



Ma hope O Ke Kula Ke A'o Mau Ana Program

Name: _____

Date: _____

Birth Date: _____

Zip Code: _____

School: _____

Not Even Phased

Lesson 1. Farming in Old Hawai'i

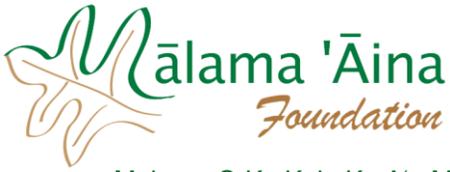
Māla

Hawai'i is naturally made for farming because of its fertile soil, abundance of water, and sunny climate. Farming in old Hawai'i was not for those afraid of hard work. The work was labor intensive and done without the modern tools we are used to. A person's hands and feet were the best tools. Mahi'ai, or farmers, would use their hands to clear soil and rake leaves, while their feet worked as spades move earth for new crops. Some examples of tools that were available were the 'o'o stick used for digging holes and trenches, the ko'i, or adze, used to cut down trees, and 'opihi shells used for weeding and working dry, compacted soil.

Agriculture played a very significant role in native Hawaiian culture. It is by these means that a person can provide for themselves, their family, friends, and animals. Baby boys were dedicated to Lono, the Hawaiian god of agriculture, rather than Kū, the god of war. In the days of old Hawai'i, farming was not done on a large scale. The amount of land in each ahupua'a was limited, so the allotment of land in each family's 'ili, or subdivision, only left enough room for planting or gardening. This also meant that mahi'ai could devote their time and energy to their individual crops. The practice of kilo, or close observation, was an important skill for mahi'ai to have. They used this skill to find plants with unique genetic differences that could be cultivated in the future. Mahi'ai understood the importance of conserving resources so everyone has what they need and being grateful to the 'āina, or land, for providing those resources. They also expressed their gratitude to Lono, after successful harvests and celebrated him during the season of Makahiki.

When planting crops, mahi'ai practiced kilo in a different way. They would use the phases of the Moon, or helu pō when deciding what to plant and when to plant it. This determined the best planting and harvesting conditions. Understanding helu pō and their meanings was necessary for many aspects of life including farming, fishing, and building. The phrase below refers to a person who can't answer a simple question and compares them to a child who doesn't know the Moon phases.

“Kamali'i 'ike 'ole i ka helu pō.”
Children who not know the Moon phases



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“Kamali’i ‘ike ‘ole i ka helu pō.”
Children who not know the Moon phases

Respond to Reading

Directions

Respond to the questions below. Underline and identify specific lines from the passage that support your claim.

What is the context of this phrase? If someone said it to you, would you see it as something positive?

The passage describes kilo, or close observation, as an important skill for mahi'ai. What are some ways mahi'ai could use kilo in farming?

Helu Pō

Hawaiian Vocabulary

(From Ho'okua'āina)

Helu Pō: Moon calendar

Mahina: Moon

Malama: Month

Anahulu: Period of ten days

Ho'onui: Enlarging, first anahulu

Poepoe: Rounding, second anahulu

Ho'ēmi: Diminishing, third anahulu

Ho'onui (or Mua): Increasing Waxing Phase



Poepoe: Full or Rounded Phase



Emi (or Hope): Decreasing Waning Phase



(Image by Liz Dacus)

A Hawaiian malama is broken into three anahulu named ho'onui, poepoe, and ho'ēmi. In ho'onui, the Moon is getting larger or waxing. The phases seen in ho'onui are Hilo, Hoaka, Kūkahi, Kūlua, Kūkolu, Kūpau, 'Olekūkahi, 'Olekūlua, 'Olekūkolu, and 'Olepau. In poepoe, the Moon is beginning to round and becomes a full Moon. The phases seen in this anahulu are Huna, Mōhala, Hua, Akua, Hoku ili, Hoku palemo, Māhealani, Kulu, Lā'aukūkahi, Lā'aukūlua, and Lā'aupau. In ho'ēmi, the Moon is decreasing in size and is waning. The phases seen in the final anahulu are 'Olekūkahi, 'Olekūlua, 'Olepau, Kāloakūkahi, Kāloakūlua, Kāloapau, Kāne, Lono, Maui, and Muku. It is important to note that 'ole Moons reflect their name. 'Ole means "without or lacking" and these Moon phases are typically bad times for planting and fishing. The best Moons for planting are any phases from Hua to Māhealani. Plants grown during this time are typically taller and healthier. The phases Hoku ili and Hoku palemo refer to the period of time when the Moon is still visible as the sun rises (Hoku ili) and when the Moon disappears as the sun rises (Hoku palemo).

(Information collected from Ho'okua'āina)

Respond to Reading

Directions

Respond to the questions below. Underline and identify specific lines from the passage that support your claim.

How do the names of the Moon phases indicate that they are good for planting?

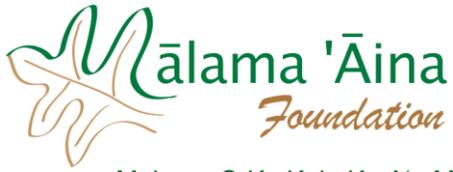
Lesson 2. Helu Pō

As you read in **Lesson 1**, the phases of the Moon determine the best and worst times to plant and harvest crops, go fishing, and perform other tasks. In Hawaiian culture, they also believe that the moon phases can affect people. For one week (or longer) you will take daily notes on how you are feeling both physically and mentally. Be sure to include details about your day, especially events that seem out of the ordinary.

Day	Notes
Lāpule ___ / ___ / ___	Helu Pō: _____
Pō'akahi ___ / ___ / ___	Helu Pō: _____
Pō'alua ___ / ___ / ___	Helu Pō _____
Pō'akolu ___ / ___ / ___	Helu Pō _____
Pō'ahā ___ / ___ / ___	Helu Pō _____
Pō'alima ___ / ___ / ___	Helu Pō _____
Pō'aono ___ / ___ / ___	Helu Pō _____

Additional Pages

Day	Notes
Lāpule ___ / ___ / ___	Helu Pō: _____
Pō'akahi ___ / ___ / ___	Helu Pō: _____
Pō'alua ___ / ___ / ___	Helu Pō _____
Pō'akolu ___ / ___ / ___	Helu Pō _____
Pō'ahā ___ / ___ / ___	Helu Pō _____
Pō'alima ___ / ___ / ___	Helu Pō _____
Pō'aono ___ / ___ / ___	Helu Pō _____



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Reflection

Reflect on your experiences with the Moon journal. Note any changes you observed in the following.

Mood (Including motivation in school)

Relationships with Family/Friends

Health

Lesson 3. Planting

Question: How does planting during different Moon phases affect plant growth.

Experiment: Planting According to the Moon Calendar

Materials

- Moon Journal
- Seeds
- Ruler

Procedure

Using your knowledge of the Moon phases, plant two of the same crop, in the same planter box, at different times. One should be planted during a Moon phase that benefits plant growth and the other during a phase that hinders plant growth. Monitor your plant for a month and use your Moon journal to take notes on their growth progress. At the end of the month, compare the growth of the two plants. Be sure to use the same methods when planting and watering your plant.

Lesson 4. The Science of Moon Phases

The light we typically know as Moonlight, does not actually come from the Moon itself. The Sun is the only object in our solar system that shines with its own light. The Moonlight we see, is actually the light beaming from the sun and reflecting off of the surface of the Moon. This process is similar to how we experience night and day on Earth. As the Earth rotates, one side is facing the Sun and is experiencing day, the side that is experiencing night. When Earth makes one full rotation, one day has gone by. When Earth has made one complete trip around the sun, a year has passed. Similar to the Earth, the Moon is also in motion and experiences its own day and night. How much of the Moon we are able to see from Earth, will change as the Moon travels through its orbit. It will take about one month for the Moon to orbit the Earth.

Moon Phase Simulation

This activity will help you to see the process of how the phases of the Moon change

Materials

Styrofoam ball
Chopstick or Skewer
Lamp (No shade)
Dark Room

Procedure

1. Place the Styrofoam ball on the chopstick or skewer so it looks like a lollipop.
2. Place the lamp in the middle of the room
3. Turn off the lights and cover up any windows.
 - a. The only light in the room should be coming from the lamp.

The light bulb - the Sun.

Your head - the Earth.

Your nose - your current location.

Your left ear/shoulder - East

Your right ear/shoulder - West

The Styrofoam ball - Moon

Discussion Questions

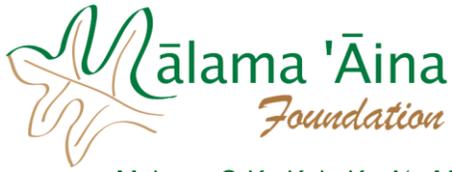
Discuss the questions on the next page with people around you and write down your thoughts as you go through the simulation. You may move around and use the materials given, but you may not touch the lamp, turn on the lights, or interfere with others. Support any claims with information from the passage or experiences from the simulation.

What would one day on Earth look like?

What would one year on Earth look like?

If facing the Sun with the Moon in front of you is noon (12:00 PM), which phase of the Moon do you see?

Position yourself at midnight (12:00 AM) and hold your Moon up so it catches the light. Which phase of the Moon do you see?



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Return to the noon position and move the Moon slightly to the left and then right, which Moon phases do you see?

Experiment with other motions and describe the different Moon phases you observed. Keep in mind that as you move your Moon, the Earth (your head) would also be rotating. Also, the Earth rotates twenty-nine times in the amount of time it takes the Moon to make one full rotation.

Lesson 5. Growing by the Moon

There haven't been many in-depth studies on lunar planting, or planting according to the moon cycle. However, there is record of this farming method being used for centuries. As you learned in the previous lessons, the native Hawaiians valued understanding the moon phases and the affects on crops. There are also records of the Mayans planting their crops according to the moon phases. While we know that this practice has been used by multiple cultures, it is not clear why it works. Some individuals believe it is because of the moon's gravitational pull. In the same way that the changing phases of the moon affects the ocean and waves, it is said to impact the amount of moisture absorbed by seeds and in the soil.

Lunar planting has increased in popularity in western cultures. In the United States, lunar planting has a specific technique to planting crops. The table below explains the best time to plant different types of flowers and crops.

Light/Waxing Moon – New/Full Moon	Day After a Full Moon/Day Before a New Moon
<ul style="list-style-type: none"> • Annual Flowers (Flowers that complete an entire life cycle (seed-death) in one season and do not regrow in the next season) • Fruits and vegetables that grow above the ground (Ex. Corn, Tomatoes) 	<ul style="list-style-type: none"> • Flowering Bulbs (A tuber of nutrients and flower parts that is created when a flower goes dormant. This ensures that the plant can grow back in the coming season.) • Biennial Flowers (Flowers that grow leaves, stems, and roots during their first year, go dormant for winter, and flower, produce seeds, and then die in their second year.) • Perennial Flowers (Flowers that live more than two years) • Fruits and vegetables that grow below the ground (Ex. Carrots, Potatoes)

Respond to Reading

Directions

Respond to the questions below. Underline and identify specific lines from the passage that support your claim.

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Native Hawaiian Lunar Farming	
<p>Ho'onui (or <i>Mua</i>): Increasing Waxing Phase</p>  <p>PoePoe: Full or Rounded Phase</p>  <p>Emi (or <i>Hope</i>): Decreasing Waning Phase</p>  <p>(Image by Liz Dacus)</p>	<p>In poepoe, the Moon is beginning to round and becomes a full Moon. The phases seen in this anahulu are Huna, Mōhala, Hua, Akua, Hoku ili, Hoku palemo, Māhealani, Kulu, Lā'aūkūkahi, Lā'aūkūlua, and Lā'aupau. It is important to note that 'ole Moons reflect their name. 'Ole means "without or lacking" and these Moon phases are typically bad times for planting and fishing. The best Moons for planting are any phases from Hua to Māhealani.</p>

Compare the United States method of lunar planting to the Hawaiian method. What differences do you notice? What are the reasons for these differences?

Lesson 6. Look on the Bright Side

It is clear that most plants require sunlight to survive, but did you know that the same can be said for humans? Seasonal Affective Disorder or SAD, is a type of mental illness that causes depressive episodes during certain times of the year. More specifically during late fall and late winter. While it is not clear what causes SAD, some researchers believe that lack of light is a contributing factor. In other words, the lack of sunlight during this time of year.

Lack of sunlight has been known to affect a person's circadian rhythm. The circadian rhythm regulates your sleep-wake cycle. When there is not enough light, the brain can produce too much melatonin (sleep hormone) and too little serotonin (the chemical that affects mood). People who live in areas with less sunlight in the fall and winter, are more likely to be affected by SAD.

A possible solution to addressing SAD is light therapy. Light therapy replaces sunshine with artificial light during the dark months in the fall and winter. The light boxes used for light therapy need to have at least 10,000 lux exposure ("Lux" measures the intensity of light), as sunlight has about 50,000 lux. During the light therapy session, the person will face the light box towards them for at least thirty minutes while they relax. It is also recommended that this be done in the morning before 10:00 AM. Using light therapy during darker seasons, has proven to be an effective treatment for those dealing with SAD.

If healthy amounts of sunlight can be beneficial for both plants and humans, could the same be said for moonlight? Explain your reasoning.

Look back at your moon journal from **Lesson 2**. Compare your notes on your behavior and health with what you learned about seasonal affective disorder. Do you notice any new patterns? Explain your reasoning.

Lesson 7. The Moon and the Stars - The Legend of Hina

Deep beneath the blue Hawaiian sea is a kingdom called Lalohana. In this kingdom under the ocean lived a beautiful young goddess whose long Hawaiian name was Hina'aikamalama, but everyone just called her Hina. She lived there with her brothers who traveled here and there, but her brother, Kipapa, was supposed to stay with her and take care of her. Kipapa had other things he wanted to do besides taking care of his sister, and one day he left her and their home under the sea, and he didn't come back. Hina was lonely, but she had a wonderful 'umeki, or calabash, hidden away that was full of good things to eat such as sweet potatoes and fish. So even though she didn't starve, she grew more and more lonely there in Lalohana all by herself.

Now, Hina knew there was a world above her ocean home. She had heard tales of the people who lived there, and sometimes she saw the bottoms of their canoes and the white swish of bubbles that marked their paddles as they cut through the water over her home. She enjoyed playing games and tricks with these people, so when they lowered their fish hooks to catch a tasty aku, she'd laugh and take the nehu bait to feed the little fishes that lived around her home.

Finally, Konikonia, the chief of the fishermen, sent his men to find the sharks that stole their bait and left them with no fish to feed the village. The men returned and said they found no sharks anywhere around those fishing grounds. So Konikonia sent for his kahuna and asked him what he should do. Hina did not fool the priest, and he told the chief the reason the fishermen could catch no fish.

Chief Konikonia began to wish to meet Hina even more than he wished for his fishermen to catch fish. He thought and thought of some way he might meet the beautiful young goddess, and finally he again called the wise kahuna to his hale to ask for advice. Again the kahuna did not let him down, and Konikonia called his men to help him with his plan to meet Hina.

Here is what he did. He ordered the carving of many, many ki'i, or small men, complete with mother-of-pearl eyes and human hair. He told his men to dive to the entrance of Hina's home at night and to place a ki'i on a string every few feet all the way up to the surface of the sea. From the surface of the sea, the ki'i continued all the way to the beach and on the entrance of Konikonia's court. When all the ki'i were in place, the kahuna told the chief to blow his conch shell to awaken the sleeping young goddess. When Hina heard the sound of the conch, she awoke and noticed the ki'i. She was charmed by the ki'i, and she swam along collecting the small carvings as she went up to the surface of the sea. She could not resist getting them all, and when she held the last ki'i, she was right at the entrance of Konikonia's court. She was so tired from her journey and from the excitement of her adventure that she decided to take a little nap before she returned to her home far under the sea.

When at last she opened her eyes again, she found herself looking at ten brown toes, and she slowly looked up, up and right into the eyes of the chief himself! Konikonia hurried to comfort her, and he asked her to be his honored guest at his court. After some time passed, Hina realized she love the mortal chief, and they were married with much happiness and feasting and dancing throughout the village.

The young bride enjoyed her new life, but one day she found herself feeling a little sad and homesick. Konikonia asked if there were anything he could do to make her lips smile and her eyes sparkle the way he loved to see them. Hina thought and thought, and finally she requested that he send his men to dive into her kingdom to find and bring her special 'umeki to her.

Her wish was granted, and when she opened the lid of her beloved calabash, out floated many pieces of sweet potatoes and fish that became the moon and the stars in the night sky. She told Konikononia that as long as the moon stayed high in the sky, all was well.

Time passed happily for everyone in the village until one evening when Hina noticed the moon resting upon the sea. She knew this meant her brothers were searching for her and would come to return her to Lalohana. She also knew her brothers would come in the form of pao'o fish that travel on the trips of tsunami waves bringing great destruction to those who live on the land.

When Hina explained this sign to her husband, he commanded all his people to find safety in the mountains. Sure enough, the tidal waves hit the village and flooded the land and destroyed crops and homes, but the people of the village were safe, and later returned to rebuild their village.

As for Hina'aikamalama, she escaped the waves and her brothers by leaping high into the heavens. There she shines in the night sky in the form of the moon and the stars, watching out for the people in the Hawaiian islands.

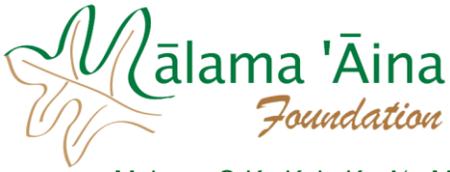
Respond to Reading

Directions

Respond to the questions below. Underline and identify specific lines from the passage that support your claim.

Hina'aikamalama told Chief Konikononia that as long as the moon stayed high in the sky, all was well. Why do you think this is?

As briefly mentioned in **Lesson 5**, changes in moon phases have been known to affect the ocean and waves. Identify some examples of this phenomenon in the mo'olelo.



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Lesson 8. Comparing Plant Growth

Use the space below to record your findings from the previous lesson.

SAMPLE A

Type of seed: _____

Planted on: _____

Moon Phase: _____

Height (inches): _____ Recorded on: _____

Additional observations: _____

SAMPLE B

Type of seed: _____

Planted on: _____

Moon Phase: _____

Height (inches): _____ Recorded on: _____

Additional observations: _____

Sketches

SAMPLE A	SAMPLE B

Drawing Conclusions

Reflect on the experiment process and your findings. What changes did you notice with your plants? What are some of the positive and negative aspects of your process?