Science Lesson 3: Using a GPS Unit

Hawaii DOE Content Standards:
Science Standard 2: Nature of Science: Understand that science, technology and society are interrelated.

Key concept: Lists of numbers convey information

Performance indicator: After completing this lesson, students will . . .

- take GPS readings of longitude and latitude
- create a saved track and individual way point as well as use the GPS to orient in the landscape

Note to the Student:

"When you have completed this lesson you will be able to find your place on the earth using a GPS unit, noting your location with Cartesian longitude and latitude points."

Activity at a glance:
Introduce students the GPS unit through hands on exploration. Create a set of way points on the GPS and a written description of sites using pairs of landmarks with point in line sighting. Create a saved track on the GPS to make a log of trip route, distance, time, and speed.

Time: One class period

Prerequisite skills: None

Skills to be introduced: using a GPS unit

Assessment:
Create a journal entry of the class activities. Students can also create a computer based log of the GPS data by downloading and printing saved way points and track information.

Vocabulary: GPS, longitude, latitude, way point, track

Materials: Map or Chart, GPS unit, computer and cable interface

Activity Overview

1. Introduce the GPS unit and plot the class location on a chart.
2. Describe the function operation of the GPS unit and satellite system.
3. Use the waypoint feature to mark, name, and save a waypoint. Relate this function to marking the location of the reef survey site and contrast with

other orienting techniques such as line of site marking and compass orienting.

4. Use the save track feature to record a trip the class takes and note the information calculated by the GPS direction, speed, distance, and time.
5. Relate this information to the equation rate multiplied by time equals distance.

Cultural Values

Pono

Discuss the effects of the Global Positioning System on the modern world.

Malama

Discuss how the GPS will help in the research on the reef.

Laulima

Working together as a team

Kokua

Taking initiative, service, clean up maintenance

Lokahi

Unity, harmony, leadership skills

Adaptations/ Extensions

Geocaching is an entertaining adventure game for GPS users. Participating in a cache hunt is a good way to take advantage of the wonderful features and capability of a GPS unit. The basic idea is to have individuals and organizations set up caches all over the world and share the locations of these caches on the internet. GPS users can then use the location coordinates to find the caches. Once found, a cache may provide the visitor with a wide variety of rewards. All the visitor is asked to do is if they get something they should try to leave something for the cache. http://www.geocaching.com/faq/

GIS is the geographic information system that can turn GPS data in to maps or record data on existing maps.

Background, teaching suggestions, resources:

- See Science lecture #3: "Using the GPS" in Appendix B.
- http://www.nasm.si.edu/exhibitions/gps/work.html
- http://www.gpsinformation.org/dale/theory.htm
- http://www.pbs.org/wgbh/nova/longitude/gps.html

Connections to other curricula or lessons:

Use charts and GPS to map and mark reef survey sight. Mark with point line of sight and compare accuracy.

Safety

Be aware of the environment you are working in and potential safety hazards of the terrain.