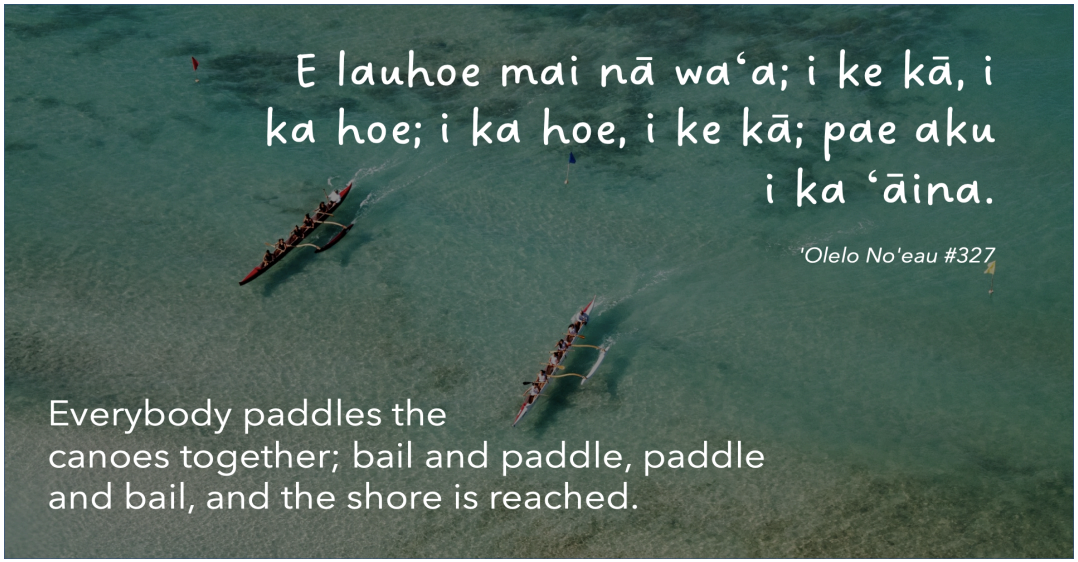
RDC Unit Overview

This is a living document

Please check back periodically for updated content materials



We invite you to contribute to the development of this Hawai'i-based, science curriculum!

Ways to Collaborate:

1. Download a copy of this document to develop content, edit materials, and tailor content to your class's unique needs.
2. Take our Open Source Contributor Feedback Form to:
    - Share learning materials you've created (i.e., lesson plans, worksheets, assessments, videos of teaching techniques, and additional resources)
    - Provide editing suggestions
    - Give insight into classroom experiences
    - Share artifacts of learning (i.e., photos, learning materials, completed student work examples)

Take the Survey Here

RDC Unit Overview

Unit Name: Kukui Tree
Topic: Photosynthesis and Matter

Teacher Name:
Grade Level: 7th Grade

Standards:

3D Performance Expectations Key: Blue: Science and Engineering Practices, Orange: Disciplinary Core Ideas, Green: Crosscutting Concepts

Adapted from the Tree Mass 7th Grade unit developed by NGSS Early Implementers

Unit Level Information		
Anchor Phenomenon	NGSS for the Unit	Unit Student-Level Explanation
The nuts of the kukui tree were used traditionally by native hawaiians as torches and candles.	**MS-LS1-6.** Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms. **MS-LS2-3.** Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.	Plants transform the matter from their surrounding environment to create new plant materials. The sun is the ultimate source of energy for a tree, any other materials are rearranged as the tree grows. Air is an important sources of matter for tree growth Historical investigations show that while soil and water are important to plant survival, they are not the main source of matter.

What lesson 1 is about:			
Lesson question	**Lesson Phenomena**	**3D Learning Objectives**	**Student-Level Explanation**

RDC Unit Overview

Where does the matter come from that creates kukui tree as it grows from a seed?	Kukui nuts are full of energy and grow into large trees	Develop a model to explain where all the matter in a kukui tree somes from as it grows from it's seed.	Plants transform the matter from their surrounding environment to create new plant materials. The sun is the ultimate source of energy for a tree, any other materials are rearranged as the tree grows.
Adapting this Lesson to Your Wahi Pana			
Begin class either watching a kukui nut burn or do an experiment in class where you make and burn your own kukui nut candles. Reference video of how to make a kukui nut candle. Ask the students, "where did the kukui nut get it's energy from?". Animated timelaps of 100 years of tree growth. Have students watch the animated video and make observations on how the tree changes as it grows.			
What lesson 2 is about:			
Lesson question	**Lesson Phenomena**	**3D Learning Objectives**	**Student-Level Explanation**
What are the components that a kukui tree needs to takes in to grow?	Kukui trees transform matter from their surrounding environment	Collect data on the parts of a kukui tree and create a drawing (model) of the anatomy of the tree to explore the function of each parts in the cycling of matter and flow of energy	The different parts of a kukui tree help it obtain the energy and matter it needs to survive. Roots take in water and nutrients, leaves process energy and are the site of gass exchanges, and the trunk and stems transport materials.
Adapting this Lesson to Your Wahi Pana			

RDC Unit Overview

Have students collect data on the parts of a kukui tree. What are the different distinct parts of the tree? Have the students hypothesize on the function of each part in relation to the cycling of matter and obtaining of energy. Break students into groups and have each group investigate the function of one of the parts of the kukui tree.

What lesson 3 is about:

Lesson question	Lesson Phenomena	3D Learning Objectives	Student-Level Explanation
What is the souce of matter that allow kukui trees to grow?	Scientists have been researching the source of matter in plants since the 1600s	Obtain and evaluate existing/historical information that explain where the matter and energy of a tree comes from as it grows	Air is an important sources of matter for tree growth Historical investigations show that while soil and water are important to plant survival, they are not the main source of matter.

Adapting this Lesson to Your Wahi Pana

Reference page 52-59 of the Tree Mass 7th Grade unit developed by NGSS Early Implementers for worksheets on completing this section.

What lesson 4 is about:

Lesson question	Lesson Phenomena	3D Learning Objectives	Student-Level Explanation

RDC Unit Overview

How does photosynthesis help plants acquire energy and matter?	Photosynthesis is the mechanism that allows kukui to acquire matter and grow.	Analyze and interpret data to provide evidence for how trees rearrange carbon dioxide and water into complex molecules to support growth	Carbon dioxide and water are the sources of matter for plant growth photosynthesis is the process by which plants use sunlight, water, and carbon dioxide to acquire matter and create energy.

Adapting this Lesson to Your Wahi Pana

Science lesson for Grade 7 - What is Photosynthesis? - animated and simple overview. Have students explore the process and structures involved in photosynthesis. Expand on the concept of photosynthesis by having students explore and model ideas about how matter moves into and out of the plant in
how different conditions affect photosynthesis and growth (i.e. The plant absorbed CO_2 when placed in sunlight but not when placed in the dark. Plants only absorb CO_2; they do not produce it. Without sunlight or CO_2, the plants die and start to decompose). Their models may include ideas about how access to light energy affects how plants cycle matter into and out of the plant. Option to have students design experiments to test if seedlings respond to different conditions in the manner they hypothesize

What lesson 5 is about:

Lesson question	Lesson Phenomena	3D Learning Objectives	Student-Level Explanation

RDC Unit Overview

How are carbon dioxide and water reorganized to make the matter that goes into a kukui tree?	When matter exits a plant, the molecules are in a different arrangement from when the matter entered.	Develop a model to explain how plants use the Sun's energy to recombine carbon dioxide and water into oxygen and carbon-based organic molecules, like sugar.	plants obtain carbon dioxide from the air, water is taken up from the soil, and energy from the sun after photosynthesis, the air contains less carbon dioxin and more oxygen

Adapting this Lesson to Your Wahi Pana

Use the following activity from the California Academy of Sciences to guide your class in modeling photosynthesis. Students will model photosynthesis, ultimately building a sugar molecule.

interactive video that walks you thorugh the process of photosynthesis

Reference page 93-94 of the Tree Mass 7th Grade unit developed by NGSS Early Implementers for background reading regarding this seciton.

What lesson 6 is about:

Lesson question	Lesson Phenomena	3D Learning Objectives	Student-Level Explanation

RDC Unit Overview

Adapting this Lesson to Your Wahi Pana			
What lesson 7 is about:			
Lesson question	**Lesson Phenomena**	**3D Learning Objectives**	**Student-Level Explanation**

RDC Unit Overview

Adapting this Lesson to Your Wahi Pana			
What lesson 8 is about:			
Lesson question	**Lesson Phenomena**	**3D Learning Objectives**	**Student-Level Explanation**
Adapting this Lesson to Your Wahi Pana			
What lesson 9 is about:			
Lesson question	**Lesson Phenomena**	**3D Learning Objectives**	**Student-Level Explanation**

RDC Unit Overview

Adapting this Lesson to Your Wahi Pana			
What lesson 10 is about:			
Lesson question	**Lesson Phenomena**	**3D Learning Objectives**	**Student-Level Explanation**
Adapting this Lesson to Your Wahi Pana			

RDC Unit Overview