



Geocaching

GRADE LEVEL: 6- 12

TIME: 45 MIN

SUMMARY

In this lesson, students will learn how satellites interact with Global Positioning System (GPS) devices. Students will learn how to interpret geographical coordinates in order to locate geocaches.

OBJECTIVES

1. Participants will learn how to use a GPS device.
2. Participants will understand how a geocache works with satellites.
3. Participants will take part in geocaching to explore a Port of Baltimore mitigation site.

VOCABULARY

- **Cargo** - Goods carried on a ship, aircraft, or motor vehicle.
- **Cargo Ship** - A ship that transports goods and materials from one port to another.
- **Draft**- The vertical distance between the water surface and the bottom of the ship.
- **Dredging**- The process of removing sediment from shipping channels.
- **Dredged Material**- Sediment removed from the shipping channels.
- **Latitude** - A measure of the angular distance of a location from the earth's equator (north or south). Latitude is usually expressed in degrees and minutes.
- **Longitude** - A measure of the angular distance of a location from the meridian at Greenwich, England (east or west). Longitude is usually expressed in degrees and minutes.
- **Satellite** - An artificial body placed in orbit around the earth or moon or another planet in order to collect information or for communication.

- **Shipping Channels** - Areas in the water that are maintained to a depth that can accommodate cargo ships. They are marked by buoys and identified on nautical charts (so captains know where to travel).

MATERIALS

- Geocache – example: waterproof box that contains a few small items/prizes in addition to a log and pen
- Multiple GPS devices or Smartphones with the Geocaching Application
- White board
- Markers

BACKGROUND

Geocaching is an outdoor recreational activity for all ages. Individuals explore new environments throughout the world while searching for “geocaches” or “cashes”. Inside the geocache, there are a variety of small objects and a log where you can find out who else has also found the box. Participants have the option to take one of the small items and replace it with one of their own objects to leave for someone else to find. In order to find the geocache, one enters its geographical coordinates into a Global Positioning System (GPS) device or a smart phone with the Geo-caching application to locate its position.

ACTIVITY

1. **Engage/Elicit (15 min):**
Have students sit around in a circle. Open with the following questions:
 2. Do you know where you are?
 3. How did you get here?
 4. What do you do when you get lost?

Explain one way people keep track of their location is by using Global Positioning System (GPS) units that use satellites to pinpoint their location in the world. (Hint: This is why you can only use them outside). You need three satellites to have an

accurate location. If you have more, you will have an accurate elevation too. By using three satellites, they triangulate your location.

2. **Explain (10 min):**

GPS units tell us where we are by using coordinates on a map. Draw a map or a circle on the board. The earth is split up into quadrants. The first way the earth is divided is by the equator. It gives us the northern hemisphere and the southern hemisphere. The earth is then again divided by east and west, using the prime meridian. *We are located in the NW quadrant.*

Before the students head out to find the geocaches, explain what they are looking for by using the example cache. Explain that after they find the cache, open it up to read the message inside. After they read the message, take the prize and re-hide the cache in "the same exact spot". After instructions were given have the students find the geocaches. Help students who are having trouble.

How to use the GPS: The easiest way to have students feel comfortable with the GPS is having them do these steps as you walk through them. First explain the buttons to the students. Explain they should not have to use the 3-button (left) side.

1. Look at the two-button (right) side. Press and hold the button with the light bulb on it. The GPS should make a sound as it turns on.
2. The GPS will start acquiring satellites. Once the satellites are acquired it will flip to the map screen.
3. Explain that the button with an X on it is how you flip through the different screens.
4. Flip to the blue screen which is the orienteering screen. Explain that this is the screen they will be using when they are trying to find the caches. They will be following a red arrow that will show them the direction. The top right box is also important. It tells you how far away they are from the cache.
5. Using the X button, flip to the main menu screen. Explain how on this screen they will be using the joystick to move around on this screen. Using the joystick move down and highlight the word "Find". Push down

on the joystick to go into the "Find" sub-screen.

6. Using your joystick highlight the word "Waypoints" and push down on the joystick to enter the waypoints submenu.
7. Using the joystick highlight the assigned letter. Push down on the joystick. The screen tells you about this cache. The word "Go to" should be highlighted. Push the joystick down again.

Using the X button scroll to the blue compass screen. Follow the red arrow to the cache. **IMPORTANT:** The arrow only points in the correct direction while you are moving. When you get within 15-30 ft. start looking. If they get lost, see the piece of paper attached to the GPS (below)

3. **Explore (20 min):**

Let students use the GPS units to find their identified geocache(s). Assist students who are having difficulty with GPS units or finding the geocache.

4. **Evaluate/Wrap-Up (10 min):**

When the group has reassembled, review each of the geocaches' site information with the students. Explain how human interactions with the environment can cause positive and negative effects on the environment. Have students think about how they can cause positive changes to the site they have visited.

DIVE DEEPER

Ask students if they were able to design mitigation projects, what would they do? What was their favorite project that they learned about? Do they have any new ideas that could benefit the environment?

