# LESSON PLAN

## The Three Sisters

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# LESSON PLAN

## Goals

Students will understand Indigenous permaculture as an approach to agricultural design that includes whole systems thinking and considers the co-habitation of plant, animal and human beings. Students will also learn how to apply traditional ecological knowledge (TEK) when growing and living amongst corn, beans and squash, also known as "the three sisters."

## Standards

This course meets California State Career Technical Education standards for Agriculture and Natural Resources grades 7-12. Standards include:
CTE.ANR.C10.0; CTE.ANR.C10.2; CTE.ANR.C10.4; CTE.ANR.C11.1; CTE.ANR.F5.1; CTE.ANR.G11.0; CTE.ANR.G6.3; CTE.ANR.G6.4; CTE.ANR.G10.1; CTE.HSMT.A.4.4

## Courses and Grade Level

This lesson is designed for use in upper division, high school classes, but it can be modified for earlier grade levels, as well as college-level curriculum use.

## Unit Length

This lesson plan requires approximately a week of instruction time.

- 180 minutes of in-classroom time, broken up into 4, 45 minute segments
- 1-2 hours homework time
- 1-3 hours take home exam time

## Required Materials

- Computer/laptop/ipad
- Internet access

# OBJECTIVES AND ASSESSMENT

| Students will be able to: | CA Standards: | Learning Activity | Evidenced By: |
|---|---|---|---|
| Students will be exposed to the concept of Mother Earth | CTE.ANR.C10.4 | Video | Worksheet<br>Homework |
| Students will understand the origins of how corn, beans, and squash came together and the oral histories that Indigenous cultures passed this knowledge to future generations in relationship to current scientific understandings | CTE.HSMT.A.4.4 | Video<br>Readings | Group Activity |
| Students will understand the soil science behind a traditional three sisters garden | CTE.ANR.G6.4<br><br>CTE.ANR.F5.1 | Video<br>Primary sources | Activity<br>Homework |
| Students will understand the roles of each of the three sisters plants and how they individually complement their togetherness on Mother earth | CTE.ANR.G11.0<br>CTE.ANR.C11.1 | Video<br>Readings | Activity<br>Homework |
| Students will gain knowledge of the preparation of soil for the three sisters and irrigation techniques | CTE.ANR.C10.0<br>CTE.ANR.C10.2<br>CTE.ANR.C10.4<br>CTE.ANR.F5.1<br>CTE.ANR.G10.1 | Video | Activity<br>Homework |
| Students will learn about lunar correlation with the growing of each of the three sisters | CTE.ANR.G10.1 | Teacher Presentation<br>Video | Homework |
| Students will become familiar with the (3) plants' stages of growth | CTE.ANR.G6.3 | Video<br>Primary Sources | Teacher Presentation<br>Homework |

## Handouts

Robin Kimmerer – Mishkos Kenomagwen: The Teachings of Grass Video Worksheet
Lentil Planting Experiment Activity
Who Is Mother Earth? Homework 1
How to Grow a Three Sisters Garden
Planting The Three Sisters Group Activity Worksheet
Growing The Three Sisters Homework 2
Take-Home Quiz Homework 3

## Videos

Robin Kimmerer - Mishkos Kenomagwen: The Teachings of Grass | Bioneers
Oneida Nation Legend of Three Sisters
Robin Kimmerer - Three Sisters on Vimeo
The Great Laws of Nature: Indigenous Organic Agriculture

## Additional Teacher Resources

Mother Earth? What *is* Our Relationship to the Planet We Call Home?
The Three Sisters: Corn, Beans and Squash
Origin of the Words Denoting Some of the Most Ancient Old World Pulse Crops and Their Diversity in Modern European Languages
How to Plant By The Moon's Phases
Nitrogen Fixation: Fixing the Gap Between Concept and Evidence-Based Learning with Legume Biology
The Interworking of the Three Sisters
Food Yields and Nutrient Analyses of the Three Sisters: A Haudenosaunee Cropping System
How Legumes Fix Soil
How to Grow a Three Sisters Garden
The Three Sisters: Corn, Beans and Squash
Chickasaw Three Sisters
Indigenous Permaculture: An Operational Framework
The Indigenous Science of Permaculture

## Readings

Oneida Nation Legend of Three Sisters
It's True - You Really Should Talk To Your Plants

# INSTRUCTIONAL PROCEDURE

## DAY 1: NATIVE WAYS OF KNOWING MOTHER EARTH

| Duration | Activity | Steps and Instructions |
|---|---|---|
| **5 minutes** | Teacher Presentation | Introduce the topic. |
| **30 minutes** | Video and Worksheet | Play video Robin Kimmerer - Mishkos Kenomagw-en: The Teachings of Grass \| Bioneers<br><br>Have students complete the video worksheet. |
| **10 minutes** | Experiment | Pass out the instructions and introduce the growing experiment. |
| **2 minutes** | Homework | Review "Who is Mother Earth" Homework 1.<br><br>Assign students to read Oneida Nation Legend of Three Sisters on their own. |

## DAY 2: THE THREE SISTERS

| Duration | Activity | Steps and Instructions |
|---|---|---|
| **5 minutes** | Experiment | Have students say positive and negative things to their lentils. |
| **5 minutes** | Teacher Presentation | Introduce the topic of the 3 sisters. See the Teacher Guide. |
| **5 minutes** | Video | Play video Robin Kimmerer - Three Sisters on Vimeo. |
| **25 minutes** | Group Activity: Planting a Three Sisters Garden | Distribute worksheet and handout. Review instructions in the Teacher Guide. |
| **5 minutes** | Homework Review | Assign "Three Sisters Origins" homework. See Teacher Guide. |

## DAY 3: INDIGENOUS PERMACULTURE

| Duration | Activity | Steps and Instructions |
|---|---|---|
| **15 minutes** | Teacher Presentation | Introduce the topic of Indigenous permaculture. |
| **25 minutes** | Video | Play video The Great Laws of Nature: Indigenous Organic Agriculture. |
| **5 minutes** | Homework | Introduce "Three Sisters Take-Home Quiz" homework. |

## DAY 4: PLANT RELATIVES

| Duration | Activity | Steps and Instructions |
|---|---|---|
| **15 minutes** | Reflection | Lead a writing reflection following the prompts in the teacher guide. |
| **30 minutes** | Class Discussion | Have students discuss the essay prompts in small groups and write their responses own their own. |

# GRADING

| Activity | Points (100 Total) |
|---|---|
| Homework<br>Homework 1 - 10 points<br>Homework 2 - 20 points<br>Homework 3 - 20 points | 50 pts |
| Participation<br>Attendance - 10 points<br>Lentil Experiment - 10 points<br>Discussion -10 points<br>Group Activity -10 pts<br>Writing Reflection - 10 points | 50 pts |

Name: _____

# ROBIN KIMMERER – MISHKOS KENOMAGWEN: THE TEACHINGS OF GRASS

## VIDEO WORKSHEET

**Instructions:** Answer the following questions after watching the video.

**1.** What does land mean to you?

**2.** Explain what Robin Kimmerer means when she asks: "Is the land a source of belongings or a source of belonging?"

**3.** If we learn the names of plants and their gifts, what does it open the door to?

**4.** What is the "Honorable Harvest?"

**5.** If plants are our teachers, what are their lessons, and how might we become better students?

Name: _____

# ROBIN KIMMERER – MISHKOS KENOMAGWEN: THE TEACHINGS OF GRASS

## VIDEO WORKSHEET

## ANSWER KEY

**Instructions:** Answer the following questions after watching the video.

**1.** What does land mean to you?

**(2 points)**

**(Open ended, answers will vary)**

**2.** Explain what Robin Kimmerer means when she asks: "Is the land a source of belongings or a source of belonging?"

**(2 points)**

**Is the land a resource that we can take and extract from for human needs or is the land a place filled with various life forms that use the resources for collective growth and evolution that we all contribute to, are birthed from and eventually return back to.**

**3.** If we learn the names of plants and their gifts, what does it open the door to?

**(1 point)**

**Reciprocity**

**4.** What is the "Honorable Harvest?"

**(3 points)**

**(Open ended, answers will vary) Learning plant names and gifts; not taking the first or last plant; introduce yourself, if you are going to take a life; ask permission and wait for the answer; you must be held accountable for it; reciprocate the gift by leaving a spiritual or material gift behind.; take only what you need and/or only what is given to you.**

**5.** If plants are our teachers, what are their lessons, and how might we become better students?

**(2 points)**

**(Open ended, answers will vary)**

# LENTIL PLANTING EXPERIMENT

**Suggested Activity Time: 3-4 Days**

**Summary**

This activity explores the impact that positive and negative energy have on the growth of a plant. For the sake of time, the lentil plant (a member of the pea family) will be used. However, this experiment can be used on a variety of different plant species.

**Learning Objectives**

- Students will utilize a Native American technique of growing, which involves talking to the plants.
- Students will utilize what they learn in class to assist them in growing healthy plants.
- Students will learn about the harm that negative energy, no matter how great or small, can impact the growth of a living being.
- Students will learn the values of caring for another living life.
- Students will learn about soil care.
- Students will learn how to water the lentil responsibly.

**Requirements**

This activity is recommended for the springtime (March-May), preferably two weeks after the last frost date, but it can be completed indoors any time of the year.

You will need: Indoor space for growing sprouts, at a constant 68F temperature setting;
To continue growing the plant past the sprout phase, you will need outdoor space with full sunlight.

**Optional Reading:** It's True - You Really Should Talk To Your Plants

**Materials**

- Pencil
- Permanent marker
- 2 paper cups
- Paper towels
- White or yellow lentil seeds (no red)
- *Optional watering can

# LENTIL PLANTING EXPERIMENT

## Student Instructions

**1.** With your permanent marker, label one of the cups - "Happy" and the other cup "Sad" and write your name on both cups as well. The name of the group of plants in the cup marked happy are the Happy group and vice versa.

**2.** Fill each cup 1/8 full with water.

**3.** Choose an area in the class (or in your house if this is done at home) to place your lentils. Lay the paper toweling down and then place your cup upside down on top of the lentils. This will ensure the lentils do not get water logged. Should the lentils become too waterlogged they will not grow. You will need to monitor them over the next few days.

**4.** Before the end of class make sure you create some distance between your lentil cups. (at least a couple of feet).

**5.** Walk up to the lentil cup marked Sad. Speak to the lentils in that cup for 1 minute straight. Get angry, mad, rude and or disrespectful to the lentils and then put the cup back where you picked it up from.

**6.** Now go to the second cup labeled "Happy." Pick up those lentils and for a minute straight tell the lentils how much you love and appreciate them, show them as much love as you possibly can.

**7.** Repeat these steps with your lentils at the beginning, and end of each class for the next four days.

Name: _____

# WHO IS MOTHER EARTH?

**Instructions:** Research two definitions or explanations of Mother Earth. You may find a definition from a primary source, an organization's website, a tribe's website or other written or oral media.

Write the definitions in the space provided below, and include source information. Sources can follow any format, but must include 1) a description of where the information was found, 2) information such as what country, culture, ethnicity or tribe is the source, and 3) a website URL if the information was sourced online.

Compare and contrast each one. Your response must describe at least one common theme and one difference. Do these definitions align with your worldview? Why or why not? Use additional paper if necessary.

**Mother Earth Definition 1**

_____

_____

_____

**Source**

_____

_____

_____

**Mother Earth Definition 2**

_____

_____

_____

**Source**

_____

_____

_____

Name: _____

# WHO IS MOTHER EARTH? (CONT.)

**Compare and contrast common themes (at least one similarity and one difference)**

**Do these definitions align with your worldview? Why or why not?**

# WHO IS MOTHER EARTH?
## ANSWER KEY

**Total Points: 10**

- **2 points for including two definitions, 1 per definition**
- **2 points for the source, at least 2 pieces of information described in the instructions must be provided**
- **4 points for identifying at least 1 common theme and 1 difference**
- **2 points for the 'worldview' response**

**Instructions:** Research two definitions or explanations of Mother Earth. You may find a definition from a primary source, an organization's website, a tribe's website or other written or oral media.

Write the definitions in the space provided below, and include source information. Sources can follow any format, but must include 1) a description of where the information was found, 2) information such as what country, culture, ethnicity or tribe is the source, and 3) a website URL if the information was sourced online.

Compare and contrast each one. Your response must describe at least one common theme and one difference. Do these definitions align with your worldview? Why or why not? Use additional paper if necessary.

**Mother Earth Definition 1**

**1 point**

**Source**

**1 point**

**Mother Earth Definition 2**

**1 point**

**Source**

**1 point**

**Compare and contrast common themes (at least one similarity and one difference)**

**4 points for identifying at least 1 common theme and 1 difference**

**Do these definitions align with your worldview? Why or why not?**

**2 points**

Group Name: _____

Student Name: _____

# PLANTING THE THREE SISTERS

**Instructions:** Review the How to Grow a Three Sisters Garden handout and design a plot for planting the three sisters.

**Problem Statement:** Your school has a small 10X10 foot garden, and the students have decided to grow a three sisters garden. In your group determine a plot layout based on what you have learned this week, and the How to Grow a Three Sisters Garden handout.

**Which plot layout did you choose?** _____

Show evidence for the amount of each plant you can grow. Draw the plants in the grid below and show your calculations, based on measurements presented in the handout. Each square represents 1 square foot.

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Based on this layout, how many of each sister can you grow? Answers will vary depending on the layout.

Corn _____

Beans _____

Squash _____

# PLANTING THE THREE SISTERS
## ANSWER KEY

**Total Points: 10**

- **1 point for selecting a viable plot layout following a Three Sisters theme**
- **6 points for filling in the grid, with correct spacing**
- **3 points for correctly calculating how many of each of the Three Sisters can be grown based on the plot design chosen.**

**Instructions:** Review the How to Grow a Three Sisters Garden handout and design a plot for planting the three sisters.

**Problem Statement:** Your school has a small 10X10 foot garden, and the students have decided to grow a three sisters garden. In your group determine a plot layout based on what you have learned this week, and the How to Grow a Three Sisters Garden handout.

**Which plot layout did you choose?** _____

Show evidence for the amount of each plant you can grow. Draw the plants in the grid below and show your calculations, based on measurements presented in the handout. Each square represents 1 square foot.

Based on this layout, how many of each sister can you grow? Answers will vary depending on the layout.

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Corn **20-50 Corn plants**

Beans **20-40 Bean plants**

Squash **3-10 Squash plants**

**Responses will vary. The mound layout will have the lower numbers, with the field layout in the middle, and the landscape layout with the highest numbers.**

Group Name: _____

# GROWING THE THREE SISTERS

**Instructions:** Independently research the origins of each seed and the sun, water and additional conditions required for each plant to grow. Compare your answers with your group members, and answer the comparative question. Show the sources of your responses by pasting in URLs of source websites, or citing books and other sources. Sources can include oral history, e.g. asking someone who is knowledgeable about the Three Sisters.

**Hints**

- Origin can be where it "evolved" alongside humans, or at any point where it came from.
- Amount of water can vary depending on particular varieties.
- Ideal growing conditions includes factors such as soil conditions (what nutrients are in the soil? What is the soil's drainage? etc.), natural fertilizers/soil amendments, optimal phase in the lunar cycle, etc.
- Order refers to what order to plant it in compared to the other sisters (e.g. first, second or third)

**Corn**

Place of Origin: _____

Amount of water needed: _____

Amount of sun needed: _____

Ideal growing conditions: _____

Order of planting: _____

**Source 1:** _____

**Source 2:** _____

**Beans**

Place of Origin: _____

Amount of water needed: _____

Amount of sun needed: _____

Ideal growing conditions: _____

Order of planting: _____

**Source 1:** _____

**Source 2:** _____

Group Name: _____

# GROWING THE THREE SISTERS (CONT.)

**Squash**

Place of Origin: _____

Amount of water needed: _____

Amount of sun needed: _____

Ideal growing conditions: _____

Order of planting: _____

**Source 1:** _____

**Source 2:** _____

Were there any differences in the findings of different members of your group? If so, share at least 1 for each Sister.

**Corn:** _____

**Beans:** _____

**Squash:** _____

Were there any similarities in the findings of different members of your group? For which plants? If so, share at least 1 for each Sister.

**Corn:** _____

**Beans:** _____

**Squash:** _____

# GROWING THE THREE SISTERS

## ANSWER KEY

**20 Points total**

- **1 point for following directions**
- **15 points for completing responses for each Sister and including sources**
- **4 points for pointing out similarities and differences, students should point out at least 4 distinct similarities and differences to earn all four points.**

**Instructions:** Independently research the origins of each seed and the sun, water and additional conditions required for each plant to grow. Compare your answers with your group members, and answer the comparative question. Show the sources of your responses by pasting in URLs of source websites, or citing books and other sources. Sources can include oral history, e.g. asking someone who is knowledgeable about the Three Sisters.

**Corn**
Place of Origin: **(1 point)**
Amount of water needed: **(1 point)**
Amount of sun needed: **(1 point)**
Ideal growing conditions: **(1 point)**
Order of planting: **(1 point) First**
**Sources: (1 point)**

**Beans**
Place of Origin: **(1 point)**
Amount of water needed: **(1 point)**
Amount of sun needed: **(1 point)**
Ideal growing conditions: **(1 point)**
Order of planting: **(1 point) Second**
**Sources: (1 point)**

**Squash**
Place of Origin: **(1 point)**
Amount of water needed: **(1 point)**
Amount of sun needed: **(1 point)**
Ideal growing conditions: **(1 point)**
Order of planting: **(1 point) Third**
**Sources: (1 point)**

Were there any differences in the findings of different members of your group? If so, share at least 1 for each Sister.

Were there any similarities in the findings of different members of your group? For which plants? If so, share at least 1 for each Sister.

**(4 points for 4 distinct similarities and differences)**

Name: _____

# THREE SISTERS TAKE HOME QUIZ

**Instructions:** Read The Indigenous Science of Permaculture. Use any of the following resources to answer the quiz questions listed below on a separate document.

## Videos

- Robin Kimmerer - Mishkos Kenomagwen: The Teachings of Grass | Bioneers
- Oneida Nation Legend of Three Sisters
- Robin Kimmerer - Three Sisters on Vimeo
- The Great Laws of Nature: Indigenous Organic Agriculture

## Readings

- Oneida Nation Legend of Three Sisters
- It's True - You Really Should Talk To Your Plants

## Additional Resources

- Mother Earth? What is Our Relationship to the Planet We Call Home?
- The Three Sisters: Corn, Beans and Squash
- Origin of the Words Denoting Some of the Most Ancient Old World Pulse Crops and Their Diversity in Modern European Languages
- How to Plant By The Moon's Phases
- Nitrogen Fixation: Fixing the Gap Between Concept and Evidence-Based Learning with Legume Biology
- The Interworking of the Three Sisters
- Food Yields and Nutrient Analyses of the Three Sisters: A Haudenosaunee Cropping System
- How Legumes Fix Soil
- How to Grow a Three Sisters Garden
- The Three Sisters: Corn, Beans and Squash
- Chickasaw Three Sisters
- Indigenous Permaculture: An Operational Framework

**1. Short Answer:** Why are corn, beans, and Squash considered companion plants?

**2. Short Answer:** What Soil is the best soil to use to plant corn beans and squash?

**3. Essay:** Why is it important to learn from Indigenous science? Offer at least 3 distinct reasons with examples for each one. Your response should be 200-300 words long. Be prepared to share your response to this question in class tomorrow.

# THREE SISTERS TAKE HOME QUIZ
## ANSWER KEY

**20 points total**

**1. Short Answer:** Why are corn, beans, and Squash considered companion plants?

**Corn provides the stalk for the beans to climb, beans hold the corn stocks in place by strengthening them while also providing nitrogen to the soil, while squash delivers protection from animals and maintains certain soil moisture that corn needs to grow during hot or drought periods. (5 points)**

**2. Short Answer:** What Soil is the best soil to use to plant corn beans and squash?

**60 degrees to 85 degrees fahrenheit, Nitrogen heavy grounds, medium to loose well drained soils that are high in water capacity and high in organic materials. 1 of the above answers is sufficient. (5 points)**

**3. Essay:** Why is it important to learn from Indigenous science? Offer at least 3 distinct reasons with examples for each one. Your response should be 200-300 words long. Be prepared to share your response to this question in class tomorrow.

**Answers will vary but may include the ideas that traditional knowledge has been developed over thousands of years of careful observation and experimentation; it helps people to be more interconnected with nature; that mainstream science is actually only just beginning to "catch up" with indigenous knowledge; and if we don't learn from it we are in danger of losing it. Examples can include, but are not limited to: quantum physics, prescribed burns, mycelium networks, talking to plants, etc. (10 points)**