



Navigations 8

Student Inquiry Guide

Explore `Imiloa's exhibits and collect data to share with your classmates along the way. A hint is provided for each checkpoint to help you navigate. Keep in mind ... the information you're looking for may be behind you.

Part 1: Origins

Beyond the Koa Forest



Checkpoint 1: Kumulipo Pre-Show Area

Look for the image shown at left to find your exact location. Read this display panel and notice similarities in the Hawaiian names for sea and land life forms. Pick two paired forms and write their names below. How are they similar?

Sea Life Name paired with Land Life Name

Sketch one set of paired sea and land life forms.

Say the words aloud and listen for similar sound patterns.



Checkpoint 2: Kumulipo Theater

Enter the dark theater and take a seat. Imagine where the light will emerge. When the show begins, what do you see first? What do you hear?

According to the Kumulipo chant, what life emerges from the fathomless darkness of Pō? How do colors change as life evolves?

The words below are from the Kumulipo chant. Think about what each one means. Circle, then combine in your own way, at least three words to create a sentence describing the Hawaiian concept of Pō.

boundless	power	movement	crawling	flying	creation
source	simple	complex	abundance	beginnings	family
pig/rat/dog	poi	forests	fertile	fruit	seed bearing



Create a drawing to show the relationship of the sea, land, and sky that emerged from Pō.



Personal Sightings

Of the myriad colors in your life, which ones grab your attention? What colors do you like to wear? What color is your house? Your bedroom? What colors are your favorite foods?

Into the Starry Sky



Checkpoint 3: Astronomy Origins

Navigate your way through our Solar System and beyond. Find your way to each location listed below, beginning with our Sun. Then continue your journey through the origins exhibits to find answers to the questions. The image at left will help guide you to the first panel. Other hints are provided in each box.

<p style="text-align: center;">No Confusion over Fusion <i>(“Our Energetic Sun”)</i> Name two things we’ve learned about the Sun’s energy.</p>	<p style="text-align: center;">In the Neighborhood <i>(“It’s a Massive Mixed Plate”)</i> Name four kinds of objects, other than our Sun, that are found in our stellar neighborhood.</p>
<p style="text-align: center;">Earth Birth <i>(movie box by the meteorite display)</i> Watch the movie about the formation of Earth. Note the change in color. Why is that, do you think?</p>	<p style="text-align: center;">Dust Disks <i>(“Where Stars are Born”)</i> Why do astronomers care about clumps of dust?</p>

Gravity's a Big Deal!

("Pushy Planets")

Gravity keeps you on Earth. How does gravity affect our Moon and other planets in our Solar System?

Cosmic Wheel of Fortune

("Home Cosmic Home")

What does the *cosmic pinwheel* explain?

More than Meets the Eye

("There's more to the night sky")

Use the joy stick to zoom in on a spiral galaxy. What do astronomers learn from images in different wavelengths?

Rainbow of Wavelengths

("In the Light of Stars")

How do spectra give astronomers clues to a star's composition?



Personal Sightings

When you make a purchase, store clerks often scan a barcode to determine the cost of an item. How are barcodes similar to a star's spectral pattern? How are they different?

- ♦ If you discovered a new star, what would you name it? Imagine the spectral pattern of your star.

Part 2: Voyaging

Purpose, Patterns, and Possibilities



Checkpoint 4: Hawaiian Voyaging

Find your location by looking for this image, which is part of a large display showing the history of Pacific voyaging.

Look at the timeline and pick three events that intrigue you. Record what happened and when in the table at right.

When	What happened?

Navigate your way through the voyaging exhibits to a display titled “Traditional Meets Modern.” Canoes built today include both traditional and modern elements. List examples of each.

Traditional	Modern

What is the connection between crab claws and voyaging canoes?



Personal Sightings

Hilo’s canoe, Hōkūalaka`i, was launched in 2004. Find the drawing of its deck on the floor. Step aboard the canoe and imagine your role as part of the voyaging crew! What would you be doing?



Checkpoint 5: Hawaiian Star Compass

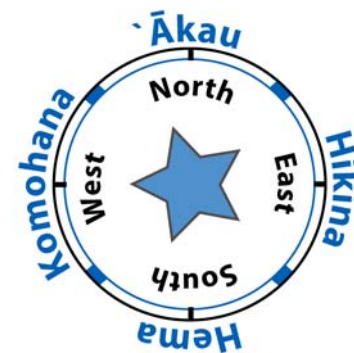
Voyagers use the Hawaiian star compass to navigate across the vast Pacific Ocean. Find the compass and look for these cardinal directions:

ʻĀkau

Hikina (where the Sun and stars “arrive” from the horizon)

Hema

Komohana (where the Sun and stars “enter” the horizon)



Use the Hawaiian star compass to make these sightings:

1. Stand at **Hikina** and look toward **Hema**. What do you see?
2. Move to **Komohana** and stand facing the canoe. Look up at the banner to your left. Identify three wayfinding elements represented in the image. *(Need a hint? Look behind you.)*
3. Pick another cardinal direction. What is the farthest thing you can see from this point?

The 11-foot-long canoe on the compass is named ʻImiloa. It is a small version (about 1/5 the size) of Hōkūalaka`i. Based on this information, what is the approximate length of Hōkūalaka`i?

Go back to the 40-foot drawing of the Hōkūalaka`i canoe deck. Is this drawing larger or smaller than the actual length of Hōkūalaka`i?



Personal Sightings

Exploration begins with imagination. Envision a new place to explore—across the ocean or out in space. Where would you like to go? Would you go alone or with a group of friends? How would you get there?

Big Eyes See Far



Checkpoint 6: Telescope Mirrors

Find the circles representing mirror sizes in telescopes atop Maunakea and stand on the smallest one—the 0.6-meter (2-foot) University of Hawai`i mirror. Note the sizes of the other four mirrors represented by circles. Why is this important? Read on.

Increasing mirror size increases the amount of light a telescope can collect. Here's how it works

**NASA's Infrared Telescope mirror is not represented by a circle, but its size is 3 meters (10 feet). Comparing it to the UH 0.6-meter (2-foot) telescope, calculate the correct number to fill in this blank:
The NASA mirror is n times larger than the UH mirror.**

**You can now determine how much more light the NASA mirror collects compared to the UH mirror by squaring the number from above ($n \times n$). Fill in this blank:
The NASA mirror collects n² times more light than the UH mirror.**

Collecting more light gives astronomers more and better information, which is why building a new 30-meter (100-foot) telescope atop Maunakea has been proposed. How much more light would a 30-meter mirror collect compared to the UH 0.6-meter (2-foot) telescope? (*Hint: Use the steps above to calculate the answer.*)

Would a circle representing the proposed 30-meter mirror fit in this exhibit hall? (*Hint: Pace it out. Walk from the smallest to largest circle, counting your steps, and use that as a guide to determine where a 30 m circle might be.*)



Personal Sightings

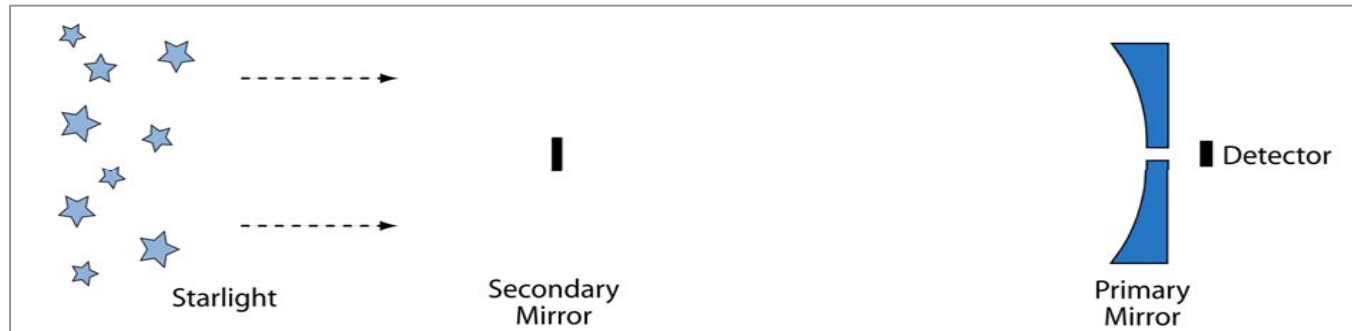
If you could view anything in the universe through a telescope atop Maunakea, what would you like to see?



Checkpoint 7: Virtual Observatory

Go to “Explore Mauna Kea,” a computer station inside the virtual observatory. Tour Gemini to discover how primary and secondary mirrors are used to collect light. This type of telescope is known as a Cassegrain reflecting telescope.

In the diagram at right, draw lines to show how starlight reaches the detector.



Q² *Quests and Questions*

Now that you navigated your way through `Imiloa, reflect on what you’ve learned about origins and voyages in astronomy and the Hawaiian culture.

- ♦ Think of a question about our vast universe that you can investigate.
Where and how will you begin your quest to find the answer to your question?
- ♦ Consider other things you’d like to explore. *Music? Language? Careers? Hobbies?*
Would your exploration relate to your culture? If so, how?
- ♦ Predict a new wayfinding technique you think could become a reality this century.
How might this new technology benefit your community or the world?