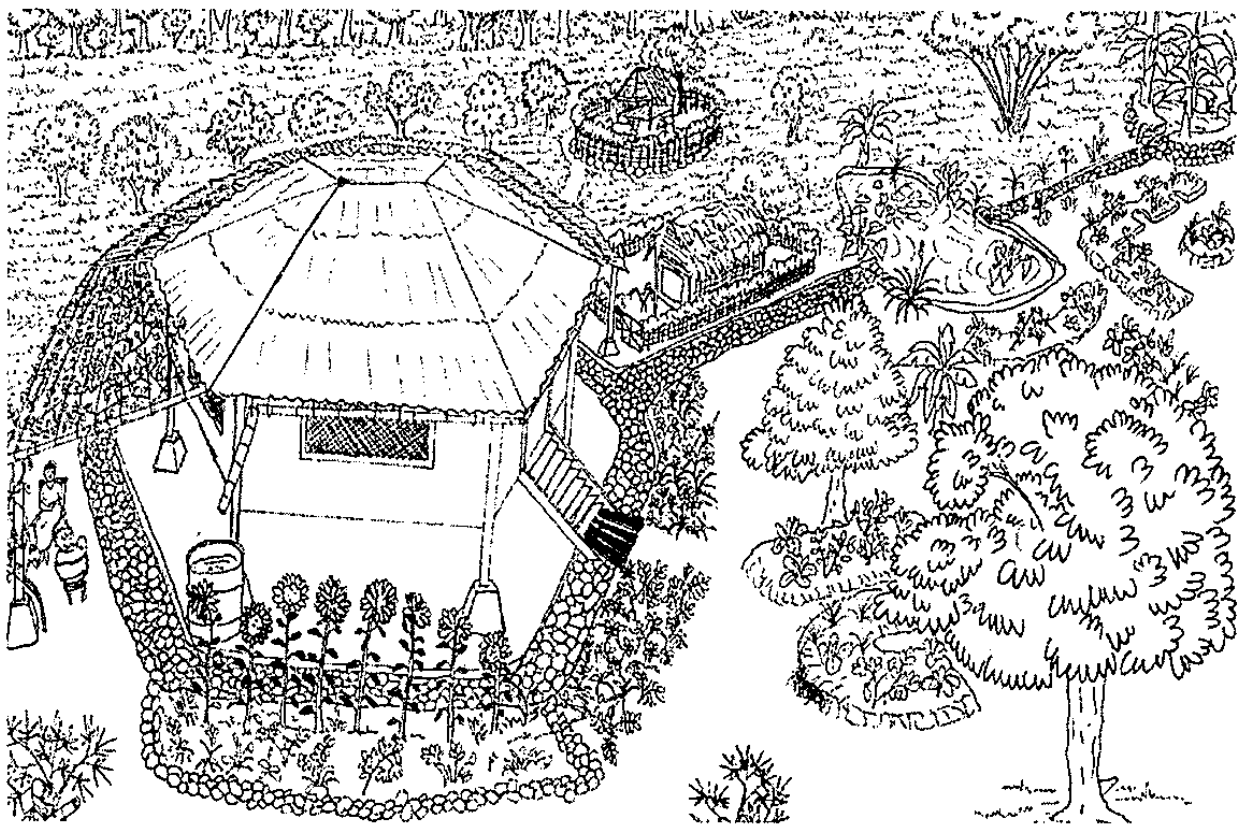
Cooperation not competition: Cooperation between people promotes community involvement, trading between members of the community, shared and improved knowledge and skills. Through cooperation many benefits can be achieved. Cooperation is important on all levels, in the family, in the village, in the districts and as a whole nation. Competition, on the other hand, creates conflict, jealousy and anger within communities especially if a resource is scarce. A good example is water use, usually the end result is that a few people have a lot while the rest receive only a little.

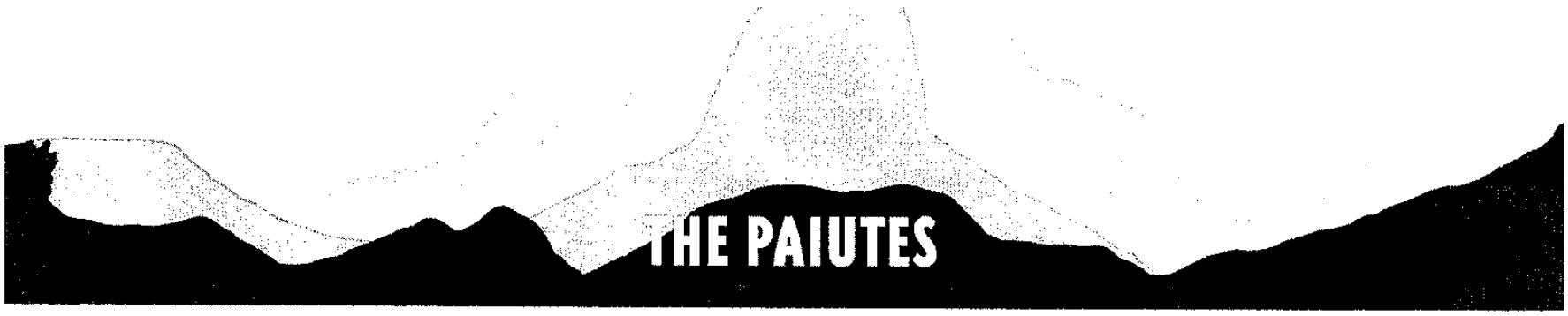
See solutions, not problems: Every problem that we are faced with has a solution. Often, the problem can contain within itself a solution. For example, turning weeds into compost and mulch, and using manure as a valuable resource for increasing soil fertility.

Observation: Natural patterns and cycles help us understand and make better plans for our farms, houses and gardens. Observation helps us to understand things like what works and what is not working and needs changing, by conducting simple experiments we can observe which are the best plants to grow and what is the best technique for growing them.

Beauty

Highly productive land can also be very beautiful, it is also the same for the house area. Indonesia has a very beautiful environment, and beautiful gardens and houses will add too it. Gardens and fishponds can be made in beautiful shapes. Flowers can be grown next to and among the vegetables. Small trees and legumes can be grown with fruit trees. This will encourage increased productivity and diversity.





AT A GLANCE:
SOUTHERN UTAH AND PAIUTE SUBSISTENCE, AGRICULTURE, AND TRADE

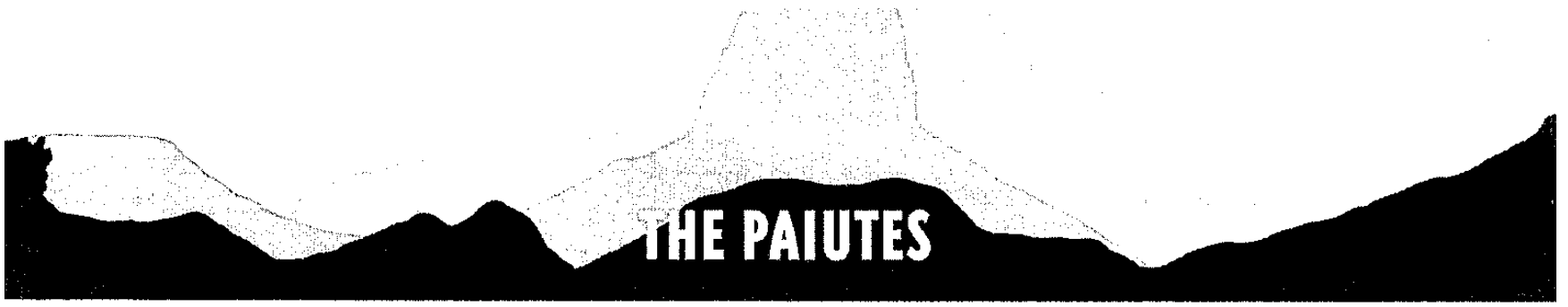
The ancestral territory of the Southern Paiutes covers parts of the Great Basin, the Mojave Desert, and the Colorado Plateau. This dry region does not contain abundant natural resources, but it is extremely diverse in types of plants and animals. Traditionally, the Paiutes lived in small communities that traded amongst one another to maximize their access to the diverse resources of their southern Utah homeland. Some Paiutes diverted streams to farm a variety of vegetables, while others living in the mountains had better access to fish, wild berries, and game. A strong Paiute trade network allowed each band to meet its resource needs while helping other bands survive.

Skilled botanists, the Southern Paiutes cultivated and gathered ninety-six varieties of edible plants, using them both for food and to build tools. Some of the tools Paiute traditionally used were milkweed nets for hunting, mahogany shovels for guiding streams and digging potatoes and bulbs, and willow baskets for storing grains, carrying water, and processing seeds. Paiute basketry was particularly specialized and inventive. The portability of resources was essential to the Paiute trade network, and baskets allowed the Paiutes to transport goods and travel distances that would not have been possible with heavy, fragile pottery. (For more information on Paiute basketry, see "The Art and Technology of Utah's Five Unique Indian Cultures" lesson plan).

Invariably, the resources available to a particular Paiute band were linked to their location and habitat. Historically, Paiute bands that lived near rivers and streams built complex irrigation canals to plant and harvest a variety of vegetables, including several types of squash and four different colors of corn. There is evidence that the Paiutes dammed rivers and diverted water for up to a half-mile. The Paiutes prepared fields for planting by burning off the existing brush, tilling the soil, and digging out irrigation rows. Communities that did not live near rivers utilized a method of irrigation in which they dug pits three feet across and six inches deep. Rainwater collected in the pits and was used to water the plants. Once the land was prepared and planted, the Paiutes left their farms and gardens unattended until it was time for weeding. They used the time between planting and weeding to hunt and gather.

The Paiutes were prodigious hunters and gatherers. They gathered many types of fruit in southern Utah, including raspberries and strawberries, which could be eaten fresh or dried for wintertime. They even used chokecherry and elderberry; the latter can be made into a delicious fruit beverage.

Often, seasonal subsistence activities offered the Paiutes an opportunity for social and trade gatherings. Bands held community rabbit hunts, and rabbits then were used for food, clothing, and warm fur blankets. The Paiutes also came together to gather pine nuts in the fall, and harvesting pine nuts was an especially important Paiute subsistence practice. Pine nuts are a rich



source of protein, stay preserved in their shell for months, and have a delicious, nutty flavor. Another important social and economic event occurred in the springtime, when the Paiutes traditionally gathered around Fish Lake, Utah, for the beginning of fish-spawning season. Fish Lake serves as the largest body of water in the Paiutes' territory in southern Utah.

In addition to maximizing the food resources of their homeland, the Paiutes found a variety of additional uses for local flora. Some were used as medicine. Yarrow treated wounds and eased infections. Strawberry leaves and roots were helpful for upset stomachs when steeped in water and consumed as a tea. Other plants were used as tools that improved the Paiutes' quality of life. The Paiutes burned juniper bark to ward off insects. They used bark from the Fremont cottonwood to make clothing. They cut cedar poles to support their teepees and wickiups.

Clearly, the subsistence and trade practices of the Southern Paiutes allowed them to maximize the resources of their arid southern Utah homeland, but this lesson also seeks to teach students the current locations of the Paiutes by using the five contemporary bands of the Southern Paiute—Cedar, Indian Peaks, Kanosh, Koosharem, and Shivwits—as the teams that trade with one another. It is important for students to realize that the Paiutes still live in southern Utah. In the 1950s and 1960s, due to the federal policy of Termination, the Southern Paiutes almost lost their last remaining Utah homelands. Today, however, after decades of struggle, the Southern Paiutes are again federally recognized, and they have regained some of their lands and are rebuilding their reservation communities.

The persistence and adaptability of the Southern Paiutes is still evident today. For more information on the history and current location of each of these bands, see the Southern Paiute Interactive Map, available at www.UtahIndians.org. For more information on the termination period, see "The Southern Paiutes of Utah, from Termination to Restoration," lesson plan.

GARDEN SPOTLIGHT

GREAT BASIN PERMACULTURE

Jessica and Tiffany, Las Vegas, Nevada

Jessica and Tiffany are gardeners who grew up in Henderson, Nevada, just outside of Las Vegas. These two gardeners share a passion for reading and investigating their natural world. As they read together, they saw a big need for grassroots conservation efforts to take care of the Las Vegas region. They realized that caring for water resources and using alternatives energies could advocate for a responsible way of growing food here in the Valley. Three years ago, they began a self-sustaining garden in Las Vegas.

Tiffany wasn't always a professional gardener; she began as a magazine editor and only worked indoors. She dreamed of working outdoors. After hearing about composting and worms, she began to learn how to garden on her own by simply experimenting. She kept track of her failures by journaling and always asked herself "why" things failed. Even though she experienced many errors gardening, she remained excited about learning more because those mistakes taught her how to garden.

As a child, Jessica loved learning about nature. When she was 8, she learned about the ozone layer depleting due to pollution. That day she went home and cried, feeling helpless. Her mother told her, "All we can do is what we can do. We can't go up and fix the atmosphere but we can fix little things we do." After that, Jessica began learning about small ways she could help the environment. She encourages others to think about small solutions, "Even if it is taking care of worms, or even if it's not stepping on a worm you see. You are still making a difference." Jessica was an elementary school teacher and began a garden at her school. Today, she teaches teachers how to garden.

Jessica and Tiffany began thinking of creating a space where they could practice and learn more about permaculture. Permaculture is a type of ecological design and engineering that focuses on sustainable practices for a self-sufficient result. Part of the Permaculture design is creating an edible landscape that is respectful of the earth and can be shared with people. Together, they designed and created a permaculture garden in Las Vegas called the Permaculture Learning Garden (PLG) three years ago. There, they plant using a water saving design. They plant native and hardy fruits, vegetables, herbs, and flowers. The community is welcome to visit and share the harvest the garden produces. One of the goals of maintaining the PLG, is seed saving. They save seeds from each harvest to reuse and repopulate their garden. In addition, they began a seed saving library at the Green Valley Library where seeds from their community garden will be saved and shared for free with the Las Vegas community.

Tiffany explains that, "Permaculture is about being flexible, observing, and interacting with our outdoor environment. Here in Las Vegas, it is most important to think about our water since we don't have much. Kids can help save water by watering plants with the water that you run before jumping in the shower, or by turning off the faucet when you are brushing teeth. It's about kids talking to their parents and neighbors about how most water is wasted by watering landscapes. Kids can suggest trading in grass for other designs that involve less water use."

Jessica recommends kids start gardening with one seed. Her great-grandmother gave her Hollyhock seeds that she planted in her hometown, Reno years before Jessica was born. As Jessica continues to plant those seeds, she is continuing her great-grandmother's legacy. She would like kids to be curious about their own seed heritage. Do you have seeds you or your family has saved?

STUDENT WORKSHEET

Name: _____

1. Vocabulary

- Grassroots conservation: Local people who volunteer to protect natural resources
- Resources: Source or supply from which a benefit is produced
- Advocate: A person who speaks, acts, plans, and writes in support or defense of a person, cause, etc.
- Composting: a mixture of various decaying organic substances, as dead leaves or manure, used for fertilizing soil.

2. Questions

- Summarize Tiffany and Jessica's garden in 2 sentences or less.

- How has reading this Spotlight changed your thoughts and opinions about gardening in Las Vegas?

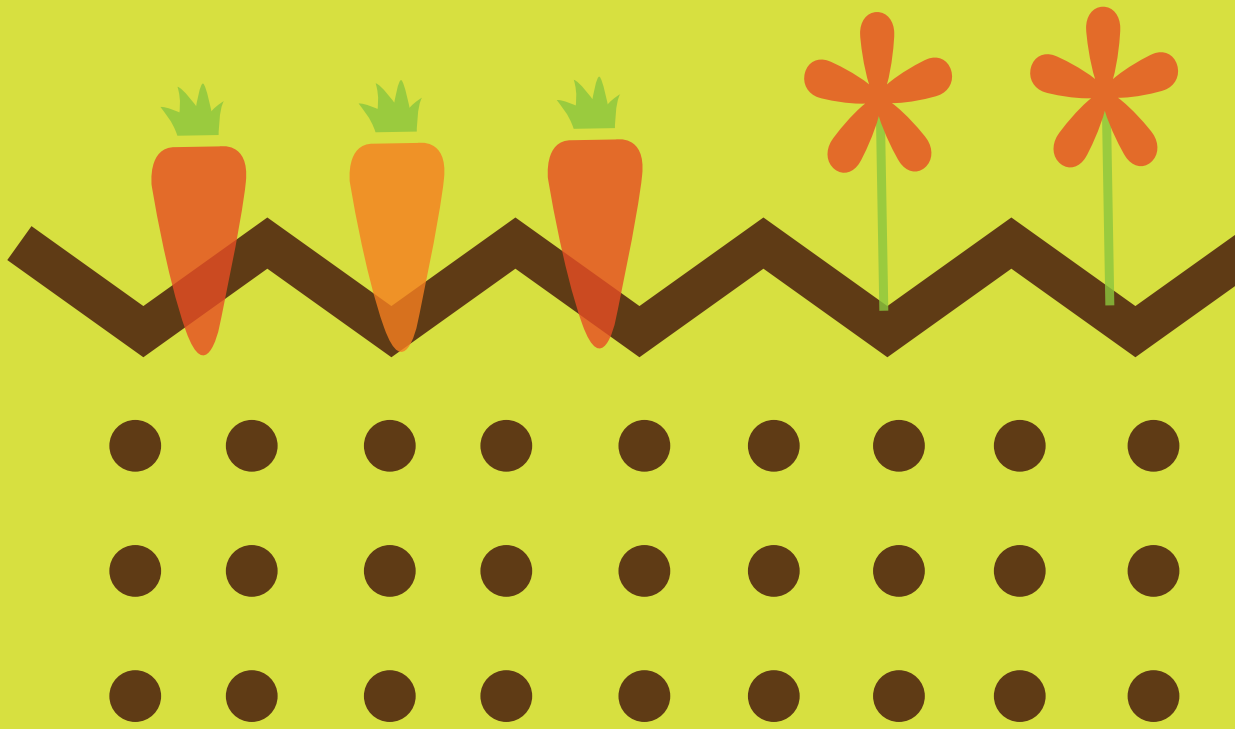
- Give examples of how Great Basin Permaculture uses the Learning Garden to save resources.

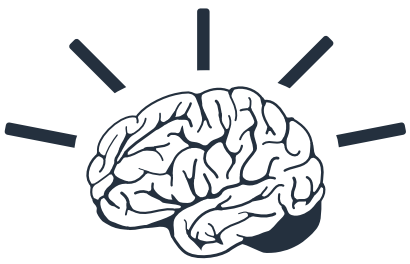
- Why is it important to be careful with our natural resources like water?

- Share your thoughts and opinions about the Seed Saving Library that Great Basin Permaculture has begun.

Lesson Three

Pesticides





BRAIN BREAKS!

1. Plant Partners Teacher will give class a plant part (seed, root, stem, leaves, flower). Students turn to a partner and go back and forth naming vegetables harvested from that part of the plant. Repeat until partners can no longer name vegetables from that plant part.

2. Apple, Watermelon, Banana (rock, paper, scissors) Students play rock, paper, scissors replacing rock with apple, paper with watermelon and scissors with banana. Play as many rounds as possible in given time frame.

3. Garden Taboo Teacher plays music. When music stops students pair up. Teacher calls out a garden topic such as fruit. Partner A has to describe any fruit they want to their partner without saying the name. Partner B has to try and guess what their partner is describing.

4. Syllable Snacks Teacher will call out a number (1-4). Students work with a partner to come up with garden vocabulary words that contain that number of syllables. Partner A will begin by naming a vocabulary word with the given number of syllables; partner B will go next. They will alternate until one partner can no longer name a vocabulary word with the given number of syllables.

5. Fruit/Veggie Knock Students will work with a partner and touch knuckle to knuckle (veggie) and palm to palm (fruit) in a given sequence. Teacher will name the sequence to the class (Ex: veggie, veggie, fruit) and students will have to use the given hand gestures to complete the sequence. Teacher will increases the number of movements with each round (Ex: Round 1-veggie, veggie, fruit. Round 2-fruit, veggie, veggie, fruit).

6. Fruit/Veggie Match Students will stand. Teacher will name a fruit or vegetable and students will have to touch that part of the body corresponding to the part of the plant that the fruit or vegetable grows from (roots-feet, stem-legs, leaves-body, flowers-head). Teacher will call out and play the game “Simon says” going a little faster with each round.

7. Plant Part Finger Hop Students touch thumb to thumb, pointer to pointer, middle to middle, ring to ring, pinkie to pinkie as they say the plant part finger hop chant (seeds, roots, stems, leaves, flowers). Teacher will randomly call out a plant part, students will have to touch the corresponding fingers. Teacher will repeat, increasing the pace with each round.

8. The Harvester Students will stand and squat (harvest) with a shovel in hand. They will shovel the dirt over alternating shoulders like a farmer. Students will work at their own pace “harvesting” for the given time frame.

9. Apple Squat Students will stand and begin by squatting. They will then stand up on one foot, hop twice saying “apple, apple” then return to a squat. Repeat with increasing speed each round and alternating feet.

10. Fruit Freeze Teacher will randomly call out different fruits and vegetables. If the teacher calls out a veggie, students have to jog (or march) in place, if teacher calls out a fruit, students have to freeze.

11. Garden Guess Students will work with a partner. Partner A will silently think of a fruit or vegetable. Partner B can ask three questions about what their partner is thinking. After three questions, partner B has to guess the fruit or vegetable. They will then switch roles, and partner B will silently think of a fruit or vegetable and partner A gets to ask questions and guess. Repeat as many times as possible in the given time frame.

OVERVIEW

Students will explore and investigate the use of pesticides in agriculture, including the effects to our health and environment.

OBJECTIVES

- Students will interpret, analyze, and evaluate the use of pesticides on fruits and vegetables.

STANDARDS

Nevada State Standards

(5) 1.11 Describe the positive and negative impacts of technologies (dams, agriculture, using natural resources) on society and the environment. [N.5.B.2, E.5.C.3, L.5.C.3, L.5.C.4]

(5) 4.8 Investigate and describe how organisms, including humans, can cause changes in their environments. [N.5.B.2, L.5.C.4]

Next Generation Standards

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems
Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1)

ESS3.C: Human Impacts on Earth Systems
Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)

Common Core Standards

English Language Arts

CCSS.ELA-Literacy.W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

TIME

One to two 1-hour sessions

QUESTIONS

- What are pesticides? Why are pesticides used? What effects, if any, do pesticides have on people and the environment?

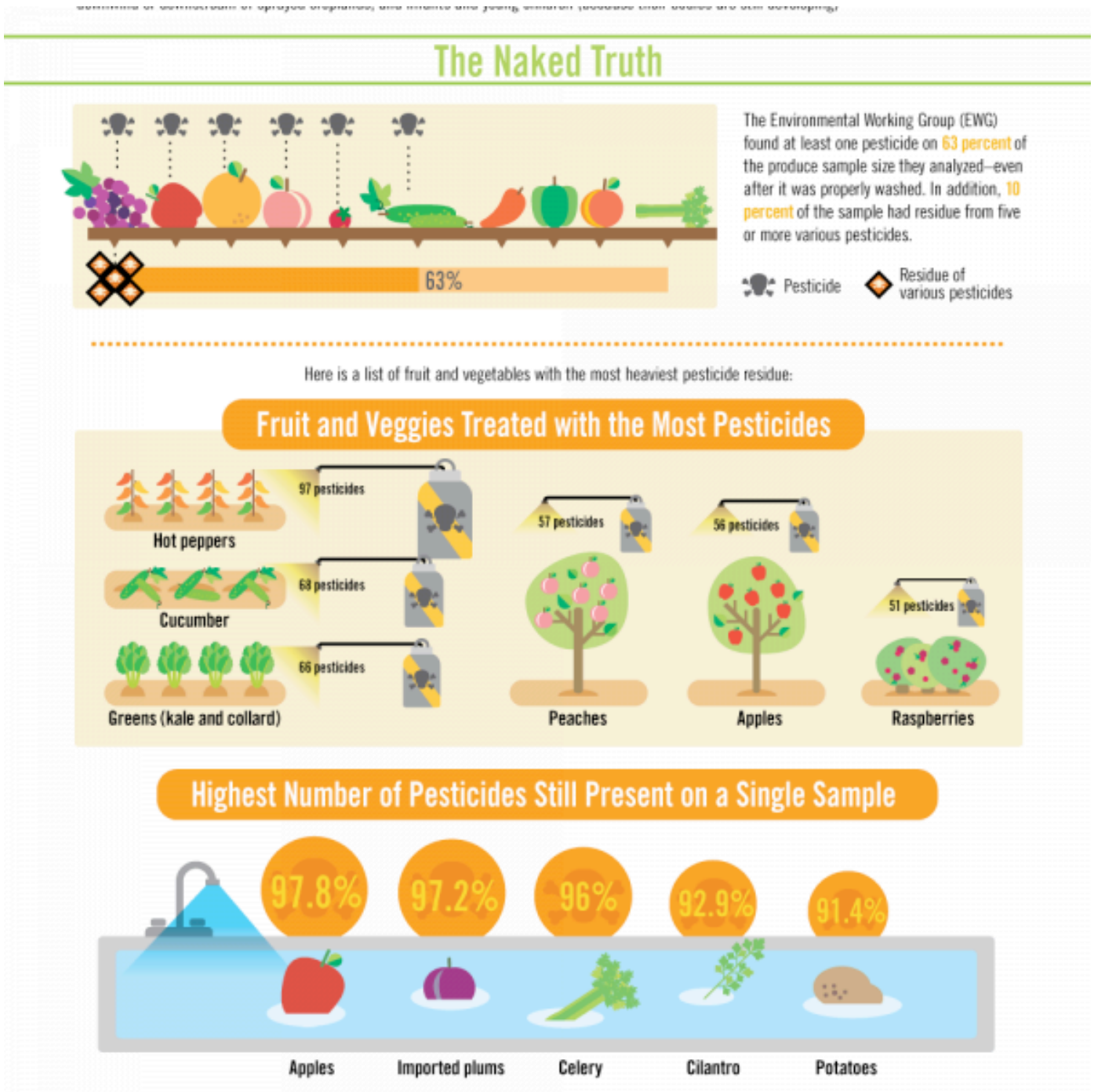
MATERIALS

- Visual Diagram of Pesticide Scenarios
- Student Response Sheet
- Article: "Kids' Guide to Pesticides"

TEACHER BACKGROUND

Each year, an estimated 1 billion pounds of pesticides are applied to U.S. farms, forests, lawns and golf courses. More than 17,000 pesticide products are currently on the market.

Source: http://www.panna.org/issues/pesticides-101-primer



http://www.loveinfographics.com/categories/health-and-diet-infographics/fruit-vegetables-pesticides-facts-statistics-infographic-infographic

http://www.loveinfographics.com/categories/how-to-guides/controlling-pests-without-pesticides-infographic

Out in the Garden

In order to prepare your students for this lesson it is important that they spend time in the garden observing plants and soil and looking for insects and pests. Ask students to take their Garden Journal and record potential problems and present problems they observe in the garden. For this lesson, you can preface with the question, “In what ways do plants need protection?” Some students might recognize the need for insect deterrents. What are examples of how plants protect themselves? Then suggest that they brainstorm solutions for that problem.

PROCEDURES

1. Inform the students that the assessment for the lesson will be to create a poster informing consumers of the pros and cons of using chemical pesticides.

2. Preview the word pesticide, review root word and suffix.

3. Create a K-W-L chart of pesticides. (K: What students know, W: What students would like to know, L: What students learned (this can be completed after the lesson).

4. As a class, draw/discuss a chart of pesticide moving through a root vegetable (ie beet). See attached diagram.

5. Present Scenario 1. Give students time to discuss and write a brief response.

6. Present Scenario 2. As a class, fill in the two blanks. Give students time to discuss and write a brief response.

7. Class Discussion with guiding questions

8. Present article attached to lesson and hold a class discussion highlighting main ideas.

ASSESSMENT

1. Students will weigh the pros and cons of pesticides by selecting one of the following:

   - Write an opinion essay.
   - Make a Poster about your school garden’s stance on the use of pesticides to put on display during your school’s Farmers' Market (also see Farmers’ Market Lesson 3).
   - Write a commercial to present to the class (also see Farmers’ Market Lesson 3).

ADAPTATIONS

Read scenario aloud to students. Students work in groups where one team member is the scribe.

DID YOU KNOW?

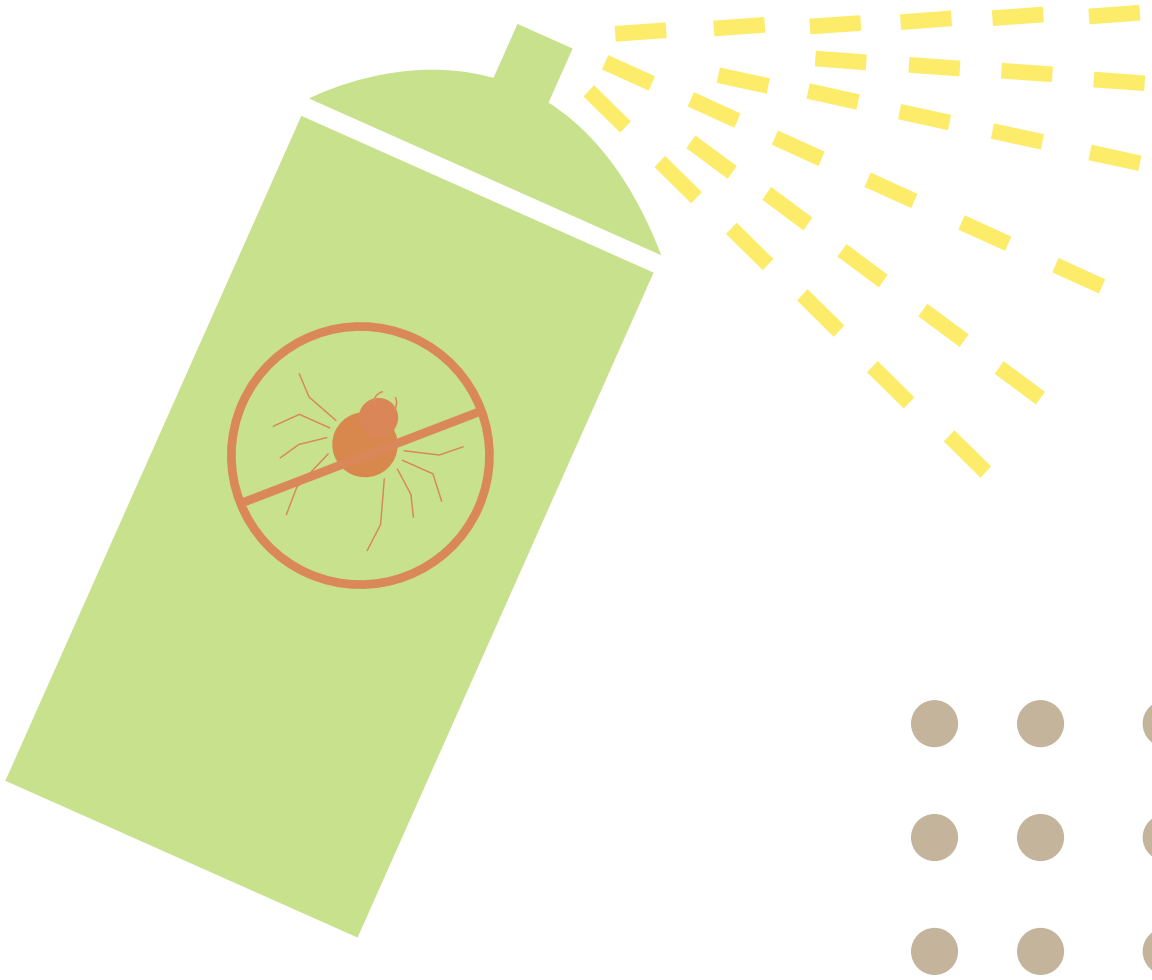
- Polyculture is an alternative to using chemical pesticides. Polyculture is the practice of growing multiple types of plants, rotating crops, timing crops according to when pests will be least problematic, and using trap crops that attract pests away from the real crop.

GARDENER TIPS

- Cilantro and lettuce are good companion plants because the smell of the cilantro keeps caterpillars away.
- Marigolds attract horn worms away from tomatoes.
- Sunflowers attract aphids and other insects and protect the rest of the garden.
- Look for holes in leaves and any changes in plants and be aware of pests and brainstorm.
- Coffee grounds repels ants and cockroaches in the garden.

NUTRITION FACTS

- Foods labeled "100% Organic" must contain all organic ingredients, "USDA Organic" labeled foods contain at least 95% organic ingredients, and foods that have at least 70% of organic ingredients can be labeled "made with organic ingredients."



STANDARDS FOR LESSON 3 LESSON MAP

NG 5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

ESS3.C Human Impacts on Earth Systems

> Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

ELA Reading By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 4-5 text complexity band independently and proficiently.

ELA Wrting Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

LESSON 3 LESSON MAP

Lesson 3: Pesticides

Day 1

- Preview
- Vocabulary introduction: pesticide
- And preview effect of pesticide on plant included in resources
- KWL-pesticides
- Lesson introduction: preview final product student-created poster on pros and cons
- Song Link: play for students

Day 2

- Students will work on scenario #1

Day 3

- Students will work on scenario #2

Day 4

- Read and discuss article #1 "Pesticides"

Day 5

- Read article #2 and take notes

Day 6

- Student activity evidence sheet for article #2 and discussion

Day 7

- Finish student activity evidence sheet and discussion

Day 8 and Day 9

- Students work on poster on stance on pesticides
- Presentation of posters if time allows

Day(s) ____

Math Grade 5 Farmers' Market Lesson 2: Cost and Profit

Handout "Making a Profit"

Pages 8-9

Day(s) ____

Literacy Connection Opinion on pesticides, create pesticide stance poster, and present/defend stance

Planet Patrol *A Kids' Action Guide to Earth Care* by Marybeth Lorbiecki

Poetry Connection *"Listening to the song, "Shiva" (see attached)*

Day(s) ____

Science/Social Studies Extension

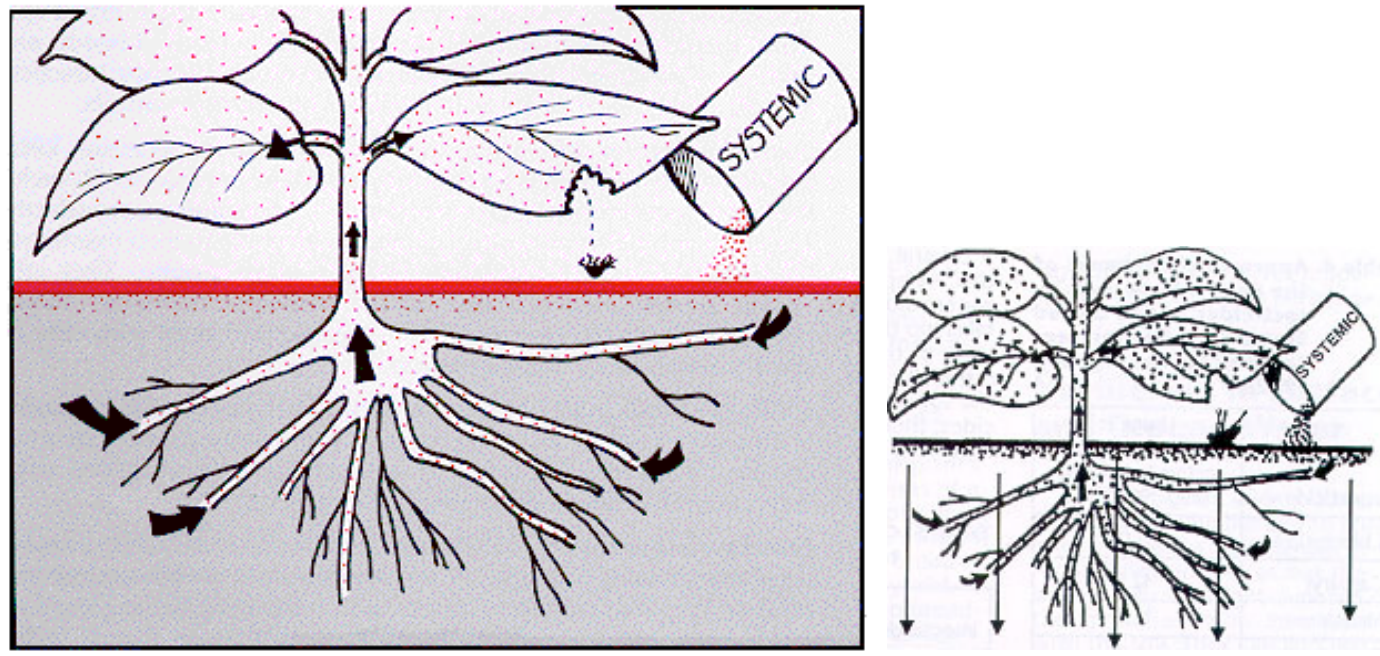
Observations and recording gardening methods

PREVIEW VOCABULARY

Read scenario aloud to students. Students work in groups where one team member is the scribe.

Definition: **pesticide**: any chemical substance used for killing pests, as insects, weeds, etc.	Root Word: Pest
Suffix Connection: **cide:** from Latin meaning "killer," "act of killing,"	Used in the formation of compound words: *pesticide, homicide.*

Preview Diagrams



http://www.extension.org/pages/17852/types-of-pesticides#.U4Gppdrn_IV

Optional material to review post lesson

http://www.activistpost.com/2012/09/simple-ways-to-avoid-pesticides-in-food.html

Student Worksheet

Name: _____

Scenario One:

A red alert has just come to the _____ Elementary School's attention. A monster bug is approaching the school grounds! The school has one day to prepare a plan to defeat the monster bug and protect itself. Principal _____ has asked the fifth grade, (since they are the smartest and strongest grade on campus) to develop a plan! Information about the monster bug is trickling in and you will continue to get information from Officer Roundupnomore as she learns more. All we know at this moment is
that this bug is hungry!

1. Develop a plan to protect your school.

- Illustrate your plan.

2. Does your plan hurt anyone or the school?

3. What are the short term and long term risks of your plan?

Student Worksheett

Name: _____

Scenario Two:

Officer Roundupnomore has just learned that this monstrous bug only likes eating certain items. The monster bug is attracted to the sweet lumber scent of the walls, desks, and pencils. Officer Roundupnomore has recently informed the brave 5th grade team that the monster bug loves to eat _____ (school material) and hates the smell of _____(any object that many students bring to school). Officer Roundupnomore has also announced that any use of chemicals will linger in the school for a minimum of ten years. Taking this new information into account, revise or re-write your plan to protect your school.

4. Develop a plan to protect your school.

- Illustrate your plan.

5. Does your plan hurt anyone or the school?

6. What are the short term and long term risks of your plan?

7. How has this plan evolved from your original plan?

Guiding Questions:

1. In the scenarios, what were the pros of using chemical pesticides? What were the cons?
2. Were any of the plans destructive to the school environment? If yes, how so?
3. What alternatives to using destructive methods did the class create?
4. How did it help to know what the monstrous bug liked to eat and smell?
5. How did learning any chemical would remain on your school for ten years impact your plan? How does this connect to pesticides in the real world?

Extension 1:

Experiment:

Place apples in jars with cold water, hot water, hot water with vinegar, and cold water with vinegar. After 20 minutes, remove the apples from the jars. Compare the water, document with illustrations and observations. After drying off the produce, compare the apples. What conclusions can you draw on washing produce?

After the experiment, share with your class the suggested method of washing produce. This method also extends the quality of the produce.

How to Wash Fruits and Vegetables to Minimize Exposure to Pesticides

- Fill a bowl with water and add 1/8 to 1/2 cup of vinegar, depending on the size of your bowl.
- Place your fruits and veggies in the bowl.
- Soak for 15 to 20 minutes.
- Rinse with water.
- Dry off entirely

Source: http://goodgreenhabits.com/wash-your-fruits-veggies-with-vinegar/

Extension 2:

Interview a farmer about alternatives to using pesticides. Be sure to ask about chemical free sprays and companion planting.

Extension 3:

Listen to Olmeca's song about Dr. Shiva: https://soundcloud.com/olmecaofficial/shiva

KIDS' GUIDE TO PESTICIDES

A FACTSHEET FROM SAFER PEST CONTROL PROJECT

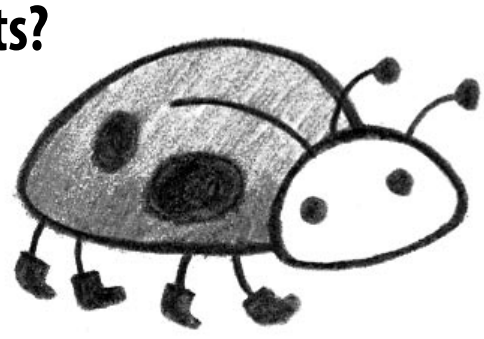
What are pesticides?

Pesticides are chemicals made to kill pests. They come in many forms: liquids for spraying, gels for putting into cracks and crevices, pellets that pests can eat or that will dissolve over time. There are many different brands and types of pesticides ***(can you name some?)*** but most fall into one of these three categories:

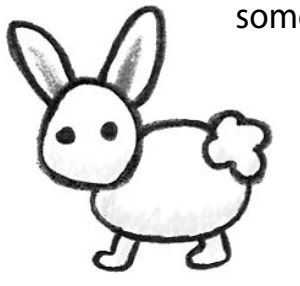
- ***insecticides*** — insect killers
- ***herbicides*** — plant killers
- ***fungicides*** — mold/fungus killers

All pesticides are poisons designed to kill something.

What are pests?



Pests are plants, insects, or even animals that people consider dangerous, ugly, or inconvenient. ***(Can you think of an insect or a mammal that someone you know calls a pest?)*** In homes and schools many people think cockroaches, ants, and mice are pests. Outdoors, especially in yards, some people think dandelions and clover are pests. And some people don't want rabbits eating their garden plants and so consider rabbits pests. Some bugs, like mosquitoes, can bite people and sometimes—rarely—a bug or animal can carry a disease. Pests are not often dangerous to people and, if you think about it, most bugs, plants and animals are not pests.



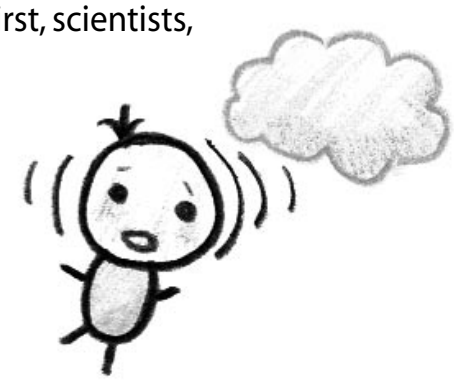
Are pesticides dangerous?

Pesticides can be very dangerous to people—especially kids—and especially when they are not used properly. If someone wants to apply a pesticide in a public place, like a school or park, they have to have a special license or work with someone who does.

Can pesticides hurt people or pets?

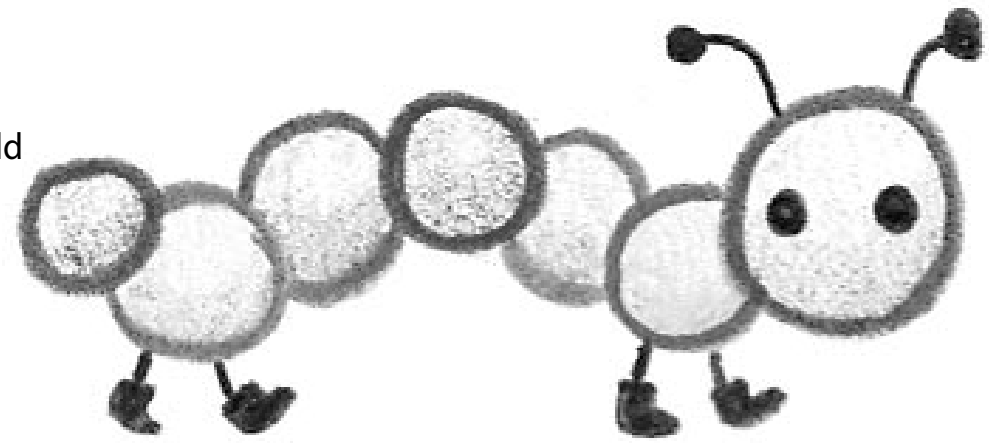
Yes, especially when sprayed in the air, used too often, or in places where people or pets are often playing, sleeping, or eating. If you get pesticides on your skin, they can make you dizzy, shaky, tired, or sick to your stomach. Breathing too much of the fumes, too often, can make kids, pets, older folks, and sometimes even healthy adults sick. Some pesticides can build up in a human or animal body over time and can lead to more serious health problems.

People started depending on pesticides about 50 years ago. At first, scientists, farmers, and everyone else thought they were shortcuts to getting rid of many pest problems and that



they couldn't hurt people or animals. But now we know that there are many risks to using pesticides. Pesticides can pollute our drinking water, lakes, and streams. In big enough amounts, they can poison pets, wildlife, birds, good insects (the kind that eat pest insects), and people.

All of these are reasons why we should avoid using pesticides whenever possible. There are many simple, less dangerous ways to control pests. In any situation where a pest seems to be out of control, people should look for solutions that won't hurt plants, useful insects, birds, pets, or people, and won't pollute our water or the air we breathe.



What Can Kids Do About Pesticides?

1 Never, ever play with pesticides or even with empty pesticide containers. If there are pesticides in your home (like bug killers or weed killers) ask your parents to put them out of reach of younger children—like your younger brothers, sisters, and cousins.

2 Tell your parents what you learned today—that there are safe ways to control pests that don't use pesticides and that pesticides can hurt birds, pets, and people even if used properly. If they have questions, they can get free information from the Safer Pest Control Project at 312/641.5575.

3 Offer to help pull weeds by hand at home. Help plant a garden that will provide a good place to live for beneficial bugs like ladybugs, dragonflies, and green lacewings.

4 Give your parents a hand in the kitchen.

5 Never play in a yard that has just been sprayed with pesticides. Yards that have just been sprayed will have small white 'danger' signs in them.

6 Learn about bugs and plants and animals and how we all fit together in our world.

Safer Pest Control Project is dedicated to reducing the health and environmental impacts of pesticides and promoting safer alternatives in Illinois.

4611 N. Ravenswood, Suite 107, Chicago, Illinois 60640 Tel: 773/878-7378 Fax: 773/878-8250 Web: www.spcpweb.org

INTEGRATED PEST MANAGEMENT

https://student.societyforscience.org/article/how-limit-need-pesticides

Pesticides

Integrated pest management can boost human health

by Alison Pearce Stevens
11:22am, January 10, 2014

One way to limit the need for toxic pest-killing chemicals is to encourage nature's pest killers, like ladybugs, to inhabit your yard or garden. You can buy these beneficial insects to release in your yard.

Pesticides are designed to kill particular classes of organisms. Most target a narrow range of species of insects, mites or nematodes. That doesn't mean they can't, however, also poison other critters, including bees or even people.

Pesticides sold for use around the home tend to be relatively nontoxic or are mixed in concentrations that are not overly strong. They should be relatively safe around people, at least when used as directed. But kids are smaller than adults. That means it takes a smaller dose of pesticide to have an effect inside a child's body. And even low levels of pesticides can cause behavioral problems, trouble concentrating or even cancer, notes the American Academy of Pediatrics (AAP).

That presents a concern, because kids are exposed to a wide variety of pesticides every day, the AAP finds. Shoes track these chemicals into our homes. The wind spreads them beyond the field or garden. Some bug or rodent killers are even designed for use in homes. And traces of pesticides may even taint foods.

That's why the AAP recommends taking steps to reduce pesticide exposure. One way is to eat organic foods. Another is to switch to integrated pest management, or IPM. This takes a natural approach to pest control.

For instance, gardeners or farmers may release ladybugs or other natural predators onto their plants. There, the good bugs munch on the pests. Or growers can plant things that attract birds and other predatory species. Examples include plants that produce yummy berries and seeds, or that provide protective cover for the natural predators. Those species can control pests naturally. They patrol a yard or field snacking on caterpillars, grasshoppers and other animals that may pose a threat to plants.

Recently, some crop scientists have found that certain species of plants naturally produce vapors that act as chemical distress calls. Various insects and other predatory animals have evolved to learn that these scents signal a plant is under attack by a pest. Often a predator will find those pests yummy. Plants that make these distress scents basically recruit their own saviors.

People also can choose certain species of crops or garden plants whose roots exude their own weed killers. These plants include some lawn grasses and garden shrubs. Botanists refer to this type of chemical defense as allelopathy (Ah LEE lo path ee).

IPM practices allow the use of chemical pesticides, but only as a last resort. So consider

allowing a few weeds in the lawn (or hand-pulling them) to avoid the need for poisonous weed killers. Seal cracks around the house to keep spiders, crickets, mice and other pests outside, where they belong. And fix leaky pipes to dry up the water that lures many pests into a building.

Taking such IPM steps can minimize any need for pesticides. That leads to a safer environment for people, pets and welcomed wildlife — including bees.

Power Words

allelopathy A plant's production of chemicals that impair the growth and survival of other plant species.

botany The field of biology that focuses on plants. A scientist in this field is known as a botanist.

evolve To change gradually over generations, or a long period of time.

integrated pest management (abbreviated **IPM**) The process of using primarily non-chemical steps to reduce pest problems. IPM practices allow the use of chemical pesticides, but only as a last resort.

mite Tiny eight-legged creature related to spiders and ticks. It is not an insect.

organic (in agriculture) Farm products grown without the use of non-natural and potentially toxic chemicals, especially pesticides.

pediatrics Relating to children and especially child health.

pesticide A chemical or mix of compounds used to kill insects, rodents or other organisms harmful to cultivated plants, pet or livestock, or that infest homes, offices, farm buildings and other protected structures.

predator (adjective: **predatory**) A creature that preys on other animals for most or all of its food.

Further Reading

R. Kwok. "Weed wars." *Science News for Students*. Dec. 7, 2011.

S. Oosthoek. "Cool Jobs: Green science." *Science News for Students*. March 14, 2013.

J. Richardson. "A plant enemy's enemy." *Science News for Students*. April 3, 2013.

GARDEN SPOTLIGHT

DR. VANDANA SHIVA

Delhi, India

"Uniformity is not nature's way; diversity is nature's way." -Shiva

Adapted from:

http://www.bio.davidson.edu/people/kabernd/seminar/2004/gmbios/lh.html
http://www.eomega.org/workshops/teachers/vandana-shiva

Vandana Shiva was born on November 5, 1952 in Dehradun, India, an ancient city nestled within the Himalayan Mountains. With a forest conservationist father and farming mother, Shiva quickly developed a deep respect for nature. She aspired to be a scientist. Today, she is a physicist. Dr. Shiva studies how science technology impacts the environment and conducts research in science, technology, and environmental policy. In 2002, Time Magazine recognized her as an "Environmental Hero."

Vandana Shiva is a world-renowned environmental leader, eco-feminist, and thinker. She founded the international seed saving project, Navdanya (meaning Nine Seeds or New Gift in Hindi), in order to preserve plant diversity and support local farmers. This organization helps farmers save and trade seeds to preserve native plants and increase harvests. Her studies have validated the ecological value of traditional farming and have been instrumental in fighting destructive development projects in India. Navdanya is composed of over 70,000 farmers and has conserved more than 2,000 rice varieties established in 34 seed banks!

Shiva believes that there is wisdom in traditional practices of farming and seed saving. In many parts of the world, women are heavily involved in agriculture; Dr. Shiva works tirelessly to ensure that all women's human rights are protected. She says, "I learned a lot from the women in my region, the Himalaya. Peasant women, who have never been to school, are top biodiversity experts who changed the policies of this country [India]." Shiva recognizes that women carry the knowledge necessary to preserve nature.

Dr. Shiva has internationally campaigned against Genetically Engineered Foods. She argues that genetically modified organisms (GMOs), such as herbicide resistant and Bt crops, increase the need for chemicals to combat resulting super weeds and super pests. This decreases farmers' ability to farm diverse plants through natural seed saving because big companies hold a patent on those seeds that they are not allow to replant. (Shiva, 2002).

Vocabulary:

1. Himalayan Mountains: Mountain system, southern Asia. The greatest mountain system on Earth and includes more than 110 peaks rising to elevations above 24,000 ft (7,300 m), including Mount Everest.

2. Environmental Policy: The commitment of an organization to the laws, regulations, and other policy mechanisms concerning environmental issues and sustainability.

3. Eco-feminist: a movement or theory that applies feminist principles (human rights of women, concerning equity and equality) and ideas to enivornmental issues

4. Social justice: “Social justice is the view that everyone deserves equal economic, political and social rights and opportunities.” – National Association of Social Workers

5. Founder: a person who establishes or begins a whole new project

6. Diversity: being composed of many different elements or types

7. Biodiversity: the variety of life forms in the world or in a particular habitat

8. Native seeds: a plant species “that occurs naturally in a particular region, state, ecosystem, and habitat without direct or indirect human actions” (Federal Native Plant Conservation Committee)

9. Ecology: the branch of biology that deals with the relations of organisms to one another and to their physical surroundings

10. GMO: genetically modified organism. An organism or microorganism whose genetic material has been altered by means of genetic engineering.

11. Patent: the exclusive right granted by a government to an inventor to manufacture, use, or sell an invention for a certain number of years.

STUDENT WORKSHEET

Name: _____

Questions:

1. Summarize Dr. Shiva's work. What does she do?

2. Why does Dr. Shiva believe GMOs are harmful to farmers in India?

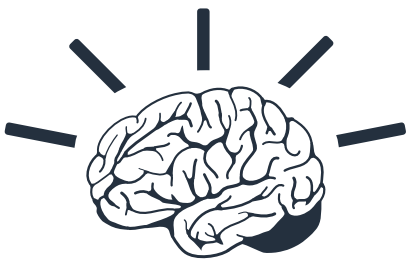
3. Write a definition of seed saving in your own words. Do you think it is important? Why or Why not?

4. Research what plants are native to Las Vegas. Are there any seed banks in Nevada? The Southwest?

(Hint: Research The seed library in the Green Valley Library in Henderson. It was established by the Great Basin Permaculture group. See spotlight 4).

Lesson Four

Genetically Modified Organisms (GMOs)



BRAIN BREAKS!

1. Plant Partners Teacher will give class a plant part (seed, root, stem, leaves, flower). Students turn to a partner and go back and forth naming vegetables harvested from that part of the plant. Repeat until partners can no longer name vegetables from that plant part.

2. Apple, Watermelon, Banana (rock, paper, scissors) Students play rock, paper, scissors replacing rock with apple, paper with watermelon and scissors with bananas. Play as many rounds as possible in given time frame.

3. Garden Taboo Teacher plays music. When music stops students pair up. Teacher calls out a garden topic such as fruit. Partner A has to describe any fruit they want to their partner without saying the name. Partner B has to try and guess what their partner is describing.

4. Syllable Snacks Teacher will call out a number (1-4). Students work with a partner to come up with garden vocabulary words that contain that number of syllables. Partner A will begin by naming a vocabulary word with the given number of syllables; partner B will go next. They will alternate until one partner can no longer name a vocabulary word with the given number of syllables.

5. Fruit/Veggie Knock Students will work with a partner and touch knuckle to knuckle (veggie) and palm to palm (fruit) in a given sequence. Teacher will name the sequence to the class (Ex: veggie, veggie, fruit) and students will have to use the given hand gestures to complete the sequence. Teacher will increases the number of movements with each round (Ex: Round 1-veggie, veggie, fruit. Round 2-fruit, veggie, veggie, fruit).

6. Fruit/Veggie Match Students will stand. Teacher will name a fruit or vegetable and students will have to touch that part of the body corresponding to the part of the plant that the fruit or vegetable grows from (roots-feet, stem-legs, leaves-body, flowers-head). Teacher will call out and play the game “Simon says” going a little faster with each round.

7. Plant Part Finger Hop Students touch thumb to thumb, pointer to pointer, middle to middle, ring to ring, pinkie to pinkie as they say the plant part finger hop chant (seeds, roots, stems, leaves, flowers). Teacher will randomly call out a plant part, students will have to touch the corresponding fingers. Teacher will repeat, increasing the pace with each round.

8. The Harvester Students will stand and squat (harvest) with a shovel in hand. They will shovel the dirt over alternating shoulders like a farmer. Students will work at their own pace “harvesting” for the given time frame.

9. Apple Squat Students will stand and begin by squatting. They will then stand up on one foot, hop twice saying “apple, apple” then return to a squat. Repeat with increasing speed each round and alternating feet.

10. Fruit Freeze Teacher will randomly call out different fruits and vegetables. If the teacher calls out a veggie, students have to jog (or march) in place, if teacher calls out a fruit, students have to freeze.

11. Garden Guess Students will work with a partner. Partner A will silently think of a fruit or vegetable. Partner B can ask three questions about what their partner is thinking. After three questions, partner B has to guess the fruit or vegetable. They will then switch roles, and partner B will silently think of a fruit or vegetable and partner A gets to ask questions and guess. Repeat as many times as possible in the given time frame.

OVERVIEW

Students will explore the pros and cons of Genetically Modified Organisms (GMO)

OBJECTIVES

- Students will identify, evaluate, and compare and contrast arguments for and against GMOs.
- Students will calculate amount of seeds that could potentially be saved from one plant using exponents.

STANDARDS

Nevada State Standards

Cause and effect relationships are routinely identified, tested, and used to explain change. (5-PS1-4)

Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)

(5) 1.11 Describe the positive and negative impacts of technologies (dams, agriculture, using natural resources) on society and the environment. [N.5.B.2, E.5.C.3, L.5.C.3, L.5.C.4]

(5) 4.8 Investigate and describe how organisms, including humans, can cause changes in their environments. [N.5.B.2, L.5.C.4]

Next Generation Standards

5.NBT.A.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

ESS3.C Human impacts on earth systems. Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

TIME

One hour

QUESTIONS

What do you think a Genetically Modified Organism is?

Why would you want to modify an organism?

MATERIALS

- Scenario, T-charts, DNA visual, Exponents worksheet

Out in the Garden

In order to prepare your students for this lesson it is important that they spend time in the garden observing. Ask students to take their Garden Journal and select a plant. The students will then select the strongest sprout of that type of plant. Ask them to brainstorm the benefits of using the biggest, most developed plant. Also ask, why some plants grow better than others. What are some ways to help the other plants grow just as well? It is important for the students to notice the differences that can affect the purchasing value of each plant. Explain that the consumer typically places importance on the appearance of the product.

PROCEDURES

1. Preview vocabulary: genes, modify, DNA.
2. Introduce students to the concept of genetic modification.
3. Class will read scenario as a whole group.
4. Teacher will lead discussion and model the completion of the T-Chart (Comparing the teacher).
5. Complete 2nd T-chart (about GMO foods).
6. Discuss as a class the pros and cons of using GMOs. Be sure to discuss the use of GMOs in the Garden.
7. Read and discuss article, "GMO's Are on the Ballot."
8. Closure: Discuss seed saving. Calculate, using exponents, the amount of non-GMO seeds that could be saved. Use the worksheet to review exponents.

ASSESSMENT

Students will weigh the pros and cons of using GMOs by selecting one of the following:

- Write an opinion essay
- Make a Poster about your school garden's stance on the use of GMOs to put on display during your school's Farmers' Market (See Farmers' Market Lesson 3, Advertisement)
- Write a commercial to present to the class (See Farmers' Market Lesson 3, Advertisement)

ADAPTATIONS

Read scenario aloud to students. Students work in groups where one team member is the scribe.

DIGGING DEEPER

- Over 70% of all packaged food products in North America contain GMOs. Research how to be able to differentiate between GMO and non-GMO packaged products.

DID YOU KNOW?

- A terminator seed is a seed you cannot seed save from the plant because the mother seed is a GMO.
- Areas that have been destroyed by fires are replanted through seed bombing.

GARDENER TIPS

- Seed Saving – figure out some of the strongest or best plants and save the seeds from that plant. Tips – make sure to dry out the seed properly so mold does not grow on it. It can be helpful to put brown rice grains in the jar to soak up moisture.

NUTRITION FACTS

- At least 90 percent of the soy, canola, corn, and sugar beets sold in the United States have been genetically modified.

LESSON 4 STANDARDS & LESSON MAP

NG 5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

ESS3.C Human Impacts on Earth Systems

Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. Individuals and communities are doing things to help protect Earth's resources and environments.

ELA Reading Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

ELA Wrting Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).

Lesson 4: GMOs

Day 1

- Preview
- Vocabulary introduction: genes, modify DNA
- Preview concept of genetic modification
- Scenario #1 and T chart with teacher leading discussion

Day 2

- Finish class discussion on scenario #1 and class T chart

Day 3

- Article #1 "What is a GMO"

Day 4

- Finish article #1 and discussion

Day 5

- Lesson 3 and 4 Quiz

Day(s) ____

5.NBT.A.2 Explain patterns in the number of zero of the product when multiplying a number by powers of 10

Math using exponents to calculate seed saving quantities- student activity evidence sheet in resources

Day(s) ____

Literacy Inference and quoting accurately from the article

Planet Patrol *Kids Care for the Earth* by Gare Thompson (National Geographic)

Day(s) ____

Science/Social Studies Extension

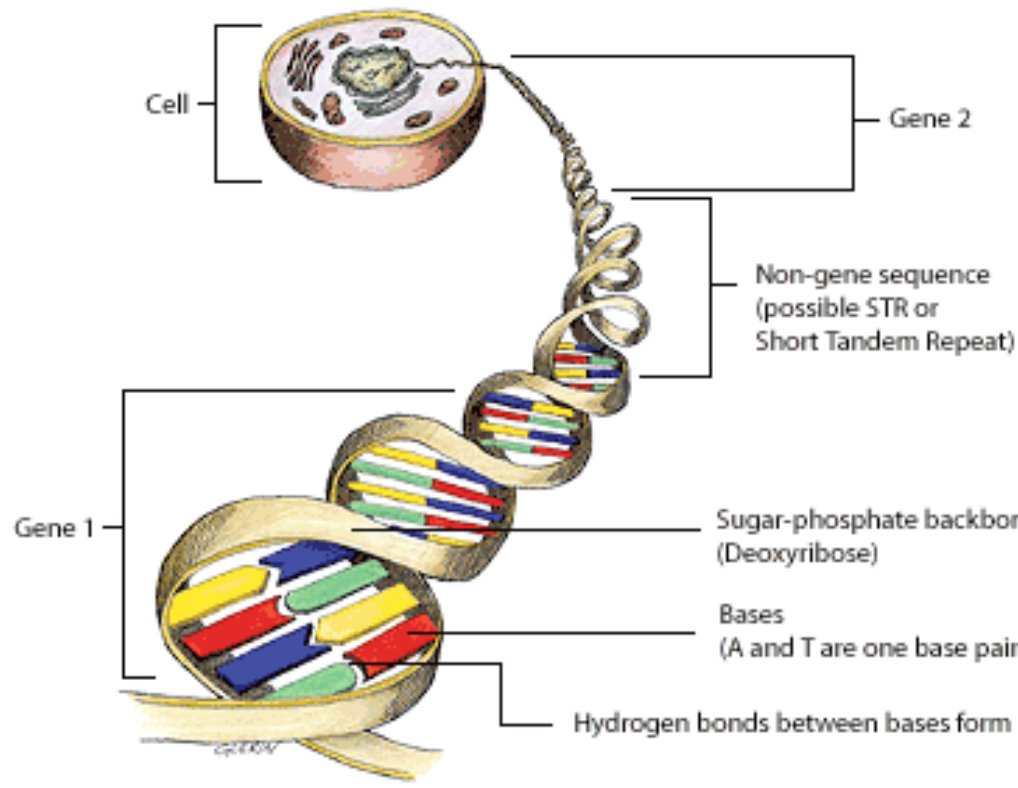
Graph this effect – located in resources

Student Worksheett

Scenario:

When Mrs./Mr. _____ class walked into their room today, their teacher was nowhere to be found. Inside the classroom was a mysterious box waiting for them. Rushing to unwrap the mystery box, _____ (student) ripped it open to find a DNA strand along with a note.

This is Mrs./Mr. _____'s DNA. DNA is the tiny building block material within every organism (a living thing). DNA carries all the information about how a living thing will look, act, and function. For instance, DNA in humans determines such things as what color the eyes are and how the lungs work. Each piece of information is carried on a different section of the DNA. These sections are called genes. DNA is short for deoxyribonucleic acid.



Source: http://www.eduplace.com/kids/hmsc/6/a/cricket/cktcontent_6a33.shtml

There has been a massive complaint that teachers are too slow at grading. This is a problem. Students do their homework each day yet it takes days, weeks to get it back. In order to fix the problem, some have suggested that genetic modification is the only way so make them work faster.

As a class, choose one trait you would like to change about your teacher. Once you write the trait down, the new gene can be inserted into Mrs./Mr. _____'s DNA.

The class sat down and decided that Mrs./Mr. _____'s undesirable trait was how long s/he took to return homework. Every time they turned in an assignment, Mrs./Mr. _____would take weeks to give the students a grade!

As the class came to an agreement about what gene they would modify, _____student) added the "super homework grading speed" gene to Mrs./Mr. _____'s DNA. S/he inserted the gene and waited patiently for their teacher to return. As they waited, the class agreed this would make their teacher much more productive, thus making them smarter students. They felt proud of their ingenuity.

Suddenly, Mrs./Mr. _____arrived in class with a 3-foot stack of graded work. In less than five seconds, all the students had multiple graded assignments on their desks! This super power had also made Mrs./Mr. _____a really tough grader. Students who were always straight A students, were getting Ds and Cs. Mrs./Mr. _____was not so nice this way! S/he was hurting their self-esteem.

Before the students had realized, Mrs./Mr. _____ had written 5 new assignments on the board that were due tomorrow! The class began to exchange worried looks as their super speedy grading teacher zipped through their classroom.

_____(student) began to look frantically for the magic box containing Mrs./Mr. _____'s DNA. S/he hoped she could pull out the gene that had transformed their teacher. There was no sign of the box and no sign of turning back.

The students had created a super fast monster teacher!

Make a t-chart of the pros and cons of genetically modifying your teacher.

Pros of Genetic Modification	Cons of Genetic Modification

Add on to the T-chart comparing the pros and cons of genetically modifying organisms and seeds.

Pros of Genetic Modification	Cons of Genetic Modification

Discussion Guiding Questions:

1. How did changing the teacher's DNA change the teacher?

2. In the end, were the students happy with the genetic modification of their teacher?

3. Did changing the DNA have intended consequences? Why or why not?

4. What could the students have done differently and still obtained similar outcomes?

5. What other solutions are there to the teacher's productivity without genetically modification?t

6. After completing Lesson 1 and Lesson 2, hold a class discussion about the connection between GMOs and Pesticides

   In order for crops to grow in a more desirable fashion, scientists have created seeds that are tolerant to insects, pesticides, and disease. The result is stronger crops at the expense of fruits and vegetables that cannot produce growing seeds, dangerous health effects, and negative environmental impact. The increasing use of pesticides and GMOs has resulted in super bugs and super weeds that are growing immune to these methods.

7. Propose to the class that seed saving is an alternative to using genetically modified seeds. Inform the class that by saving seeds and replanting those seeds, they can help ensure seed diversity. As a math extension, use the worksheet to calculate how many seeds could potentially be saved from one sunflower and one bell pepper.

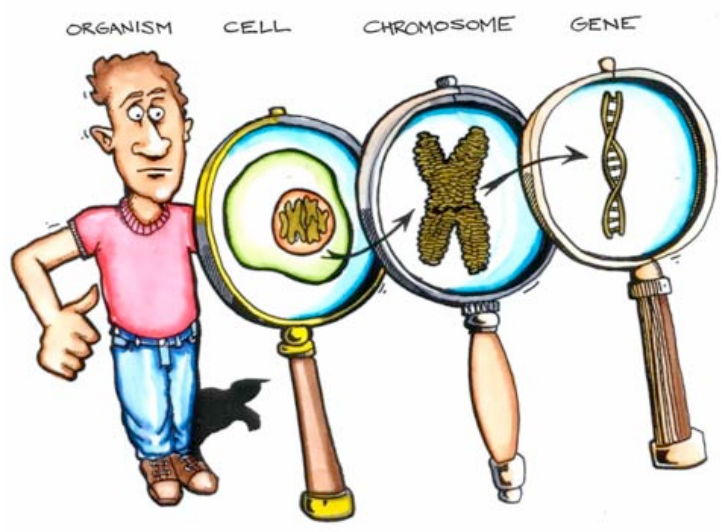
Extension 1:

Graph This Fact:

GM crop farming is expanding rapidly around the world. Global acreage of GM crops has risen 25-fold in just four years, from approximately 4.3 million acres in 1996 to about 100 million acres in 1999. Worldwide sales of GM foods rocketed from an estimated $75 million in 1995 to a staggering $2.3 billion in 1999.

Source: http://www.mitchellteachers.org/WorldHistory/MrMEarlyHumansProject/currentarticles/ShouldWeGrowGeneticallyModifiedCrops.pdf

Extension 2: Have students take the online quiz to determine whether they are for or against GMOs. http://www.pbs.org/wgbh/harvest/exist/



http://technyou.education.csiro.au/book/export/html/91

STUDENT WORKSHEET 2: MATH CONNECTION

USING EXPONENTS TO CALCULATE SEED SAVING QUANTITIES

SEED SAVING

Using exponents to calculate how many seeds can be saved from one plant.

1. One sunflower can produce about 100 seeds.

If those 100 seeds are replanted, and saved for seeds, how many seeds are available?

100 sunflowers x 100 seeds in each = _____ seeds

Write that number as an exponent 10_

If those _____ seeds were planted, and saved for seeds, how many seeds are available?

____ sunflowers x 100 seeds in each= _____ seeds

Write that number as an exponent 10_

2. One bell pepper can produce about 80 seeds.

If those 80 seeds are replanted, and saved for seeds, how many seeds are available?

80 bell peppers x 80 seeds in each = _____ seeds

Write that number as an exponent _____

If those _____ seeds were planted, and saved for seeds, how many seeds are available?

____ bell peppers x 80 seeds in each = _____ seeds

Write that number as an exponent _____

ANSWER KEY

SEED SAVING

Using exponents to calculate how many seeds can be saved from one plant.

1. One sunflower can produce about 100 seeds.

If those 100 seeds are replanted, and saved for seeds, how many seeds are available?

100 sunflowers x 100 seeds in each = ___ 10,000___ seeds

Write that number as an exponent 10^3

If those ___10,000___ seeds were planted, and saved for seeds, how many seeds are available?

__10,000__ sunflowers x 100 seeds in each= ___10,000,000___ seeds

Write that number as an exponent 10^6

2. One bell pepper can produce about 80 seeds.

If those 80 seeds are replanted, and saved for seeds, how many seeds are available?

80 bell peppers x 80 seeds in each = ___6,400___ seeds

Write that number as an exponent __6.4^3__

If those ___6,400___ seeds were planted, and saved for seeds, how many seeds are available?

__6,400__ bell peppers x 80 seeds in each = ___512,000___ seeds

Write that number as an exponent __5.12^5__

LESSON 3 AND 4 QUIZ

Name: _____

1. What is a GMO?

_____

_____

2. Give one example of how GMOs are used.

_____

_____

3. Give one reason why GMOs are used.

_____

_____

4. Give one reason why some people are for GMOs and one
reason why some people are against GMOs.

_____

_____

_____

5. Name one alternative to using GMOs.

_____

_____

_____

6. What is a pest?

_____

_____

7. What is pesticide?

_____

_____

_____

8. What does the suffix –icide mean?

_____

_____

9. Give one reason for and one reason against using pesticides.

_____

_____

_____

10. Name one alternative to using pesticides.

_____

_____

_____

BONUS: If you had your own farm, would you choose to use pesticides and GMOs? Why or why not?

GARDEN SPOTLIGHT

LUNA GARCIA, LAS VEGAS

"It was amazing to see how the plants change."

Last year, Luna, an 8 year old gardener, began learning about cultivating food by joining the Junior Master Gardeners (JMG) Program. The Junior Master Gardener is a nationwide program for youth developed by the Cooperative Extension System. In Las Vegas, the University of Nevada, Reno Cooperative Extension runs a fall and spring class for kids ages 7-12. They learn to garden by getting their hands dirty in the soil. Her dad is also a Master Gardener. Master Gardeners are members of the local community who volunteer to help others in their community with gardening and food production.

Since new kids are always joining JMG, Luna enjoys helping the new kids learn. Luna's knowledge comes from spending time observing in the garden. When other kids are scared of bugs, Luna reassures them that each bug has their place in the garden. She is very good at distinguishing "good bugs" and "bad bugs" by noticing the small different traits in each species.

Luna is currently helping her family turn their backyard into a full garden. She helps with the compost by recycling their trash at home. Luna's parents are also a part of the group, Food Not Bombs. Food Not Bombs is an organization that recovers and shares food that would otherwise go to waste. After picking food from stores, gardens, and other sites, they prepare and serve free healthy meals in public spaces including parks and events. Luna sometimes helps prepare meals for her community.

Luna is a bright gardener. She loves to cultivate because it always brings her new ideas. She wants to encourage other young people to garden, even if it is just a little bit at a time, she says, "All you need to do is plant some seeds."

Questions:

1. Think of your space at home. Where and what would you plant?

2. Go to your school's learning garden. Without talking, spend time observing the garden. Write down 3 observations that helped you learn something new. For example, by observing the Snap Pea plant, I noticed it needs a structure to grow its vines.

3. Read the pamphlets about Junior Master Gardeners and Food Not Bombs. Write a brief summary about each organization.

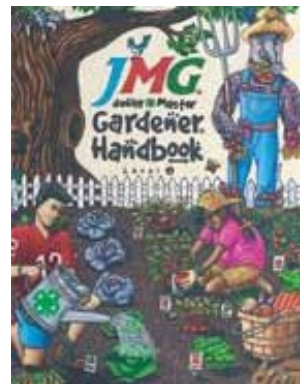
University of Nevada Cooperative Extension

Junior Master Gardeners
Children's Gardening Program, 2014

Hi Parents! Thank you for your interest in children's gardening. Here is some basic information about Junior Master Gardeners (JMG):

- This fun group meets twice monthly during spring and fall, on Saturdays. .
- Class is open to all boys and girls, ages 7-12.
- We have two groups to choose from:
    1. North Las Vegas, located at 4734 Horse Drive, 89129.
    2. South, located at UNR Cooperative Extension offices, 8050 Paradise Rd., 89129.

We will be working from the Junior Master Gardeners handbook, which can be found online at JMGkids.us.



- Each semester class will consist of 8, 3-hour sessions.
- The fall class begins in September and concludes in December.
- The spring class begins in February and concludes in May.
- Class will include a community service component to be determined by the group.
- 50% of all produce from the garden is donated to local charities. The students divide the remaining 50% of what they grow, to take home and try it.
- Each session includes one hour in the garden, plus one hour of classroom time where students learn about the environment, growing food, and how things live and grow in the desert.
- Cost for each semester is $50.00 per child, which includes award pins and certificates.
- Students will also need to purchase a workbook from the JMG website, located at jmgkids.us.
- Space is limited, so please register early.

For more information or to register, please contact Karyn Johnson at 702.257.5523 or email to johnsonk@unce.unr.edu

An AAA/EO program

Food Not Bombs
Las Vegas

FREE VEGAN MEALS

You're invited!

Who says there's no such thing as a free lunch? Join us for our **Free Weekly Picnics in the Park**. A fresh, free vegan meal – for anyone who's hungry, without exception.

Every Wednesday, 4pm – 6pm at Paradise Park
4775 McLeod Dr, between Harmon and Tropicana, Las Vegas

Every Sunday, 10:30am – 12:30pm at Baker Park
E. St. Louis and 10th St., Las Vegas

foodnotbombslasvegas.org

Food Not Bombs Las Vegas

Who We Are

Food Not Bombs is grassroots mutual aid. We recover food from grocery stores and restaurants that would otherwise be thrown out, use it to make fresh vegetarian meals, and set up in public spaces such as city parks to share a meal with anyone who's hungry, without restriction. We also provide food at activist events and anywhere else we are invited. We work together on principles of leaderless consensus and nonviolent direct action. We call ourselves “Food Not Bombs” because we want a community that works for life rather than death, and we oppose militarization and the criminalization of poor and hungry people.

Interested?

We meet up every Saturday at 2:00pm at the Coffee Bean & Tea Leaf, 4550 S. Maryland. Drop in any time for a meeting, or for one of our free meals, to find out more about how you can get involved.

Web: FoodNotBombsLasVegas.org **Twitter:** twitter.com/foodnotbombslv
Myspace: myspace.com/fnblasvegas **Facebook:** tinyurl.com/fb-fnblv
E-mail list: groups.yahoo.com/group/FoodNotBombsLasVegas

GMO's Are On the Ballot This Fall

How will you vote?

What is a GMO?

A GMO is a Genetically Modified Organism. A genetically modified food is a plant or meat product that has had its DNA artificially altered in a laboratory by genes from other plants, animals, viruses, or bacteria, in order to produce foreign compounds in that food. The correct scientific term is "transgenics," and is also often referred to as (GE) genetically engineered. This type of genetic alteration is not found in nature, and is experimental.

Example: Genetically Modified corn has been engineered in a laboratory to produce pesticides in its own tissue. GMO Corn is regulated by the Environmental Protection Agency as an Insecticide, but is sold unlabeled. Unlike the strict safety evaluations required for the approval of new drugs, the safety of genetically engineered foods for human consumption is not subject to rigorous testing.

There is a lot of debate about the safety of GMO foods. Proponents (those in favor) of labeling, including organic farmers and food producers, say it is simply consumers' right to know what is in their food. They say labels aren't a negative, only educational, and that they may encourage shoppers to seek out more information about their eating habits. Opponents (those against), including traditional farmers, biotech firms and some scientists, say labeling wrongly implies that genetically engineered food is unsafe. They say labeling is misleading, expensive and will encourage costly, frivolous lawsuits. They believe that the only way to supply the growing world population with food is to use GMO seed because of the special properties such seeds are purported to have.

50 countries with over 40% of the world's population already label genetically engineered foods, including the entire European Union. Even China labels genetically engineered foods. California should lead on this important issue. What do these countries know that we don't?

The fact of the matter is that genetically engineered ingredients show up in most of the processed foods in your shopping cart. It is a good bet that one or more of the ingredients (such as corn, HFC/high-fructose corn syrup,

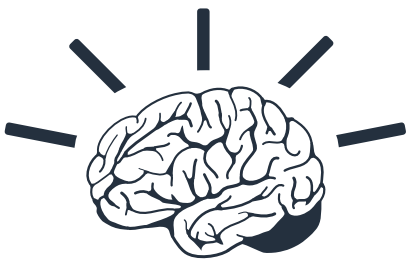
soybeans, etc.) in the food you eat was most likely grown from seeds that have had their genes altered...but you have no way of knowing. Labeling will not outlaw or restrict genetically modified foods. The California Right to Know Genetically Engineered Food Act is simple: The initiative would simply require food sold in retail outlets to be labeled if it contains genetically engineered ingredients so that every consumer has the ability to easily identify foods with genetically modified ingredient(s.)

The choice is yours....but only if you vote! So, how would you vote?

http://kidsgrowingstrong.org/gmos

Lesson Five

Examining the Impact of Pesticides and GMOs on Sweet Potatoes



BRAIN BREAKS!

1. Plant Partners Teacher will give class a plant part (seed, root, stem, leaves, flower). Students turn to a partner and go back and forth naming vegetables harvested from that part of the plant. Repeat until partners can no longer name vegetables from that plant part.

2. Apple, Watermelon, Banana (rock, paper, scissors) Students play rock, paper, scissors replacing rock with apple, paper with watermelon and scissors with bananas. Play as many rounds as possible in given time frame.

3. Garden Taboo Teacher plays music. When music stops students pair up. Teacher calls out a garden topic such as fruit. Partner A has to describe any fruit they want to their partner without saying the name. Partner B has to try and guess what their partner is describing.

4. Syllable Snacks Teacher will call out a number (1-4). Students work with a partner to come up with garden vocabulary words that contain that number of syllables. Partner A will begin by naming a vocabulary word with the given number of syllables; partner B will go next. They will alternate until one partner can no longer name a vocabulary word with the given number of syllables.

5. Fruit/Veggie Knock Students will work with a partner and touch knuckle to knuckle (veggie) and palm to palm (fruit) in a given sequence. Teacher will name the sequence to the class (Ex: veggie, veggie, fruit) and students will have to use the given hand gestures to complete the sequence. Teacher will increases the number of movements with each round (Ex: Round 1-veggie, veggie, fruit. Round 2-fruit, veggie, veggie, fruit).

6. Fruit/Veggie Match Students will stand. Teacher will name a fruit or vegetable and students will have to touch that part of the body corresponding to the part of the plant that the fruit or vegetable grows from (roots-feet, stem-legs, leaves-body, flowers-head). Teacher will call out and play the game “Simon says” going a little faster with each round.

7. Plant Part Finger Hop Students touch thumb to thumb, pointer to pointer, middle to middle, ring to ring, pinkie to pinkie as they say the plant part finger hop chant (seeds, roots, stems, leaves, flowers). Teacher will randomly call out a plant part, students will have to touch the corresponding fingers. Teacher will repeat, increasing the pace with each round.

8. The Harvester Students will stand and squat (harvest) with a shovel in hand. They will shovel the dirt over alternating shoulders like a farmer. Students will work at their own pace “harvesting” for the given time frame.

9. Apple Squat Students will stand and begin by squatting. They will then stand up on one foot, hop twice saying “apple, apple” then return to a squat. Repeat with increasing speed each round and alternating feet.

10. Fruit Freeze Teacher will randomly call out different fruits and vegetables. If the teacher calls out a veggie, students have to jog (or march) in place, if teacher calls out a fruit, students have to freeze.

11. Garden Guess Students will work with a partner. Partner A will silently think of a fruit or vegetable. Partner B can ask three questions about what their partner is thinking. After three questions, partner B has to guess the fruit or vegetable. They will then switch roles, and partner B will silently think of a fruit or vegetable and partner A gets to ask questions and guess. Repeat as many times as possible in the given time frame.

OVERVIEW

Students will continue to study the effects and impact of pesticides and GMOs on our food.

OBJECTIVES

- Students will conduct an experiment to evaluate the impact of pesticides and GMOs.

STANDARDS

Nevada State Standards

(5) 1.3 Replicate investigations conducted by others and compare results. [N.5.A.2, N.5.B.3]

(5) 1.4 Draw conclusions from scientific evidence. [N.5.A.3]

(5) 1.5 Create and use labeled illustrations, graphs (tables, line plots, stem and leaf plots, scatter plots, histograms), and charts to convey ideas, record observations, and make predictions. [N.5.A.1, N.5.A.4]

(5) 1.1 Use evidence recorded in a science notebook to develop descriptions, models, explanations, and predictions. [N.5.A.1]

Next Generation Standards

ESS3.C: Human Impacts on Earth Systems

Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)

Describe and graph quantities such as area and volume to address scientific questions. (5-ESS2-2)

Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3)

TIME

This lesson will span 2-4 weeks, depending on the growth of the sweet potatoes.

QUESTIONS

- What do you think might be impacting the growth of each sweet potato?
- Why is regeneration important? What does it tell you?
- What other plants use regeneration in ways similar to sweet potatoes?

MATERIALS

- 4-5 sweet potatoes: Two conventionally farmed (most likely to be from GMO stock with sprayed pesticides), one from the organic section, and one from the Farmer's Market
  - Also consider using a sweet potato from your school garden. See "Out in the Garden" for more information.
- 4-5 glass jars with water (to be changed every few days to once a week)
- A sunny area. *You may consider setting up a table outside in the garden for the duration of this experiment in order to maintain sunlight or setting up inside the classroom grow lights that will simulate sunlight.
- Toothpicks
- Science Journals

Out in the Garden

Consider conducting this experiment with a sweet potato grown in your school garden. Coordinate with your garden staff for best planting times. Typically, sweet potatoes are planted in the spring, around February. Students can use their Garden Journals to document the process of growing a sweet potato from seed to experiment. This will allow students to keep track of all materials that came into contact with the vegetable (i.e. compost, pest repellents, etc.).

PROCEDURES

1. *Preview:* Scientific Method, see attached, Growing Classroom page 15.
2. Preview experiment with students and poll students for their hypotheses of which sweet potato will re-grow the quickest.
3. *Create:* Science Journals with space for illustrations, labeling, written response, and questions.

Adapted from "Third Grader Proves Importance of Organic Food" https://www.youtube.com/watch?v=98S24g7ZZmw

1. Insert four toothpicks one-third of the length from the top of the sweet potato. The toothpicks need to be inserted around the sweet potato to keep it suspended in the jar. Space these toothpicks equally apart for best results. Take one conventionally farmed sweet potato and wash it using Lesson 2's suggested wash (vinegar and water).

2. Label each jar. Then, fill the glass jars halfway with warm water and have the students suspend the sweet potato in the jar. The toothpicks will keep the sweet potato from being submerged completely in the water, but the bottom pointed end of the potato will be under the water.

3. Choose a window that receives filtered sunlight. The sweet potato plant will need at least four hours of sunlight a day. *See suggestions for alternative light sources above.

4. Instruct the students to care for the sweet potato vine properly. The students will need to inspect the sweet potato every day. The water will need to be changed when it appears cloudy.

5. Tell the students to look for small stems to emerge from the top of the potato. Tie the small vines to toothpicks with twist ties carefully to promote growth.

6. Cut the sweet potato vine back with scissors when it becomes too unruly. Only cut back 2 to 3 inches of the vine to keep it healthy.

7. Create a four-tiered observation log. Students will update their observation logs every day, every other day, or weekly depending on stages of growth.

8. Watch Elise's video http://www.youtube.com/watch?v=exBEFCiWyW0

ASSESSMENT

- Inquiry and connections made to GMOs and Pesticides in Journals.
- Graph the growth rate, create a poster or posters to display at a Farmers' Market comparing the sweet potatoes
- Watch Elise's video https://www.youtube.com/watch?v=98S24g7ZZmw

ADAPTATIONS

Create teams. Some students will be in charge of taking pictures during each data collection point, others will be in charge of writing captions for each data collection point, and others will be in charge of graphing growth at each data collection point. You should rotate these teams so that each student can participate and understand each role.

*Due to the current regulations, companies do not have to disclose if products are made from GMOs or if they have been grown with the use of pesticides. This might make it slightly difficult to find non-GMO produce. You can ask at a Farmer's Market or natural food stores for guidance.

EXTENSION

1. Research the pesticide Chlorpropham and write a pamphlet that will be shared at the end of the experiment.

GATE Adaptations Since a GATE class does not meet on a daily basis your observation method would be modified.

- Some options could be to have the students stop by before/after school or during morning/lunch recess. This can be something they all do, rather than split up the days to certain students.

- For graphing the growth rate, you can introduce/use technology like Prezi and Excel or any number of iPad applications.

DIGGING DEEPER

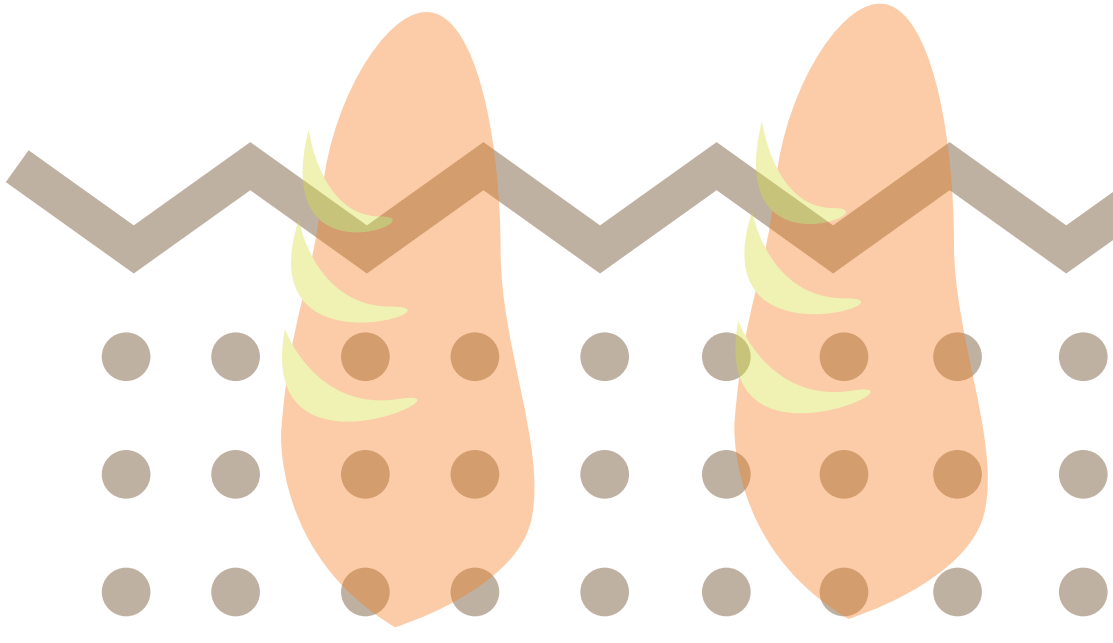
- Research the pesticide Chlorpropham and write a pamphlet that will be shared at the end of the experiment.
- Try regrowing the following vegetable scraps in water: romaine lettuce, celery, green onions, garlic sprouts, fennel, or leeks

DID YOU KNOW?

- Budnip is a pesticide sprayed on vegetables. It is also called Chloropham. It is sprayed on blueberries, beets, carrots, onions, spinach, and tomatoes.

NUTRITION FACTS

- Sweet potatoes have more vitamin A, vitamin C, fiber, and calcium, while also having fewer calories and carbohydrates than white potatoes. In many cases, sweet potatoes are also less expensive!



LESSON 5 STANDARDS & LESSON MAP

NG 5-LS2 Ecosystems: Interactions, Energy, and Dynamics

5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

5-ETS1-3 Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.

ELA Reading Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

ELA Wrting Use precise language and domain-specific vocabulary to inform about or explain the topic.

Lesson 5: Examining the Impact of Pesticides and GMOs on Sweet Potatoes

*Look into planting sweet potatoes in February. Research where to buy a variety of sweet potatoes (with and without pesticides)

Day 1 and Day 2

- Observe and Ask Questions

Day 3

- Prepare scientific journals and charts
- Make hypotheses and plant several potatoes

Day 3-20

- Make daily observations, begin to draw conclusions

Day 21

- Report Results: Make persuasive poster to report results

Day(s) ____

Math Grade 5 Farmers' Market materials, Lesson 2 "Cost and Profit" (if not already used in previous lessons)

Handout pages 8-21

Day(s) ____

Book *Let's go to the Farmer's Market* by Molly Smith

Day(s) ____

Science/Social Studies Extension

Watch Elise's video and write her a letter.

Research Chlorpropham and present information to classmates.

SCIENTIFIC METHOD

from The Growing Classroom (page 15)

Below are the steps for the scientific method:

Information:

- What do we want to find out?
- What do we already know from observation, other scientists, or our own research?

Hypothesis:

- What do we predict will happen during the experiment?

Experiment:

- What will our test design be?
- What is the control?
- What materials will we use?

Results:

- What happened in the experiment?
- What did our data tell us?

Conclusions:

- What did we find out from the experiment?
- Are there more questions to ask now?

Application:

- How can our information be used?

A fun way for students to remember the six important steps to this version of the scientific method is the mnemonic device *I Have Einstein's Rules Clear Always!*

Here is a simplified scientific method for younger scientists:

Guess:

- Suggest a reasonable answer to the question (If I add compost to the garden, will my plants grow faster than if I don't add compost?).

Test:

- Design a simple experiment for testing the guess.
- Experiments should have the test variable (such as a garden bed with added compost and plants) and a control (part of the garden bed with no added compost and the same type and number of plants).
- The test is measured comparison and data collection of the plant growth for the composted and non-composted areas.

Tell:

- Give students an opportunity to analyze the results and draw conclusions in order to apply what they have learned, share their results and, of course, create more questions. (Students graph the average growth of plants in the two beds, analyze and report the results, and determine whether or not it is advantageous to use compost).

THE SCIENTIFIC METHOD

Guess, Test, and Tell

1. Guess: What will happen?
2. Test: Try out your idea.
3. Tell: What happened?

Experiment Outline

Use this outline to set up your experiment and present your findings to the class.

1. GUESS

- What is your question?
- What does your group think will be the answer to your question?

2. TEST

- List the materials your group needs to set up your experiment.
- Write out the procedure for your experiment. Be detailed.
- How are you going to collect evidence? Attach or draw your collection charts, graphs, or diagrams.

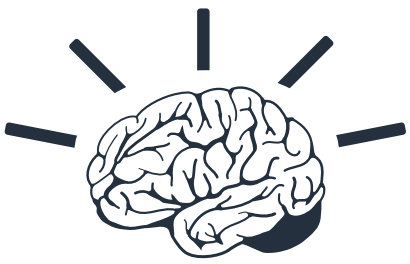
3. TELL

- What happened?
- What are your conclusions? (Did you answer your question? What worked? What didn't work? What would you do differently next time? What would you do the same? What did you learn?)
- What are the next steps for your group? (Further experiments? More questions?)

From: The Growing Classroom, by Roberta Jaffe and Gary Appel

Lesson Six

Food Justice Simulation



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OVERVIEW

Students will examine food systems.

OBJECTIVES

- Students will experience and evaluate the food system based on accessibility within different communities.

STANDARDS

Nevada State Standards

CCSD K-5 Health Curriculum Standards

Discuss how community resources assist with making other personal health decisions [NS. 6.5.3]

CC 5.SL.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ides and expressing their own clearly.

Next Generation Standards

5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Common Core Standards

Math

CCSS.Math.Content.5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (See assessment b).

TIME

2, 45-60 minute sessions

MATERIALS

The following is provided in the handouts sections:

- Map
- Food grocery lists
- Simulation money
- Food logs
- Grocery store inventory with prices
- Student reflection logs

Out in the Garden

After the lesson, students will measure the distance between their classroom and the school garden. Then, if possible, measure the distance to the nearest grocery store. Compare and discuss. Suggestion: Use ratios and conversion of units.

1 mile = 5,280 feet

1 mile = 1,760 yards

Next, ask the students to estimate how many produce varieties there are currently growing in the garden and in the grocery store. Conduct the actual calculations. Compare and discuss.

*It might be a good idea to practice estimation before making any actual measurement.

Background on Las Vegas Food Deserts:

1. Over 42,000 people in Las Vegas live in a Food Desert. That's 7.2% percent of the population that does not have a nearby supermarket within ¼ of a mile. In the entire U.S., 23 million people live in a Food Desert, which is 7.3% of the population.

2. In Las Vegas, 20% of families do not have personal vehicle transportation.

Source:
http://www.mynews3.com/content/news/story/Las-Vegas-Planning-Department-food-desert/3D-Gr_IBQUai9XtTf93U3w.cspx

PROCEDURES

(adapted from: http://brooklynfoodcoalition.org/food-justice/)

- Day 1 (45 minutes)

Preview: Make sure your students understand the difference between healthy food and processed food that is unhealthy. Discuss the difference between organic and non-organic. Also, review that some people need different food if they have health issues such as diabetes or allergies. Activate prior knowledge by having students share their personal market experiences. For example: Where do they shop for food? Do they help? If so, how? How do they get to the stores? Does their family have any particular dietary needs?

1. Divide your class into 5 groups.

2. Provide each group with a coordinate grid map (see Handouts). The map has 5 color-coded communities or neighborhoods. Before assigning communities to each group, discuss observations about the map. Ensure that all students understand the key and how to measure the distance (1 square =1/4 mile). Ask the students why it is important to analyze this distance.

- The idea is to simulate a city where food access is unbalanced due to income, accessibility, and transportation disparities. Students will reflect on the importance of having access to healthy food that can, in part, be provided by your school garden.
- We will use a spectrum of income levels (high resources to low, focusing on income and transportation), food availability (determined by food stores in the area), and health needs.

3. Next, assign each team a community at random.

4. Hand out each family's description page (See Handouts). This sheet describes the family's budget, salary, and grocery list based on health needs. Each family will have a family member that requires particular food due to health impairment(s). Tell the students that they must work as a team to get all the food items on their grocery list.

5. Assign the following roles to one person in each group:

   - *Worker:* This person is responsible for ensuring there is enough money available. If the team runs out of money, this person will be responsible for their team while they are in the "working station" (see below for more info).
   - *Cooker:* This person is responsible for ensuring that the family is buying appropriate items according to the health needs of the family (On the grocery store list, an * denotes that item is a healthy food. The teacher's support might be necessary if some students are unsure about health properties of some food).
   - *Driver:* This person calculates transportation costs and also totals the miles traveled.
   - *Scribe:* This person is responsible for keeping the log accurate.
   - *Observer:* This person is responsible for documenting the team's successes and challenges and also looking at other teams during the simulation.

6. *Work:* Each family will receive a budget based on the community's income levels. If the family runs out of money, they must go to work. In this simulation, work can be a section of the room with timers. For each 5 minutes, the team may earn their designated hourly wage. Students will set a timer and pick up their color-coded wage ticket at the end of 5 minutes. It is important that the entire team is at the workstation so that the team stops working on finishing the assignment. Provide an undesirable task to be completed within these 5 minutes (i.e. jumping jacks, drill worksheet, preparing materials for you, etc).

7. *Transportation:* If a store is not within walking distance (1 square = ¼ mile), families must take transportation. When families use their car to go to the store, they must pay 1 dollar every 2 squares they drive. When families have to use public transportation, they must pay 2 dollars every 2 squares they travel.

8. *Leisure time:* Once a family is finished getting all the items on their list, provide a really fun but quiet activity (i.e. quiet ball, fun worksheet, etc). Ensure that this activity still permits them to observe the other groups.

▶ Day 2 (45-60 Minutes)

1. Facilitate a class discussion. Give students ample time to reflect individually, in small groups, and as a whole class. It is important that as a facilitator the teacher stays neutral and only asks guiding questions. Use a graphic organizer to record student responses.

2. Sample Guiding questions:

- How did your team feel during this activity? Did all the teams feel the same way?
- How is food important to you? How is food important to your community?
- What did you observe?
- What were your obstacles?
- Did you notice any patterns?
- Did your family have access to all the items you needed? Why or why not? Look at the food items you purchased. How many items have an *? What does the * mean? Was your family able to buy healthy fresh food?
- How much did your family have to travel to get all the items? Calculate the miles and compare among teams. Describe that experience. How did transportation impact your experience?
- In the simulation, did you live in a food forest or desert? If you lived in a food desert, what did you notice? What about our school community, is it a food desert?

Optional: Add a School Community Garden Icon to the map and make a list of everything you have/will harvest from your garden to further support the idea that a Farmer's Market within the school can support equitable access to affordable, organic, fresh, and nutritional food.

3. Closure:

- Each team will complete the Team Presentation Outline and present the information to the whole class.
- Optional, Give each student a Food Log to take when they shop with their family. Have them compare prices, discuss quality, and evaluate nutritional value.
- Read the University of Nevada Cooperative Extension fact sheet: "What is a Food Desert?"
    - The video states that a solution to Food Deserts is to encourage businesses to open more supermarkets. Ask the students if they can brainstorm more solutions.
- Check out Peter Menzel's Hungry Planet Photos of 27 families from around the world showing what a week's worth of groceries looks like at http://time.com/8515/hungry-planet-what-the-world-eats/
- Watch the TED Talk "A Guerrilla Gardener in South Central L.A" featuring Ron Finely:https://www.dropbox.com/s/wxmlp5jcmsoq7o1/Spotlight%205%20Video%20Guerrilla%20Gardener.mp4?dl=0

  Hold a class conversation about the two videos.

Note: You can also choose to read the article, "What is a Food Desert?" after showing the Ron Finley TED Talk (Ron Finley is featured in the Garden Spotlight 4). Together, they show two different solutions to food deserts (more grocery stores that are accessible to all communities and growing your own food).

ASSESSMENT

- Written team reflection work sheet (See handouts)
- Math Review: Each student will use the map as a coordinate grid to find the locations of stores. The students will write the location of each store using coordinate pairs.

ADAPTATIONS

Have students create a map of their neighborhood for the simulation game.

DIGGING DEEPER

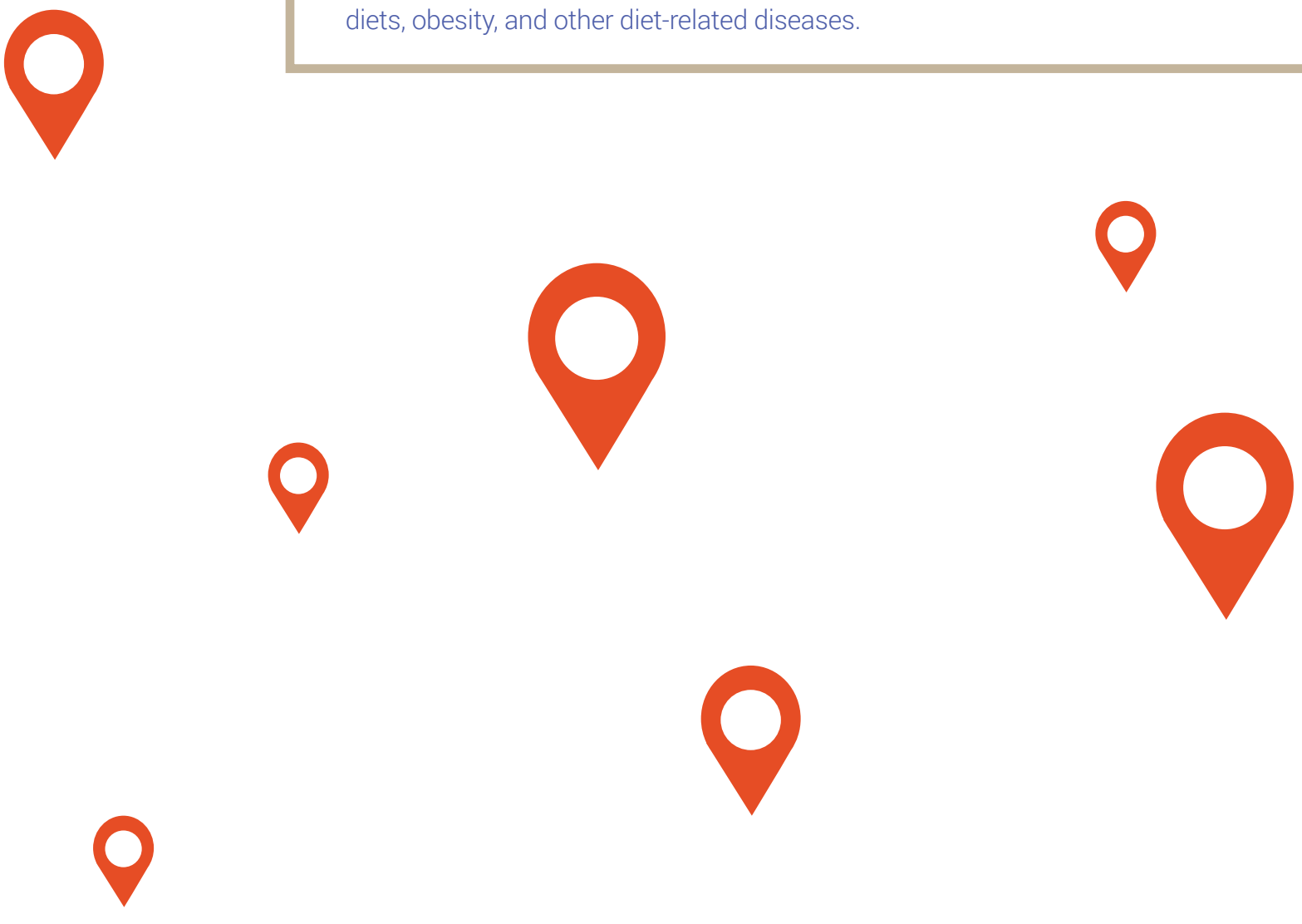
- Where is the closest Farmers' Market to your school?

DID YOU KNOW?

- 50% of urban Asian households farm.

NUTRITION FACTS

- In 2009, 23.5 million Americans, including 6.5 million children, lived in low-income areas more than one mile from a supermarket; lack of access to fresh, healthy foods can contribute to poor diets, obesity, and other diet-related diseases.



LESSON 6 STANDARDS & LESSON MAP

NG 5-ESS2-1 Develop a model to describe ways the geosphere, biosphere, hydrosphere, and or atmosphere interact.

5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the earth's resources and environment.

Math 5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation

Lesson 6: Food Justice Simulation

Day 1

- Whole class discussion on healthy vs unhealthy food that is processed as well as special dietary needs. Then divide students into groups of five and preview and discuss map

Day 2

- Assign teams a community and each team member a role then begin food justice simulation

Day 3

- Food justice stimulation continued

Day 4

- Reflection as a whole group. Student questions can be guided to extend to school community garden discussion

Day 5

- Team presentations

Day 6

- Team presentations continued

Day 7

- Videos
- Food Desert Las Vegas and Ted Talk

Day(s) __2-3__

Math 5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation

Day(s) _____

Book *Hungry Planet* by Peter Menzel and Faith D'Aluisio

Day(s) _____

Science/Social Studies Extension

5-ESS2-1 Develop a model to describe ways the geosphere, biosphere, hydrosphere, and or atmosphere interact.

5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the earth's resources and environment.

FAMILY DESCRIPTIONS HANDOUT

- **Dark Green Community:**

  1. High Income with car

  2. Total accessibility to:

     - Fresh organic produce and meats market with local food
     - Chain supermarket $$$, $$, $
     - Farmer's Market
     - Convenience Stores
     - Fast Food Restaurants

- **Light Green Community:**

  1. Middle Income with car

  2. Frequent accessibility to:

     - Fresh organic produce and meats market with local food
     - Chain supermarket $$, $
     - Farmer's Market
     - Convenience Stores
     - Fast Food Restaurants

- **Yellow Community:**

  1. Low-Middle Income with car

  2. Accessibility to

     - Farmer's Market
     - Chain supermarket $$, $
     - Convenience Stores
     - Fast Food Restaurants

- **Orange Community:**

  1. Low Income without car

  2. Accessibility to

     - Farmer's Market
     - Chain supermarket $
     - Convenience Stores
     - Fast Food Restaurants

- **Red Community**

  1. Low Income without car

  2. Accessibility to

     - Chain supermarket $
     - Convenience Stores
     - Fast Food Restaurants

Resources:

1. Food Costs:
http://www.bls.gov/opub/btn/volume-2/pdf/average-food-prices-a-snapshot-of-how-much-has-changed-over-a-century.pdf

2. Farmer's Market Locations:
http://nevadagrown.com/farmers-market-list/

STUDENT HANDOUT

Note for preparation:

You will need to prepare packets for each group including:

1. Coordinate City Map with market locations

2. One plastic bag with their total budget in cash (see attached for each family's cash)

3. One empty bag for student to drop their "spent" money into

4. Appropriate amount of each markets available items displayed on the sheets provided below (i.e. the Dark Green Family will have two Fresh and Local sheets, three Fresh for You sheets, one Family Food sheet, one Farmer's Market sheet, one Speedy Stop sheet, and one Burgers on the Go sheet)

5. Spending Log(s)

6. Team Presentation Outline

Note for Grouping Students:

Careful planning will be required when making the five family groups. Distribute students evenly based on their strengths. Try to ensure each group has a strong student in the areas of computing, executive functioning, and note taking.

FAMILY DESCRIPTION AND FOOD ITEM LISTS

Dark Green Family

1. One family member is gluten intolerant and cannot eat anything with wheat.

2. Budget: $200

3. Wage per hour: $40

4. Food items:

- 5 pounds of vegetables
- 4 pounds of fruits
- 3 pounds of meat
- 2 pounds of beans (legumes, chick peas, etc.)
- Eggs
- Bread
- Milk or milk replacement (soy, almond, or rice milk)
- 3 Snacks
- 2 Drinks
- Breakfast food

FAMILY DESCRIPTION AND FOOD ITEM LISTS

Light Green Family

1. One family member is a vegetarian and does not eat any meat products.

2. Budget: $150

3. Wage per hour: $24

4. Food items:

- 7 pounds of vegetables
- 6 pounds of fruits
- 2 pounds of meat
- 5 pounds of beans (legumes, chick peas, etc.)
- Eggs
- Bread
- Milk or milk substitute (soy, almond, or rice milk)
- 3 Snacks
- 2 Drinks
- Breakfast food

FAMILY DESCRIPTION AND FOOD ITEM LISTS

- **Yellow Family**

1. Many members of this family are allergic to lactose (milk) and nuts.

2. Budget: $100

3. Wage per hour: $18

4. Food items:

    - 5 pounds of vegetables
    - 4 pounds of fruits
    - 3 pounds of meat
    - 2 pounds of beans (legumes, chick peas, etc.)
    - Eggs
    - Bread
    - Milk substitute (soy, almond, or rice milk)
    - 3 Snacks
    - 2 Drinks
    - Breakfast food

FAMILY DESCRIPTION AND FOOD ITEM LISTS

- **Orange Family**

1. One family has high cholesterol and high blood pressure and must avoid salty, fatty and sugary items.

2. Budget: $85

3. Wage per hour: $12

4. Food items:

    - 5 pounds of vegetables
    - 4 pounds of fruits
    - 3 pounds of meat
    - 4 pounds of beans (legumes, chick peas, etc.)
    - Eggs
    - Bread
    - Milk or milk substitute (soy, almond, or rice milk)
    - 3 Snacks
    - 2 Drinks
    - Breakfast food

FAMILY DESCRIPTION AND FOOD ITEM LISTS

Red Family

1. One adult and one child in this family have diabetes; this family must avoid most sugars, salts, fats, and carbohydrates.

2. Budget: $70

3. Wage per hour: $6

4. Food items:

- 5 pounds of vegetables
- 4 pounds of fruits
- 3 pounds of meat
- 3 pounds of beans (legumes, chick peas, etc.)
- Eggs
- Bread
- Milk or milk substitute (soy, almond, or rice milk)
- 3 Snacks
- 2 Drinks
- Breakfast food

STORES' ITEMS AND PRICES

Local Organic Store

Fresh, Organic Vegetables* $4 per pound	Fresh, Organic Fruits* $3 per pound	Regular Milk $4	Milk Substitutes* -Almond -Soy -Rice $5	Organic Meat* $5 per pound Dried Beans* $3 per pound
Organic Eggs* $4	Wheat Bread* $3	Gluten Free Bread* $5	Cheese* $5	Soda $2
Natural Juice, no sugar added* $6	Juice with added sweeteners $3	Chips or Crackers $4	Cookies $4	Baked, Vegetable Chips $4
Nuts, Trail Mix or Granola* $6	Whole Grain Cereal, no sugar added* $4	Sugary Cereal $3	Packaged snack: fruit cup, pudding $3	Candy $3

Chain Fresh Food Super Market

Fresh, Organic Vegetables* $3 per pound	Fresh, Organic Fruits* $3 per pound	Regular Milk $4	Milk Substitutes* -Almond -Soy -Rice $4	Organic Meat* $5 per pound Dried Beans* $3 per pound
Organic Eggs* $4	Wheat Bread* $3	Gluten Free Bread* $5	Cheese* $5	Soda $2
Natural Juice, no sugar added* $6	Juice with added sweeteners $3	Chips or Crackers $4	Cookies $4	Baked, Vegetable Chips $5
Nuts, Trail Mix or Granola* $6	Whole Grain Cereal, no sugar added* $4	Sugary Cereal $3	Packaged snack: fruit cup, pudding $6	Candy $3

Chain Supermarket

Vegetables* $3 per pound	Fruits* $3 per pound	Regular Milk $4	Milk Substitutes* -Almond -Soy -Rice $5	Meat* $4 per pound Dried Beans* $2 per pound
Eggs* $3	Wheat Bread* $3 White Bread $1	Gluten Free Bread* $5	Cheese* $5	Soda $2
Natural Juice, no sugar added* $5	Juice with added sweeteners $3	Chips or Crackers $4	Cookies $4	Baked, Vegetable Chips $5
Nuts, Trail Mix or Granola* $6	Whole Grain Cereal, no sugar added* $5	Sugary Cereal $4	Packaged snack: fruit cup, pudding $5	Candy $3

Farmer's Market

Fresh, Organic Vegetables* $3 per pound	Fresh, Organic Fruits* $3 per pound	Organic Eggs* $4	Milk Substitutes* -Almond -Soy -Rice $3	Organic Meat* $5 per pound Dried Beans* $3 per pound
Gluten Free Bread* $5	Wheat Bread* $3	Natural Juice, no sugar added* $5	Cheese* $5	Nuts, Trail Mix or Granola* $6

Convenience Stores/Corner Stores/Gas Stations

Regular Milk $4	1-3 types Fruits* $1 each piece	Juice with added sweeteners $3	Chips or Crackers $5	Sugary Cereal $5
Eggs* $3	White Bread $2	Packaged snack: fruit cup, pudding $2 each	Cheese* $5	Soda $3
Cookies $4	Candy $3			

Convenience Stores/Corner Stores/Gas Stations

Regular Milk $4	1-3 types Fruits* $1 each piece	Juice with added sweeteners $3	Chips or Crackers $5	Sugary Cereal $5
Eggs* $3	White Bread $2	Packaged snack: fruit cup, pudding $2 each	Cheese* $5	Soda $3
Cookies $4	Candy $3			

Fast Food

Cheese Hamburgers $3	Chicken Sandwich $3	Soda $2	Potato Fries $2	Ice Cream $3

Fast Food

Cheese Hamburgers $3	Chicken Sandwich $3	Soda $2	Potato Fries $2	Ice Cream $3

Fast Food

Cheese Hamburgers $3	Chicken Sandwich $3	Soda $2	Potato Fries $2	Ice Cream $3

Fast Food

Cheese Hamburgers $3	Chicken Sandwich $3	Soda $2	Potato Fries $2	Ice Cream $3

Fast Food

Cheese Hamburgers $3	Chicken Sandwich $3	Soda $2	Potato Fries $2	Ice Cream $3

MONEY

Dark Green

$10	$10	$10	$10	$10	$10	$10	$10	$10	$10
$5	$5	$5	$5	$5	$5	$5	$5	$5	$5
$5	$5	$5	$5	$5	$5	$5	$5	**$5**	**$5**
$1	$1	$1	$1	$1	$1	$1	$1	$1	$1
$1	$1	$1	$1	$1	$1	$1	$1	$1	$1

Wage

$40	$40	$40	$40	$40

Light Green

$10	$10	$10	$10	$10	$10	$10	$10		
$5	$5	$5	$5	$5	$5	$5	$5		
$5	$5	$5	$5						
$1	$1	$1	$1	$1	$1	$1	$1	$1	$1

Wage

$24	$24	$24	$24	$24

Yellow

$10	$10	$10	$10						
$5	$5	$5	$5						
$5	$5	$5	$5						
$1	$1	$1	$1	$1	$1	$1	$1	$1	$1

Wage

$18	$18	$18	$18	$18

Orange

$10	$10	$10	$10						
$5	$5	$5	$5						
$5	$5	$5							
$1	$1	$1	$1	$1	$1	$1	$1	$1	$1

Wage

$12	$12	$12	$12	$12

Red

$10	$10	$10	$10						
$5	$5	$5	$5						
$1	$1	$1	$1	$1	$1	$1	$1	$1	$1

Wage

$6	$6	$6	$6	$6

SPENDING LOG

Family _____

Budget $_____

1. Name of store: _____

- Transportation Cost $_____
- Miles Traveled _____ miles
  (hint 4 squares = 1 mile)

- Items Purchased:

_____	$_____	_____	$_____
_____	$_____	_____	$_____
_____	$_____	_____	$_____
_____	$_____	_____	$_____
_____	$_____	_____	$_____
_____	$_____	_____	$_____

- Total amount spent: $_____
- Total amount left in budget $_____
- Do you need to go work? Yes or No
- If so, how long? _____ hours
- What items are left?

_____

_____

_____

_____

---

1. Name of store: _____

- Transportation Cost $_____
- Miles Traveled _____ miles
  (hint 4 squares = 1 mile)

- Items Purchased:

_____	$_____	_____	$_____
_____	$_____	_____	$_____
_____	$_____	_____	$_____
_____	$_____	_____	$_____

_____ $_____ _____ $_____

_____ $_____ _____ $_____

- Total amount spent: $_____
- Total amount left in budget $_____
- Do you need to go work? Yes or No
- If so, how long? _____ hours
- What items are left?

_____

_____

_____

_____

TEAM PRESENTATION OUTLINE

Names:_____

1. Describe your family? What were your health needs?

_____
_____
_____

2. How much was your family's budget?

_____
_____
_____

3. Did your team have a surplus (left over) budget? Did your family have to go work to complete the budget?

_____
_____
_____

4. How much money did your team spend on transportation?

_____
_____
_____

5. How did your team feel about the store options that were available within the community? What about the food options within the store?

_____
_____
_____

6. Describe your family's successes. Describe the challenges you experienced.

_____
_____
_____

7. Did your family have access to all the items you needed? Why or why not? Look at the food items you purchased. How many items were healthy?

_____
_____
_____
_____
_____
_____

MAP KEY

H= Home

C= Car ($1 every 2 squares)

B= Bus ($2 every 2 squares)

Stores:

1. Fresh and Local
    - Fresh Organic Local Food Store
2. Fresh For You
    - Fresh chain supermarket with some organic products
3. Family Food
    - Chain supermarket without organic products
4. Farmer's Market
    - Open only one or two days a week
5. Speedy Stop
    - Convenience Store/Gas Stationt
6. Burgers on the Go
    - Fast Food Restaurant

RULES

1. If a store is more than 1 square from your home, you must take a car or public transportation

2. If you run out of money, your entire team must go to the work station

3. You must get all items on your list

4. You must log each visit to each store and keep an accurate account of how much money is left in your budget

5. Milk does not equal one of the two drinks your family must get

WORK TABLE

Dark Green: 5 minutes = $40

Light Green: 5 minutes = $24

Yellow: 5 minutes = $18

Orange: 5 minutes = $12

Red: 5 minutes = $6

ROLES

Worker: This person responsible for ensuring there is enough money available. If the team runs out of money, this person will tell the time to go to the work area.

Cooker: This responsible for ensuring that the family is buying appropriate items according to the health needs of the family.

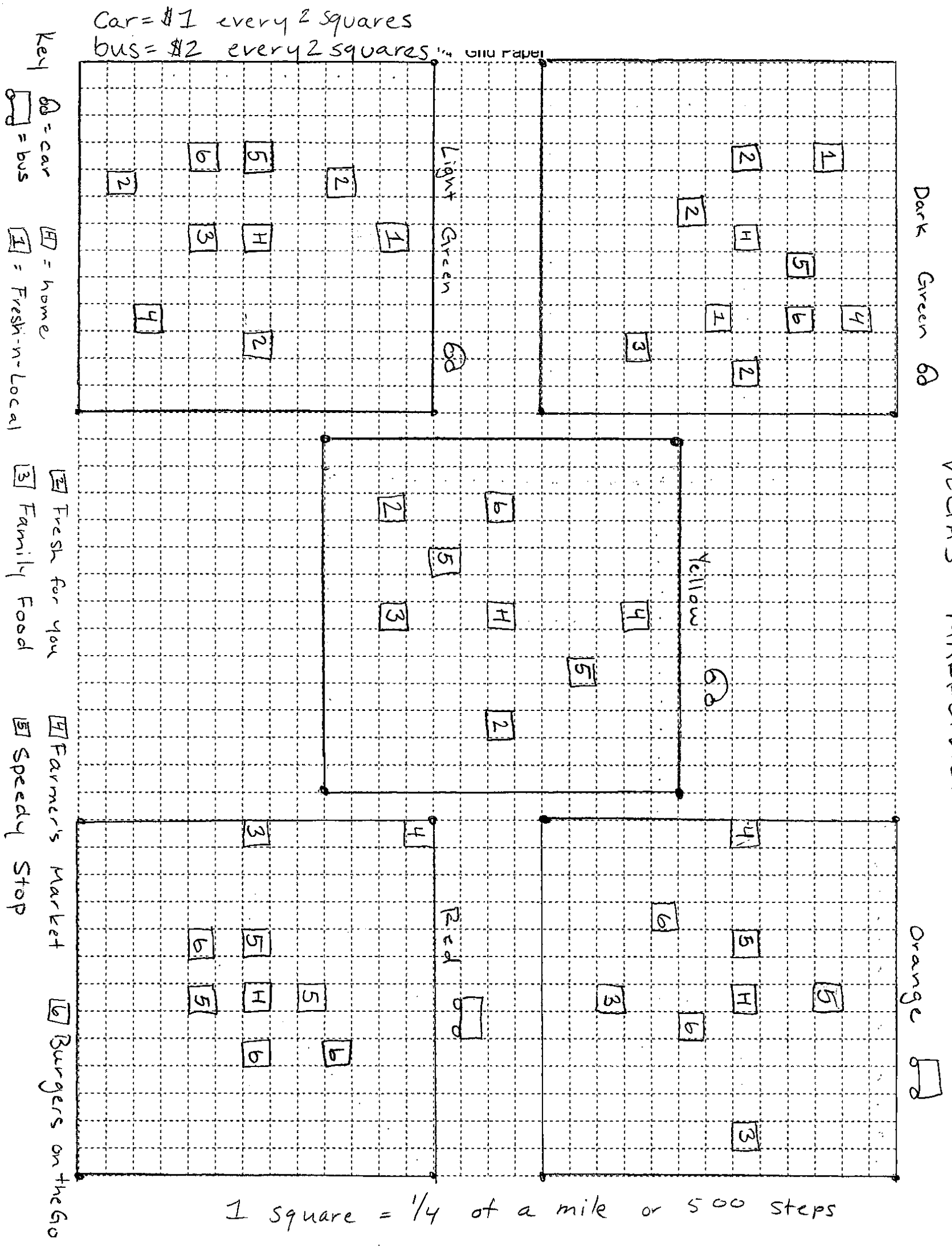
Driver: This person calculates transportation costs and also, totaling the miles traveled.

Scribe: This person is responsible for keeping the log accurate.

Observer: This person is responsible for documenting the team's successes and challenges and also, looking at other teams during the simulation.

GARDEN SPOTLIGHT

FOOD ACCESS MAP



GARDEN
SPOTLIGHT

RON FINELY

Los Angeles, California
*ELA Connection: Figurative Speech (Metaphors and Similes)

CCSS.ELA-Literacy.L.5.5
Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

CCSS.ELA-Literacy.L.5.5.a
Interpret figurative language, including similes and metaphors, in context.

"Growing food is like printing your own money"

1. Watch the 11 minute TED Talk Video on the Green Our Planet website. It has been edited and is appropriate for young viewers: http://vimeo.com/152834816

2. Read the Interview by HGTV Gardens
http://www.hgtvgardens.com/health/the-guerrilla-gardener-ron-finley-is-an-eco-lutionary?offset=1

THE GUERRILLA GARDENER RON FINLEY IS AN "ECO-LUTIONARY"

Ron Finley has been called a renegade gardener, a gangster gardener and an eco-lutionary. His TED talk about turning South Central L.A,'s vacant lots into **"food forests"** has been viewed almost one million times since March. And he's been profiled in everything from The New York Times to treehugger.com. But if you ask the bugs and bees in his garden, Ron Finley is just the guy who runs out the door every morning to look at his plants.

"I get out there and get lost," Finley says of the greenspace around his house in South Central, which feeds him and whoever else wanders by. "I run out there first thing in my underwear just to see how the seeds are doing. Four hours later, I haven't eaten or washed my face."

HGTV Gardens spent one truly fantastic afternoon soaking up every word of Ron's garden gospel. Here's what he has to say about corn, compost and why seeds are becoming the new contraband.

Your career is in fashion design. Did gardening start as a hobby?

I've always kept something in a pot or terrace garden, but when I was designing clothes it wasn't like, oh I've got to go home and graft this tree. When I had more time on my hands, the garden came to be. It's meditative and needed in a sense because it provides healthy food I can't find in my own neighborhood.

Gardening is another form of art and I plant for beauty. I want all kinds of different heights and color pops. Vegetable gardens to me are boring; I plant like a mosaic.

What's growing in your garden right now?

Purple Chinese mustard greens, three kinds of kale and tons of arugula. I've got New Zealand spinach, mint, red onions, pineapple sage, rosemary, red dandelion greens, mizuna, corn, carrots, eggplants and hot peppers. There's also almond, tangerine, Valencia orange, fig, apple, apricot and banana trees. Plus tons of sunflowers.

And you share all of this with your neighbors?

It's all on the street. I do hate it when people cut my sunflowers, though. That's not what they're there for. People rip the plant out of the ground so they can have it for the day, but it won't get to do what it's supposed to do, which is produce seeds. But it's on the street so I've got to deal with that.

What's the No. 1 thing people ask you about gardening?

They ask, "How do I start?" And I say, "At the beginning." And they say, "Where's that?" And I say, "Wherever you start."

And then?

Start some organic seeds in a tray in the house. I start stuff in a petrie dish with water so I can watch the seeds germinate. It's like elementary school. I start sweet potatoes in a jar with toothpicks on the side, too.

Then figure out a way to test your soil and see what's growing. If nothing's growing, you've got dirt and you need to put some above-ground boxes on it and get new soil. If you put the soil in there, you know where it came from. Start composting because it's the nutrients for your garden. Compost to me is a total metaphor for life.

How so?

Compost makes me think of anything that has ever died, even human beings. Carbon is brown and the nitrogen is green and you get this heat. The energy is in there. Humans are a life form that takes in oxygen, too. Do we die or is it just another energy transfer?

Are a self-taught gardener?

I'm not one of those guys who reads books about gardening. I figure in the time it's going to take me to read about it, I can put something in the ground and see what happens.

When you look at a patch of grass, what's your plan?

I do intensive planting. I plant closer than you're supposed to, but seeds are going to blow where they're going to go. Plants aren't like gangs, staying on this side or that side—they just put roots down wherever and grow. They want to live and will do whatever they can to accomplish that. That's why plants grow in teeny cracks and up walls: They want to survive. Just like humans.

And what do you do with all the great stuff you grow?

I juice a lot and make plenty of salads. I either steam or roast beets with some smashed garlic and rosemary. I sauté spinach in olive oil, butter and garlic. And corn? I eat it straight off the stalk—sometimes it doesn't make it beyond the gate.

In his legendary TED talk, Ron Finley said "growing your own food is like printing your own money."

How has your newfound fame boosted L.A. Green Grounds, the volunteer group you co-founded that creates gardens in low-income areas?

A lot of people come to our Dig-Ins to see me and I'm just glad something that simple can get people motivated. We have over 300-plus volunteers after my TED appearance when we used to get 25.

Can the war on food in your neighborhood be won one carrot at a time?

This problem is bigger than South Central—it's universal. From Nairobi and Norway to Ireland to all parts of Canada and Chicago, companies are producing food and drinks that are killing us and that needs to be addressed. In South Central there are four fast food restuarants on one block but you have to go miles for an organic apple. How does this serve the community?

Your food shouldn't kill you. The little old ladies who are growing food and giving it to shelters? That's gangster to me.

Seeds are about to be the new contraband. You're going to have little old ladies on the corner stringing organic seeds. Yo, I got organic open pollinated seeds. They're getting gangster with our food and we have to take our system back.

Now that the world knows who you are and what you're about, what's next?

World domination. Nature always wins. Always. Ask the dinosaurs if you don't believe me.

STUDENT WORKSHEET

Name: _____

Ron Finely, Guerrilla Gardener

Vocabulary

1. South Central LA: An area in the south part of Los Angeles, California that is low-income and known for gang violence

2. Urban Gardening: Gardening flowers, fruits, and vegetables in city areas

3. Renegade: a person who leaves one group and joins another that opposes it

4. Food Desert: a geographic area where affordable and nutritious food is difficult to obtain, particularly for those without access to an automobile. Food deserts usually exist in rural areas and low-income communities. Some research links them to diet-related health problems in affected populations.

5. Petri dish: a shallow cylindrical glass or plastic lidded dish that biologists use to culture cells

6. Germinate: the process by which a plant grows from a seed

1. Summarize Ron Finely's project in two or less sentences.

2. Explain Ron Finely's simile, "Growing your own food is like printing your own money?" (Hint: A simile is a metaphor that uses like or as to compare).

3. Finely says that compost to him is, "a total metaphor for life." Metaphors are a word or phrase used to make a comparison between two people, things, animals, or places. Compost is a verb or a noun. As a verb, it means to allow vegetable and other organic waste to mix together so that it can decompose to make fertile soil for planting. As a noun, it is the actual soil that has undergone a process of becoming more fertile. What message do you think Finely is trying to convey?

4. Ron Finely says there is a war on food? Do you think this is a metaphor? Why or why not?

5. Why do you think Ron Finely shares the harvest from the gardens?

6. What does the metaphor plants aren't like gangs mean?

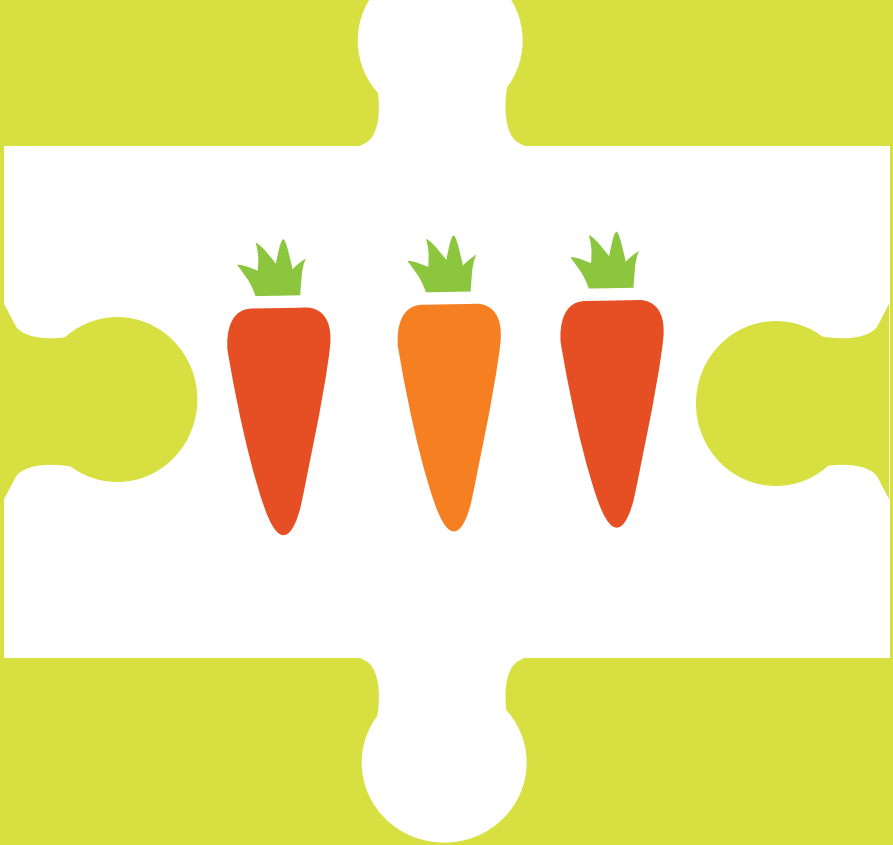
7. What figurative device is Ron Finely using when he says, "We are the soil?" Explain.

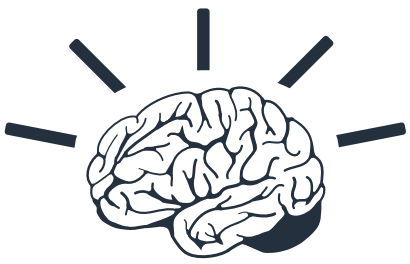
8. Why does Ron Finely consider himself defiant? What is he doing differently?

9. Write your own metaphor and simile about your school garden. Consider making art with your class metaphors and similes.

Lesson Seven

Food as a Solution: Food Deserts and Food Bill of Rights





BRAIN BREAKS!

1. Plant Partners Teacher will give class a plant part (seed, root, stem, leaves, flower). Students turn to a partner and go back and forth naming vegetables harvested from that part of the plant. Repeat until partners can no longer name vegetables from that plant part.

2. Apple, Watermelon, Banana (rock, paper, scissors) Students play rock, paper, scissors replacing rock with apple, paper with watermelon and scissors with bananas. Play as many rounds as possible in given time frame.

3. Garden Taboo Teacher plays music. When music stops students pair up. Teacher calls out a garden topic such as fruit. Partner A has to describe any fruit they want to their partner without saying the name. Partner B has to try and guess what their partner is describing.

4. Syllable Snacks Teacher will call out a number (1-4). Students work with a partner to come up with garden vocabulary words that contain that number of syllables. Partner A will begin by naming a vocabulary word with the given number of syllables; partner B will go next. They will alternate until one partner can no longer name a vocabulary word with the given number of syllables.

5. Fruit/Veggie Knock Students will work with a partner and touch knuckle to knuckle (veggie) and palm to palm (fruit) in a given sequence. Teacher will name the sequence to the class (Ex: veggie, veggie, fruit) and students will have to use the given hand gestures to complete the sequence. Teacher will increases the number of movements with each round (Ex: Round 1-veggie, veggie, fruit. Round 2-fruit, veggie, veggie, fruit).

6. Fruit/Veggie Match Students will stand. Teacher will name a fruit or vegetable and students will have to touch that part of the body corresponding to the part of the plant that the fruit or vegetable grows from (roots-feet, stem-legs, leaves-body, flowers-head). Teacher will call out and play the game “Simon says” going a little faster with each round.

7. Plant Part Finger Hop Students touch thumb to thumb, pointer to pointer, middle to middle, ring to ring, pinkie to pinkie as they say the plant part finger hop chant (seeds, roots, stems, leaves, flowers). Teacher will randomly call out a plant part, students will have to touch the corresponding fingers. Teacher will repeat, increasing the pace with each round.

8. The Harvester Students will stand and squat (harvest) with a shovel in hand. They will shovel the dirt over alternating shoulders like a farmer. Students will work at their own pace “harvesting” for the given time frame.

9. Apple Squat Students will stand and begin by squatting. They will then stand up on one foot, hop twice saying “apple, apple” then return to a squat. Repeat with increasing speed each round and alternating feet.

10. Fruit Freeze Teacher will randomly call out different fruits and vegetables. If the teacher calls out a veggie, students have to jog (or march) in place, if teacher calls out a fruit, students have to freeze.

11. Garden Guess Students will work with a partner. Partner A will silently think of a fruit or vegetable. Partner B can ask three questions about what their partner is thinking. After three questions, partner B has to guess the fruit or vegetable. They will then switch roles, and partner B will silently think of a fruit or vegetable and partner A gets to ask questions and guess. Repeat as many times as possible in the given time frame.

OVERVIEW

Students will examine food systems in different communities.

OBJECTIVES

- Students will experience and evaluate the food system based on accessibility within different communities.

STANDARDS

Nevada State Standards

CCSD K-5 Health Curriculum Standards: Discuss how community resources assist with making other personal health decisions [NS. 6.5.3]

CC: 5.SL.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ides and expressing their own clearly.

Next Generation Standards

5-LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

3-5-ETS1-1-3 Describe and graph quantities such as area and volume to address scientific questions. (5-ESS2-2)

TIME

Two to three 45-minute periods

QUESTIONS

- What food should be accessible to ALL people?

MATERIALS

- Venn Diagram
- Youth Bill of Rights, See below.
  From http://www.youthfoodbillofrights.com/index.html
- Youth Food Bill of Rights Handout

Poster Board

Out in the Garden

After the lesson, students can present their Food Bill of Rights to either a 3rd or 4th grade class. Then, divide students into small groups (3-5). Pair them with equally sized groups from the other class. Encourage students to use real examples from the school garden in order to explain to the other students about the importance of food access, healthy nutrients, and freshness.

If you have a classroom website, consider having the students maintain a daily or weekly blog posting about the garden and food justice news reports.

PROCEDURES

▶ Part 1

1. Reflect on the class discussion after the Marketville Food Access Simulation. Ask students what food should be accessible to ALL people?
   - Sample response: affordable, healthy, fresh, and possibly, organic food (pesticide and GMO free)
2. Then ask, “Was this available to each family during the simulation?”
3. Complete the a Venn Diagram: Food Forests vs. Food Deserts
   1. Definitions:
      - Food Desert: an urban area where it is difficult to buy affordable or good-quality fresh food. Ex: “many poor people live in food deserts where they have plenty of food but most of it is not healthy”
      - Food Forest: a gardening technique or land management system, which mimics a woodland ecosystem by substituting edible trees, shrubs, perennials and annuals. For the purpose of this activity, it will also be an urban area where fresh, healthly or organic food is available.
      - *Note: If students need more background knowledge of food deserts, read the articles from the Food Justice Lesson 8.
4. Ask, what are rights? What are people’s food rights?

▶ Part 2

5. Individually, each student will write 3-5 ideas about what food rights people have.
6. Then, compile a class list and title it, Mr./Ms. _____’s Bill of Food Rights.
7. Project or Print the Youth Food Bill of Rights (see below)
8. Compare your class list with the "Rooted in Community’s Youth Food Bill of Rights"
9. Pose the question: Did all people in the simulation have access to those rights? If not, what are some solutions?

10. Brainstorm solutions: school gardens, farmer's markets, co-ops, talk to community stores? Diagram solutions (See sample)

11. Closure:

Watch the video, "Rooted in Community, Youth Leadership Summit 2013" https://www.youtube.com/watch?v=VQdw8s6LFME

ASSESSMENT

Ask students to synthesize their individual suggestions for food rights with an essay or oral presentation

ADAPTATIONS

- Research and present about food CO-OPS in Las Vegas (Hint: research Bountiful Baskets)
- GATE Extensions Consider having the students actually try to create and carry out a solution by using the Osborn-Parnes Creative Problem Solving Process (CPS) or a decision-making matrix to help narrow down ideas with approapriate criteria. This follows the GATE Scope and Sequence for leadership and community. http://members.optusnet.com.au/charles57/Creative/Brain/cps.htm
- Rooted in Community
- Youth Food Bill of Rights

DIGGING DEEPER

- How many community gardens are in your neighborhood, city, or state?

DID YOU KNOW?

- 2/3 of our diet is composed of endosperm – the inside of a seed.

NUTRITION FACTS

- Communities with greater access to supermarkets consume more nutritious foods, such as fruits and vegetables. In addition, First Lady Michelle Obama's campaign, "Let's Move," has a goal of eradicating food deserts by 2017.

LESSON 7 STANDARDS & LESSON MAP

NG -LS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

3-5-ETSI-1-3 Describe and graph quantities such as area and volume to address scientific questions

ELA W.5.2d Use precise language and domain-specific vocabulary to inform about or explain the topic.

SL.5.1c Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.

SL.5.1d Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

Lesson 7: Food as a Solution: Food Deserts and Food Bill of Rights

Day 1

- Whole class discussion using guiding questions. Then go over definitions of Food desert and Food Forest and create a Venn-Diagram comparing the two

Day 2

- Class discussion on "What are people's food rights?" Students individually write 3-5 ideas then create a class Bill of Food Rights

Day 3

- Compare class created Bill of Food Rights with the Rooted in Community's Youth Food Bill of Rights. Use guided questions to extend the discussion

Day 4

- Brainstorm solutions and then watch the video "Rooted in Community Youth Leadership Summit 2013"

Day(s) ____

Math Compare prices of GMO and Organic Food

Practice cent-to-dollar conversion with prices

Day(s) ____

Literacy connection Write your own set of Bill of Rights

Day(s) ____

Science/Social Studies

Explore why Summits and Conferences help people organize their ideas and work towards a goal.

YOUTH FOOD BILL OF RIGHTS HANDOUT **

In order to reshape our broken food system, we the youth have come together to name our rights....

1. We have the right to culturally-affirming food. We demand the preservation, protection and reconstruction of traditional farming, cultural history and significance of food and agriculture. We demand that indigenous peoples have the right to establish their own autonomous food systems, should they choose.

2. We have the right to sustainable food. We demand an end to the mistreatment of animals and the environment that is caused by our current food system.

3. We have the right to nutritional education. We demand government funding to educate and inform youth and parents about nutrition.

   - Education on things such as seasonal eating, organic farming, sustainability, and diet-related illness should be provided so that people can make better informed decisions.
   - We recommend that schools recognize youth-lead fitness programs as tools for success.

4. We have the right to healthy food at school. We the youth demand more healthy food choices in our schools, and in schools all over the world. We want vending machines out of schools unless they have healthy choices. We need healthier school lunches that are implemented by schools with the ingredients decided on by the Youth. We demand composting in schools and in our neighborhoods.

5. We have the right to genetic diversity and GMO-free food. We the youth, call for the labeling of genetically modified seeds, plants, and produce. We demand a policy from the government that labels all GMO's.

6. We have the right to poison-free food. We the youth absolutely don't want any chemical pesticides in our food!

7. We have the right to beverages and foods that don't harm us. We the youth demand a ban on High Fructose Corn Syrup and other additives and preservatives that are a detriment to our communities' health. This must be implemented by our government and governments around the world.

8. We have the right to local food. We demand food be grown and consumed by region to to reduce the use of fossil fuels and the globalization of our food system.

9. We have the right to fair food. We the youth demand that everyone working in the food system must be treated with respect, be treated fairly and earn, at the minimum, a just living wage. For all those who are working in the food system, we demand a model like the Domestic Fair Trade Association to be implemented.

10. We have the right to good food subsidies. We demand an end to the subsidy of cash crops, including corn and soy beans. Rather than our tax dollars going to subsidies for industrial farming, we demand financial support for small organic farmers.

11. We have the right to organic food and organic farmers. We demand a restructuring of the process of being certified organic and fair trade to improve the thoroughness and accessibility of these programs.

12. We have the right to cultivate unused land. We demand that a policy be enacted allowing for unused land to be made available for communities to farm and garden organically and sustainably.

13. We have the right to save our seeds. We believe farmers and all people should have the freedom to save their seeds. Any law that prevents this should be reversed. No law shall ever be made to prevent seed saving.

14. We have the right to an ozone layer. We the youth demand a 20% decrease of industrial farms every 5 years, in order to decrease the high levels of greenhouse gas emissions associated with industrial farming.

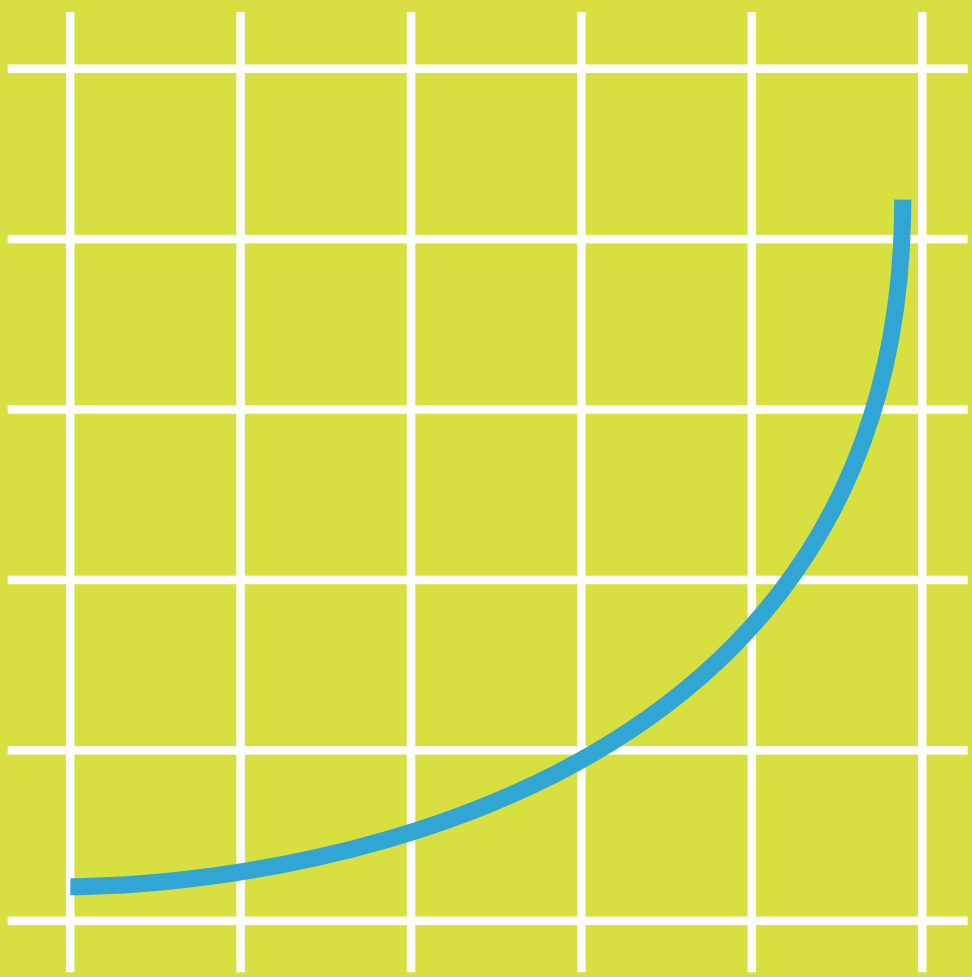
15. We have the right to support our farmers through direct market transactions. We demand that the number of farmers' markets be increased every year until there are more farmers' markets than corporate super markets.

16. We have the right to convenient food that is healthy. We want healthy options in corner stores while empowering the community to make better food choices. We demand more jobs for youth to work with our communities to make this happen and help them control their food systems.

17. We have the right to leadership education. We the youth demand that there be more school assemblies to inform and empower more youth with the knowledge of food justice. The continuation of the movement for Food Justice, Food Sovereignty and cultivation of future leaders is necessary for feeding our youth, our nation and our world.

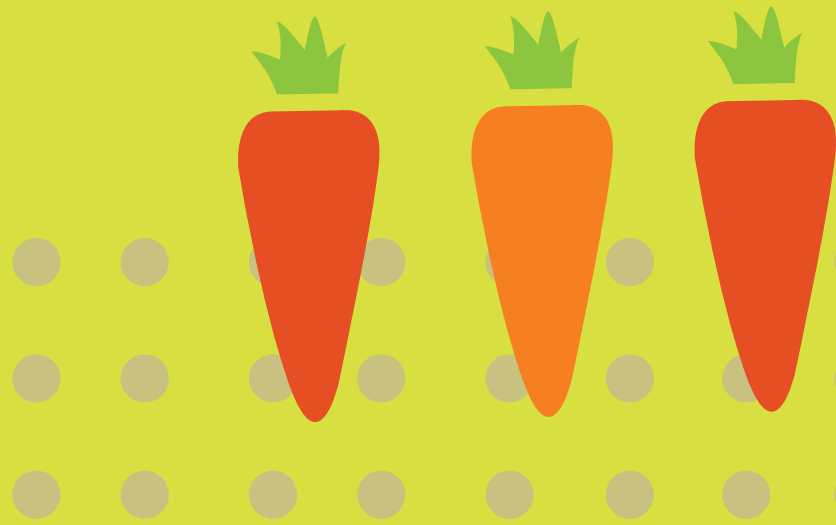
This is only the first step of many to come that will help make our visions, our dreams, and this bill a reality.

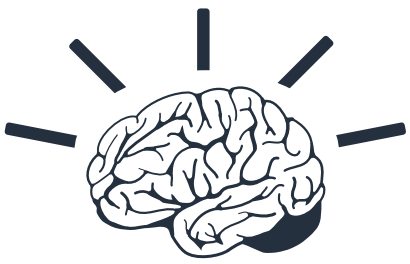
**Written by Rooted in Community and Community Services Unlimited at Rooted in Community Youth Summit,2013



Lesson Eight

Math Lesson, Graphing Data





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OBJECTIVES

- Students will graph data about communities' access to healthy and fresh food.

STANDARDS

Nevada State Standards

(5)1.4 Draw conclusions from scientific evidence. [N.5.A.3]

(5)1.5 Create and use labeled illustrations, graphs (tables, line plots, stem and leaf plots, scatter plots, histograms), and charts to convey ideas, record observations, and make predictions. [N.5.A.1, N.5.A.4]

Next Generation Standards

ESS3.C Human Impacts on Earth Systems
Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)

Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships. (5-ESS1-2)

People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1)

CCSD K-5 Health Curriculum Standards

Discuss how community resources assist with making other personal health decisions [NS. 6.5.3]

Common Core

Speaking and Listening

5.SL.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.

Math Review

5. MD.B.2 Graph data using a variety of graphs to review maximum, minimum, and mode.

MATERIALS

- Three articles: "Food is Power," USDA Defines Food Deserts," and "The Wasted Front Yards of America" (sourced from Maria Rodale's Organic Gardening)
- Poster boards

Out in the Garden

After the lesson, display the poster boards in the garden. Students will sit in the garden and reflect on the information presented on each poster board. Then, they will write a short response on how this information impacts their garden.

PROCEDURES

1. Students will be working in 3 different groups. Each group will be assigned an article and will be responsible for graphing the data presented in their article.
    - The articles vary in difficulty so groups will need to be assigned with differentiation in mind. Review reading strategies such as highlighting, annotation of the text in the margins, etc.
    - Groups will read the three articles: "Food is Power," "USDA Defines Food Deserts," and "The Wasted Front Yards of America."
    - Divide students into three teams and assign each group one article to read. Find “graphable” data and make a graph based on that data. Ensure students are including maximum, minimum, and mode in the presentations whenever possible. You may consider using literature circle strategies by assigning group roles within each team. For example, a summarizer, a fact gatherer, a recorder, etc.
    - Once the groups have finished, each team presents their graph along with a brief summary of the article.
    - Follow with a discussion on Food Deserts. (See Lesson 6 and Lesson 7 for more information).

ASSESSMENT

Group graphs and student presentations.

ADAPTATIONS

Choose an article to read with a small group, highlighting graph-able data as you read the article aloud together.

GATE Extensions Consider using the 6 Thinking Hats. This is a great way for students to view the information from different perspectives. It can also help with summarization and reflections

DIGGING DEEPER

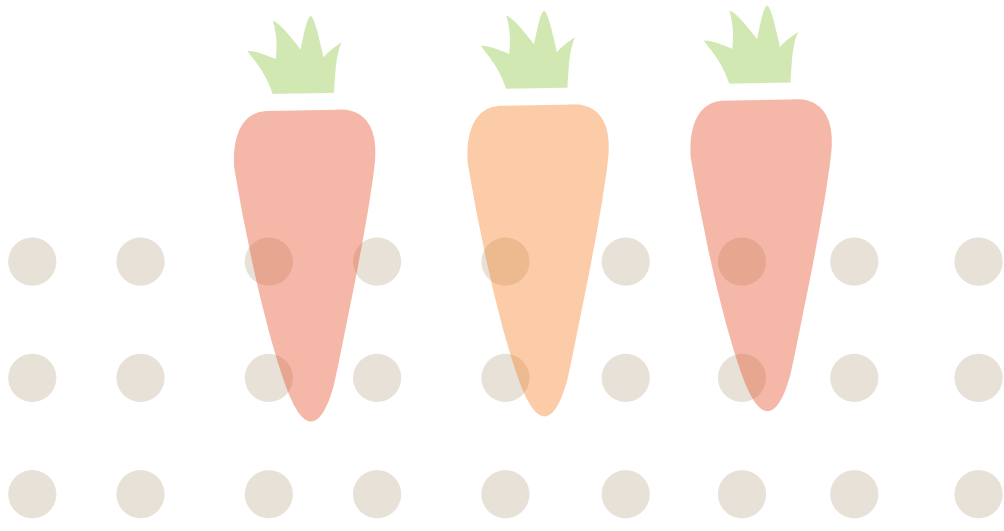
- Is the area where you live a food desert?

DID YOU KNOW?

- There are 2 million urban farmers in the world supplying food to 700 million people which is 12% of the world population.

NUTRITION FACTS

- The actual number of food deserts may be under-reported because the North American Industry Classification System places small corner grocery stores (which often sell mostly packaged, unhealthy food) in the same category as grocery stores like Safeway and Whole Foods.



LESSON 8 STANDARDS & LESSON MAP

NG 5-ESS1-2 represent data in graphical displays to reveal patterns that indicate relationships

3-5-ETS1-1 Peoples needs and wants change over time, as do their demands for new and improved technologies

ELA W.5.2d Use precise language and domain-specific vocabulary to inform about or explain the topic.

SL.5.4 report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

Math Review graphing data

Lesson 8: Math Lesson, Graphing Data

Day 1

- Divide students into three groups and assign each group one article have teams decide how they are going to graph and present the information

Day 2

- Teams graph their article

Day 3

- Teams work on how they will present their teams graph

Day 4

- Team presentations

Day(s) _____

Math Day 2, Make graphs

Day(s) _____

Literacy connection
Explore the website: http://thefoodtrust.org/index.php

Write a response to what the Food Trust Organization is proposing. Watch the video and compare observations.

Day(s) _____

Science/Social Studies

Gardening Background

FOOD DESERTS

Food deserts can be described as geographic areas where residents' access to affordable, healthy food options (especially fresh fruits and vegetables) is restricted or nonexistent due to the absence of grocery stores within a convenient travelling distance. For instance, according to a report prepared for Congress by the Economic Research Service of the US Department of Agriculture, about 23.5 million people live more than one mile away from a supermarket and do not own a car. [1] In urban areas, access to public transportation may help residents overcome the difficulties posed by distance, but economic forces have driven grocery stores out of many cities in recent years, making them so few and far between that an individual's food shopping trip may require taking several buses or trains. In suburban and rural areas, public transportation is either very limited or unavailable, with supermarkets often many miles away from people's homes.

The other defining characteristic of food deserts is socio-economic: that is, they are most commonly found in communities of color and low-income areas (where many people don't have cars). Studies have found that wealthy districts have three times as many supermarkets as poor ones do, [2] that white neighborhoods contain an average of four times as many supermarkets as predominantly black ones do, and that grocery stores in African-American communities are usually smaller with less selection. [3]

People's choices about what to eat are severely limited by the options available to them and what they can afford—and many food deserts contain an overabundance of fast food chains selling cheap "meat" and dairy-based foods that are high in fat, sugar and salt. Processed foods (such as snack cakes, chips and soda) typically sold by corner delis, convenience stores and liquor stores are usually just as unhealthy.

In addition to this, we found that many of the convenience stores that had items such as a bunch of bananas or a few apples would sell the fruits individually. Because these items are not priced, the customers are often at the mercy of the person behind the counter who determines the cost then and there. Customers who don't have a good understanding of English might never ask the price of the item.

Those living in food deserts may also find it difficult to locate foods that are culturally appropriate for them, and dietary restrictions, such as lactose intolerance, gluten allergies, etc., also limit the food choices of those who do not have access to larger chain stores that have more selection. Additionally, studies have found that urban residents who purchase groceries at small neighborhood stores pay between 3 and 37 percent more than suburbanites buying the same products at supermarkets. [4]

Healthier foods are generally more expensive than unhealthful foods, particularly in food deserts. For instance, while the overall price of fruits and vegetables in the US increased by nearly 75 percent between 1989 and 2005, the price of fatty foods dropped by more than 26 percent during the same period. [5] While such inflation has strained the food budgets of many families regardless of their financial status, the higher cost of healthy foods often puts them entirely beyond the monetary means of many lower-income people.

While unhealthy eating may be economically cheaper in the short-term, the consequences of long-term constrained access to healthy foods is one of the main reasons that ethnic minority and low-income populations suffer from statistically higher rates of obesity, type 2 diabetes, cardiovascular disease, and other diet-related conditions than the general population. [6]

Whatever their age, obesity puts people at a greater risk for serious, even fatal health disorders (particularly coronary heart disease and diabetes, [7] the first and seventh leading causes of death in the US respectively) [8]

The incidence of diabetes among US adults doubled between 1996 and 2007, and "type 2 diabetes" (a variant of the disease that is often caused by obesity) [9] may account for 90 to 95 percent of these cases. [10] Only twenty years ago, type 2 diabetes was virtually unknown among people under 40 years old, but in the past decade it has increased tenfold among adolescents (mirroring this age group's escalating obesity rates). [11] While the incidence of type 2 diabetes has risen across demographic lines in recent years, the greatest increases have occurred among people of color.

The highest rates of escalation have been identified in Native American youth [12] and African-Americans and Latinos of all age groups, with these groups suffering disproportionately higher rates of type 2 diabetes compared to whites. [13] These are also the groups most likely to live in food deserts, and researchers have established a strong correlation between food insecurity and increased diabetes rates. One study of Chicago neighborhoods found the death rate from diabetes in food deserts to be twice that of areas offering access to grocery stores, [14] while another conducted in California found that adults ages 50 and over from communities of color had double the diabetes rate of whites from the same age demographic. Researchers explain this disparity by emphasizing that the high-calorie foods most readily available in food deserts put residents living in these areas at greater risk for diabetes in the first place, and that having restricted access to healthy foods also makes it harder for them to manage diabetes once they are diagnosed. [15]

Heart disease causes more than 2.4 million deaths in the US every year. [16] One of the main causes of cardiovascular disease is a diet high in unhealthy fats and low-density lipoprotein (LDL) cholesterol [17] — typified by the types of fare commonly available in food deserts. Just as African-Americans are statistically more likely than other populations to live in food deserts, heart disease kills more blacks every year than whites [18] (despite the fact that whites make up almost 80 percent of the total US populace, and blacks comprise less than 13 percent). [19] Even children and adolescents living in food deserts are at greater risk for cardiovascular disease (both now and when they reach adulthood) due to the increased prevalence of obesity in those communities. [20]

Food for Thought

Public awareness of the formidable problems posed by food deserts is growing, thanks largely to the efforts of community activists, entrepreneurs and government officials committed to increasing people's access to healthy food options. On the national level, First Lady Michelle Obama has spearheaded the "Let's Move" campaign to combat childhood obesity, which includes a goal of eradicating food deserts by 2017 with a $400 million investment from the government focused on providing tax breaks to supermarkets that open in food deserts. [21] Many urban areas are also implementing initiatives locally to solve their food desert challenges.

Chicago – More than 500,000 residents (mostly African-American) live in food deserts, and an additional 400,000 live in neighborhoods with a preponderance of fast food restaurants and no grocery stores nearby. [22] Some food justice activists have sought to close this gap by opening food co-ops in underserved areas where supermarkets have historically been unsuccessful. In addition to selling fresh and organic fruits and vegetables, bulk whole grains and beans, and soy-based meat substitutes, some of these stores (like Fresh Family Foods on the city's South Side) also offer cooking and nutrition classes to educate the public about making healthy food choices. [23]

Los Angeles – In 2008, the Los Angeles City Council voted to enact a moratorium on new fast food outlets in a 32-square-mile zone encompassing some of South L.A.'s most arid food deserts, an area where about 97 percent of the population is either Latino, African-American, or of mixed race. [24] Having fewer fast food restaurants created greater demand for more and better food choices, so Councilmembers subsequently passed another measure offering grocery stores and sit-down restaurants serving healthier meals financial incentives to open up in underserved communities. [25] These policies have so far succeeded in bringing the first new supermarket to South L.A. in about a decade. [26]

New York City – An estimated 750,000 New York City residents live in food deserts, [27] while about three million people live in places where stores that sell fresh produce are few or far away. [28] Supermarkets throughout New York City have closed down in recent years due to increasing rents and shrinking profit margins, but the disappearance of urban grocery stores has had the most serious impact on low-income communities, especially those that are predominantly African-American (such East/Central Harlem and North/Central Brooklyn).[29]

To fill this void, the city started its Green Carts program, which has been bringing affordable fresh fruits and vegetables to underserved areas while providing jobs for vendors since 2008. Hundreds of Green Carts are already on the streets in food deserts, and that number is rapidly increasing as prospective vendors obtain training, licenses and permits from the city. [30]

What can I do if I live in a food desert?

If you recognize that you are living in a food desert, you can start by helping those in your community understand what this means and talk about ways to make change. Discussing different options, such as growing your own food, working with local retailers, etc. is a good place to start. It is also important to bring your ideas and concerns to policy makers—city council members, state legislators, etc.

To learn more you can also reach out to others who have worked on this issue.

FRUITS, VEGETABLES MORE AFFORDABLE THAN PACKAGED SNACKS AND SIDES, REPORT FINDS

http://www.cspinet.org/new/201307251.html

July 25, 2013

Fruits and vegetables are not only more healthful but are often more affordable than packaged snacks and side dishes, according to a new report from the nonprofit Center for Science in the Public Interest. The group analyzed 20 popular snack and 19 side dish items, half of them fruits or vegetables. It found that the average price per serving of the fruit or vegetable snacks was $0.34, while the unhealthy packaged snacks cost about twice as much, $0.67. Healthy vegetable side dishes cost $0.27 per serving, while less healthy packaged side dishes cost $0.31 per serving.

For instance, while a half-cup serving of apple cost $0.26, one Fruit by the Foot roll cost $0.45. A half a cup of grapes cost $0.46—and provides just 50 calories—while a package of M&M's cost $0.75—and provides 230 calories. For side dishes, a half-cup, 150-calorie serving of Stovetop Stuffing cost $0.38, while a half-cup, 110-calorie serving of sweet potato cost $0.31. An ounce of Lay's Potato Chips—about 15 chips—cost $0.27 and provides 160 calories; a half cup of sliced cucumber cost just $0.14 and has 5 calories.

"The notion that healthy fruits and vegetables are expensive and that packaged snacks are cheaper is an urban myth that deserves to be put out to pasture once and for all," said Margo G. Wootan, director of nutrition policy at the Center for Science in the Public Interest. "Very few Americans are actually eating recommended amounts of fruits and vegetables—and most of us would do well to consume fewer packaged convenience foods and snacks, which are often higher in calories, salt, and sugars."

The fruit and vegetable snacks had fewer calories than packaged snacks to which they were compared, and the same was found for the vegetable side dishes compared to packaged side dishes. For example, three Oreo cookies have 160 calories, while a half cup of cantaloupe has just 25. A half-cup serving of Rice-a-Roni has 155 calories, while a half-cup serving of cabbage is only 15 calories.

Government guidelines recommend that the average person eat two cups of fruit and two and a half cups of vegetables a day (for a 2,000 calorie diet).

"This may seem tough to some people," said Wootan. "But it is probably easier than you think. Eating a half cup of blueberries with yogurt and a half cup of orange juice at breakfast, a large apple as a snack, a half cup of baby carrots with lunch, and a large sweet potato and a cup of broccoli at dinner will get you there." A study by the U.S. Department of Agriculture found that people can purchase the daily recommended amount of fruits and vegetables for $2.00 to $2.50 a day.

The Wasted Front Yards of America

When the great Japanese organic farmer and gardener Masanobu Fukuoka visited America for the first time, he was astounded by all the wasted land used for "front yards." In Japan, which supports over 12.5 million people on land the size of the United Kingdom, that kind of waste would be unthinkable.

To top it off, we then waste oil and nonrenewable resources mowing our lawns every week. We waste time pushing or sitting on our mowers. And we waste space that could be used for productive gardens. The next time you read an article that says that scientists think the only way to solve the future food shortage problem is through biotechnology, fertilizers, and pesticides, remember three important things.

1. The front yards of America alone could probably grow enough food to feed us for the next few hundred years.
2. The chemical companies and people who make a lot of money and profit from chemicals and biotechnology are the ones who pay scientists to do research.
3. Scientists don't want to lose their jobs.

So, here are six ideas you can try in your front yard that will turn it from an energy-, time-, and space-wasting pain to an effortless and remarkable space contributing to the beauty, health, and improvement of our world. (But there are as many other solutions as there are dreams—go back to your lists and see what other creative things you can do in your front yard.)

1. **Plant timber.** Oak, black walnut, cherry, and other large timber trees are all high-value items that can be grown and sold (in 50 to 100 years) for large sums of money relative to the minor investment. What other investment will both beautify your yard and help pay for your grandchildren's and great-grandchildren's educations? I heard a story of one college that built a beautiful building with giant wooden beams and then planted trees next to the building that could be used in 100 years if the beams needed to be replaced. Now that's smart, long-term thinking.
2. **Plant an orchard.** Grow your own fresh organic apples, peaches, cherries, grapes, pears, and exotic fruits. Not only do orchards look beautiful, but you can become very popular with your neighbors by sharing the excess. (Neighborhood kids will love your yard, too!) Many new varieties (and *old*

varieties) are very disease-resistant and require no chemicals or pesticides. And you can grow wonderful varieties you'll never find at the supermarket.

3. **Let your lawn return to forest.** After about three years of letting it go, you will notice a forest emerging. In about five years, you will feel as if you live in the wilderness. If your city's zoning board doesn't approve of it, go to court to fight for your rights to make a forest. Call it your very own wildlife conservation and ozone regenerating effort. In the 1970s, Rodale Press (publisher of this book and the company I work for) decided to let a portion of the company lawn grow into a natural meadow. The local zoning laws said you couldn't let your grass grow over a certain height. We went to court, won, and an article was written in *The New Yorker* about the case.

4. **Make a meadow.** Make sure your new wildflower meadow has paths for walking, spots for relaxing, and magical places for dreaming and pretending.

5. **Plant flowers.** Beautify your neighborhood and your world with lots of flowers to enjoy and share with family and friends. If you are so inclined, you can even start a cutting garden business, selling cut flowers to your local florists or drying flowers to sell to craft shops.

6. **Clean the air.** If you live along a busy street in an urban area, you may not want to turn your lawn into a forest or meadow, or maybe you can't (not enough space, for example). What you *can* do is do your part to clean the air—and keep dust and dirt out of your house—by planting air-cleaning and air-filtering plants. Some great trees for that are ginkgo (make sure you get a male), golden-rain tree, Japanese zelkova, oak, sycamore, and willow. As an added bonus, they cut down on street noise, too.

Some Scary Lawn Facts

- Thirty percent of water consumed on the East Coast goes to watering lawns; on the West Coast, it's 60 percent.
- The average suburban lawn is deluged with 10 times as much chemical pesticide per acre as farmland. In fact, over 70 million tons of chemical fertilizers and 70 million pounds of chemical pesticides are applied to residential lawns and gardens annually.
- Lawn care pollutes, too. Check out these statistics on hydrocarbons emitted from one hour of lawn mower, string trimmer, and leaf blower use compared to driving a car for one hour:

lawn mower:	10 to 12 times more pollution
string trimmer:	21 times more pollution
leaf blower:	34 times more pollution