



# Navigations 8 Teacher Guidelines



**Navigations 8** is an inquiry guide in which students encounter questions, conduct searches, interpret data and discuss findings as they explore origins and voyaging in the Hawaiian culture and astronomy. Based on recommendations of the National Academies' Advisors to the Nation on Science, this guide engages students in the practice of science and promotes curiosity about the Universe and their place in it. The guide also strives to involve students in activities that perpetuate traditional ways of knowing. The goal is to help students advance their knowledge of the natural world while remaining grounded in their culture and maintaining local perspectives.

**Navigations Teacher Guidelines** for each grade level include learning outcomes, HCPS III Benchmarks, and Nā Honua Maui Ola Guidelines. Information on what to do before, during and after field trips is also provided. Teachers are encouraged to review these pages and use the information to prepare their students for a class field trip to ʻImiloa.

## Navigations 8 Learning Outcomes

Students will:

- ◆ Identify relationships from the traditional Hawaiian explanation for the origin of the universe.
- ◆ Explore components and phenomena in the Universe, including our Solar System, stars, galaxies, gravity, and the electromagnetic spectrum.
- ◆ Investigate navigational tools and techniques used in Hawaiian voyaging and astronomy.

## Pre-Visit Information

Teachers can use all or parts of the **Navigations 8** inquiry guide to enhance their students' experience at ʻImiloa. To use the guide, teachers must download and print a copy of it for each student—and for each teacher and chaperone accompanying the group. Student inquiry guides are not available at ʻImiloa.

A map of the exhibit hall and descriptions of the exhibits is available on the ʻImiloa Education-Field Trip website page.

*Note:* K-12 teachers can visit ʻImiloa to orient themselves on the Center prior to their scheduled field trip at no charge. Pre-trip planning visits must be arranged in advance. Contact Gail Loeffler at 969-9729 or [gloeffler@imiloahawaii.org](mailto:gloeffler@imiloahawaii.org) to schedule.

The following text is designed to be used as a springboard for *pre-visit* discussion to inspire students' anticipation of their `Imiloa experience. However, it may also be used as a "script" for teachers and chaperones to guide students *during* their visit.

### Introduction

You are about to navigate through `Imiloa's exhibit hall, where you will learn about origins and voyages from Hawaiian and astronomy perspectives. This inquiry guide will help you make the most of your experience. As you explore `Imiloa, use the guide as a navigation tool and as a journal in which to record your data.

You are about to enter a simulated Koa Forest and into Piko, where you will travel from the darkness of the night sky above Maunakea, past Lake Wai'au, and into stories of personal connections.

## **Part 1: Origins**

### Beyond the Koa Forest

Knowing and honoring your origins are important traditions in Hawaiian culture. Here, in the Kumulipo pre-show area, you will find visual clues to the wisdom passed down from early Hawaiians. The Kumulipo chant describes Pō, the dark matter from which the universe was created.

*Consider:* What do you know about your family origins?

### Into the Starry Sky

You live on a rotating planet within the Milky Way galaxy. Astronomers have spent years learning about our Solar System, galaxies, and other celestial objects in the Universe—but much remains unknown. A lot has taken place in the past 13 billion years! And we're still wondering: Is there life out there?

*Consider:* When you look up at the night sky, what do you notice first?

## **Part 2: Voyages**

### Purpose, Patterns, and Possibilities

Why do you travel from place to place? Do you walk, ride a bike, or take a car? There's always a reason to go and a way to get there, but you don't always know what's going to happen along the way or once you get there. Discover the 'who' and 'how' of Hawaiian voyaging, and encounter some possibilities for your own explorations to new places.

*Consider:* What 'tools and rules' do you use to get from place to place?

### Big Eyes See Far

What's up on Maunakea? You'll find outlines of mirrors used in different telescopes atop this sacred mountain. What do astronomers view through the telescopes? Check in at the *Aia Iā 'Oe Ke 'Ano Kūpono?* exhibit and discover if you might be interested in an astronomy job. Then check out real-time images from observatories atop Maunakea in a virtual observatory.

*Consider:* How do you express "who you are" in addition to "what you do"?

## **During Field Trip**

Distribute copies of the Inquiry Guides to students and accompanying chaperones. Let students know which parts of the guide they are to complete. Teachers and chaperones should work with students to help them complete the activities. Checkpoints orient students to where they need to be. Personal Sightings strive to get students to think about experiences beyond `Imiloa.

## **Post-Visit**

**Q<sup>2</sup>** Use *Quests and Questions*, the last section of the student inquiry guide, after a field trip to encourage students to share their new knowledge and inspire further discussion about their `Imiloa experience.

## **Extend the Experience – Suggested Activities**

Apply knowledge gained through Navigations 8 in the following activities:

- ♦ Create a Cosmic Chorus or a Big Bang Band. Invent musical instruments from other planets or galaxies. Think up “spacey” song titles and lyrics.
- ♦ Write a newspaper headline and/or story about an astronomer or voyager. Answer the question, “How Do They Do That?,” with what you write.
- ♦ Design a graphic or logo for a “Solar Skateboard” or an “Astro T-shirt.”

## **HCPS III Benchmarks**

- SC.8.1.1 Determine the link(s) between evidence and the conclusion(s) of an investigation.
- SC.8.2.1 Describe the significant relationships among society, science, and technology and how one impacts the other.
- SC.8.2.2 Describe how scale and mathematical models can be used to support and explain scientific data.
- SC.8.8.4 Explain how the sun is the major source of energy influencing climate and weather on Earth.
- SC.8.6.1 Explain the relationship between the color of light and wavelength within the electromagnetic spectrum.
- SC.8.6.3 Identify the characteristics and properties of mechanical and electromagnetic waves.
- SC.8.8.12 Describe the role of gravitational force in the motions of planetary systems.
- SC.8.8.8 Describe the composition of objects in the galaxy.
- SC.8.8.11 Describe the major components of the universe.
- MA.8.1.1 Identify situations represented by square roots and cube roots.
- MA.8.4.3 Use ratios and proportions to solve measurement problems.

## **Nā Honua Maui Ola Guidelines**

- 1.1 Utilize a variety of learning materials and strategies that promote cultural traditions, language, history, and values.
- 1.8 Understand and appreciate the importance of Hawaiian cultural traditions, language, history, and values.
- 4.7 Utilize their knowledge, skills, and ways of knowing from their own culture to learn about the larger world community.