

4th Grade Garden Unit – California Mission Gardens

- Students study California’s Mission Gardens, using a variety of primary and secondary sources to understand the native and non-native plants the Spanish grew.
- Social Studies connection: Native Americans and settlers adapted to their environments using plants for food, shelter, and clothing.
- Math: plan a mission garden, using a list of commonly found plants in real mission gardens. Students will draw out their garden plans on large graph paper, then use that to determine area and perimeter of regular and irregular shapes as well as fractions and equivalent decimals.
- Socratic Seminar: After researching invasive species and their effects on California’s native plants, students will debate about what should be done about invasive species of plants and animals.
- Opinion writing after research and seminar: What should be done about invasive species?
- EXTENSION: Research California native plants as well as plants the Spanish brought- what was more suitable to survive in California’s environment? Students may be assigned a plant that will be in our CA native plant garden AND/OR an invasive species of plant. Would the plant survive in our garden? Research watering/ space/ temperature needs and effects on other plants.

Science Standard

- Life Science, 4.3.b Students know that in any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.

Social Studies Standards

- 4.3.1 Identify the state capital and describe the various regions of California, including how their characteristics and physical environments (e.g., water, landforms, vegetation, climate) affect human activity.
- 4.2.5 Describe the daily lives of the people, native and nonnative, who occupied the presidios, missions, ranchos, and pueblos.

Common Core Math Standards

- CCSS.Math.Content.4.NF.C.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.²
- CCSS.Math.Content.4.NF.C.6 Use decimal notation for fractions with denominators 10 or 100.
- CCSS.Math.Content.4.NF.B.3d Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.
- CCSS.Math.Content.4.MD.A.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems.

Common Core ELA Standards

- CCSS.ELA-Literacy.W.4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
 - CCSS.ELA-Literacy.W.4.1a Introduce a topic or text clearly, state an opinion, and create an organizational structure in which related ideas are grouped to support the writer's purpose.
 - CCSS.ELA-Literacy.W.4.1b Provide reasons that are supported by facts and details.
 - CCSS.ELA-Literacy.W.4.1c Link opinion and reasons using words and phrases (e.g., *for instance, in order to, in addition*).
 - CCSS.ELA-Literacy.W.4.1d Provide a concluding statement or section related to the opinion presented.

Materials

- Powerpoint with images of Mission Garden and arial shots of the California Missions
- Chart graph paper
- "Square Feet" (1x1 pieces of cardboard with a piece of string that can be tied to students' shoes)
- List of common Mission Garden plants and approximate square footage recommendations

Mission Garden Resources

<http://www.gardenguides.com/89094-california-mission-gardens.html> - A list of plants featured at the California Missions

<http://kathrynvercillo.hubpages.com/hub/The-Mission-Gardens-of-California> - Comparison between gardens of the Missions and in Andalusia, Spain

<http://www.highbeam.com/doc/1G1-6547747.html> - Annoying layout, but good info from Sunset Magazine about common Mission Garden plants

VIDEO: http://www.amazon.com/Treasures-MISSION-Borreмео-Carmelo-California/dp/B002QOWKJC/ref=sr_1_2?ie=UTF8&qid=1360865406&sr=8-2&keywords=California+Mission+Gardens "Carmel's unique climate has transformed the Mission's gardens into an exotic paradise that contributes to the idyllic character of this religious complex..."

VIDEO: http://www.amazon.com/California-Missions-109-Purisima-Concepcion/dp/B0045F8H9W/ref=sr_1_13?ie=UTF8&qid=1360865406&sr=8-13&keywords=California+Mission+Gardens "California Missions #109 - MISSION GARDENS VISITS*** Huell visits the gardens of Mission La Purisima Concepcion in this episode."

What students need to know and understand before the unit:

- perimeter and area

- fractions
- right angles
- measuring complex and irregular shapes
- basic information about CA missions (Native American workers, purpose of Missions, etc.)

Lesson 1: Mission Garden Introduction

1. KWL Chart about CA Mission Gardens. Think about what you know from our own Phoebe Hearst garden observations- what do you think would have been the purpose of a garden in the Mission?
2. Read excerpts from primary source: Vallejo's "Ranch and Mission Days in Alta California" describing gardens at the missions. Students create list of all the plants and crops he mentioned and sort into fruit, vegetables, grains, and other/decorative.
3. Show images of Mission Gardens and the ariel views of Missions (powerpoint) as examples. Discuss the purpose of the Mission Gardens - to feed the priests and Native American workers, and to provide a stable source of food as an incentive to keep Native American workers there.

Lesson 2 - Explore Phoebe's Garden

- Measure the planter beds in our school garden. What is the area and perimeter?
- On graph paper: How many different combinations of lengths/widths can you come up with to make a shape with an area of 100 square feet? Make one IRREGULAR shape that is also 100 square feet in area. How do area and perimeter change? What do you think would be the best shape for a real garden? Practical solutions? Do any of the shapes present problems? Which shape has the smallest perimeter, and which has the greatest?

Lesson 3 - Measure Your Garden

- Put students in groups and have them choose one 100 square feet shape. Strap "square feet" to students' feet- have them measure mark out 100 square feet with their groups with stakes and string on the playing field. Borrow Coach Moreno's rolling measuring wheel to check.
- Once plots are marked, students tour each garden plot and ask questions. They draw out the shape of each other's garden plots on graph paper if they don't have it already on their sheets.

Lesson 4 - Build Your Own Garden

- Demonstration/Modeling:

Show 10x10 square on graph paper - ask *"What is the perimeter and area?"*

Ask *"If we want half of this area to be corn, how many squares should I shade? How do we know?"* Outline 50 squares and label it corn.

Ask *"What are three other plants that were valuable and important in a Mission Garden? How many squares should we allot for the first one? What about the others? What are the areas of land given for each of these plants? What are the perimeters? What else can we plant in any room we have left over?"* Clearly outline and label each plant's land.

- Distribute graph paper and Mission Garden Project instructions. Review instructions with students and remind them to use their Mission Plant Lists as they plan. Put students into pairs to work on this project. Give them the rest of the period to work. As they finish their rough drafts, they need to get the work checked by another student and then approved by the teacher. Students can then transfer garden plans onto large chart graph paper.

- As students design their garden, they should keep track of the plants they have chosen. They will calculate the area, perimeter, and percentage of the whole garden for each plant.

- EXTENSION QUESTION: If the Mission's population doubles, and you have to increase the amount of food produced in the garden, how will that affect the area of your garden? How will the area of your grains increase?

Build a Garden Project

For this project, you and your partner will be designing a Mission Garden of your own! Your garden needs to be exactly 200 square feet total. It can be any regular or irregular shape, rectangular or square, or a combination of either. Only use right angles!

Garden Requirements:

- One half of the garden needs to be set aside for grains. You will need to include space for corn, wheat, and barley within that half of the garden.
- The other half needs to be split up into space for at least 15 fruits, vegetables, and herbs that you have learned about in this unit. Use the list of plants and their square footage posted in your classroom.
- Each plot of land needs to be clearly and neatly labeled with the crop growing there. For example:

Corn	Barley	Wheat
	Squash	Peas
	Beans	

After work is checked by another student and then approved by a teacher, you will be given a large piece of graph paper for your final draft. Make sure this is your best work- it needs to be legible and neat!

Mission Garden Project

Plant Name	Area	Perimeter	Fraction of total
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			
21.			
22.			
23.			
24.			
25.			