

## FACILITATOR GUIDE: Investigation thru Geocaching

GRADES: 6<sup>th</sup> – 8<sup>th</sup>

### CONCEPTS & SKILLS:

#### Technology Literacy

- **21.6-8.TL.4 Use critical thinking skills to conduct research, solve problems, and make informed decisions using appropriate technological tools and resources**
  - Identify real-world issues and analyze technological resources for developing and refining questions for investigation.
  - Effectively use multiple technological resources to develop a systematic plan for conducting research. Develop possible solutions or a complete product to demonstrate knowledge and skills.
  - Use technology to gather, analyze, and assess data and its effectiveness to design, develop and test possible solutions that assist students in making decisions.
  - Analyze and evaluate information from a variety of perspectives and resources in order to assess multiple solutions and investigate them from differing viewpoints.

### MATERIALS & RESOURCES:

- One GPS device & one cell phone per every 4 students
- Websites—
  - Register the teacher or leader of the group at this site--  
<http://www.geocaching.com/default.aspx>
  - [2-minute video here--](http://www.geocaching.com/videos/default.aspx#cat=cat:newbies&vid=-4VFeYZTTYs)  
<http://www.geocaching.com/videos/default.aspx#cat=cat:newbies&vid=-4VFeYZTTYs>
  - [Hiding Your First Geocache,](http://www.geocaching.com/about/hiding.aspx)  
<http://www.geocaching.com/about/hiding.aspx>
- This is an excellent lesson to bring your local Conservation Board naturalist in to help out with. Conservation Boards and [Extension](http://www.extension.iastate.edu/content/county-offices) (<http://www.extension.iastate.edu/content/county-offices>) offices may have kits of GPS devices that you can check out, as well as people who can facilitate the lesson.

## **PRESENTATION:**

You can use this lesson to get your students out into the neighborhood near the school, or to a local park. If this is your purpose, use it to help students investigate the area where they are searching for geocaches. Have them make notes and take photos of what they see along the way. After the lesson, talk about ideas they have to make the area better. Use one of the facilitator guides under “Plan” to find a focus and create your action plan.

You can also use geocaching as your service project in one of the following ways—

- Have the class set up a geocache and register it online. See “Hiding Your First Geocache” above.
- As your students are planning for their service project, have them consider organizing a [Cache In Trash Out](#) (CITO) event. This is an activity intimately tied to geocaching. While out there on a cache hunt, collect litter along the way and dispose of it properly. CICO Events can be large cleanups that involve and benefit the larger community, or you can use this concept any time you go out geocaching.
- Or just have your group organize a geocaching activity, and facilitate it for another class.

Use the Web sites and the attachment at the end of this lesson as background to explain to the children what geocaching is.

**DIRECTIONS:**

1. Set up six virtual caches within walking distance of your classroom.  
Download the coordinates into GPS units.
2. Mark caches (e.g. JP01- JP05) so students will know if they are in the correct location. #6 is not marked. At each location, students must answer the question on their sheet before they move to the next cache. A map will help you know where the students should be heading.
3. Basic GPS instructions
  - Power button – lower right
  - Using the PAGE button (top right) go to the MENU page (keep hitting page until you get there)
  - Arrow down (top left) until WAYPOINTS is highlighted and press ENTER (bottom left).
  - The WAYPOINTS page should now appear
  - Using the arrow keys, have the students select one of the waypoints (JP 01-JP06) and highlight it and press ENTER.
  - The REVIEW WAYPOINT page should now appear.
  - Select GO TO and press ENTER
  - The compass page will now appear and the picture of the selected waypoint will appear on the compass. The name of the selected waypoint and the distance needed to get there will appear at the top of the screen.
  - The arrow will point them in the direction they need to go to find it.
4. Limitations
  - -Only accurate to 30 feet or so. Do not expect your GPS to lead you right to the destination.
  - -There must be a relatively clear "line of sight" between the receiver's antenna and several orbiting satellites. Anything shielding the antenna from a satellite can potentially weaken the satellite's signal to such a degree that it becomes too difficult to make reliable positioning. As a rule of thumb, an obstruction that can block sunlight can effectively block GPS signals.

**TIME:****60 min.**

## **Geocaching 101 Public Program**

**--Heidi Anderson, Polk County Conservation Naturalist**

### **What is geocaching?**

Geocaching is a high-tech treasure hunting game played throughout the world by adventure seekers equipped with GPS devices. The basic idea is to locate hidden containers, called geocaches, outdoors and then share your experiences online. Geocaching is enjoyed by people from all age groups, with a strong sense of community and support for the environment. There are over 1 million active geocaches in the world.

### **History of Geocaching**

On May 2, 2000, at approximately midnight, eastern savings time, the government removed the [selective availability](#) on GPS satellites. Twenty-four satellites around the globe processed their new orders, and instantly the accuracy of GPS technology improved tenfold.

On May 3, 2000, one such enthusiast, Dave Ulmer, a computer consultant, wanted to test the accuracy by hiding a navigational target in the woods. He called the idea the "Great American GPS Stash Hunt" and posted it in an internet GPS users' group. The idea was simple: Hide a container out in the woods and note the coordinates with a GPS unit. The finder would then have to locate the container with only the use of his or her GPS receiver. The rules for the finder were simple: "Take some stuff, leave some stuff."

On May 3rd he placed his own container, a black bucket, in the woods near Beaver Creek, Oregon, near Portland. Along with a logbook and pencil, he left various prize items including videos, books, software, and a slingshot. He shared the waypoint of his "stash" with the online community.

Within three days, two different readers read about his stash on the Internet, used their own GPS receivers to find the container, and shared their experiences online. Throughout the next week, others excited by the prospect of hiding and finding stashes began hiding their own containers and posting coordinates. Like many new and innovative ideas on the Internet, the concept spread quickly - but this one required *leaving your computer* to participate.

Within the first month, Mike Teague, the first person to find Ulmer's stash, began gathering the online posts of coordinates around the world and documenting them on his personal home page. The "GPS Stash Hunt" mailing list was created to discuss the emerging activity. Names were even tossed about to replace the name "stash" due to the negative connotations of that name. One such name was "geocaching."

### **What is GPS?**

The Global Positioning System (GPS) is a satellite-based navigation system made up of a network of 24 satellites placed into orbit by the U.S. Department of Defense. GPS was originally intended for military applications, but in the 1980s, the government made the system available for civilian use. GPS works in any weather conditions, anywhere in the world, 24 hours a day. There are no subscription fees or setup charges to use GPS.

Basically GPS allows you to determine your location and find other locations on earth.

### **How does GPS work?**

Each GPS receiver is a computer that receives signals broadcast from GPS satellites. A receiver needs to read signals from at least three satellites at a time to calculate its general location by a process called trilateration.

With signals from four satellites, a GPS receiver can get a more accurate fix that includes altitude and the exact time, as well as latitude and longitude. The more satellite signals the receiver reads, the more accurate the position it reports to you.

### **If I use a GPS unit can someone track where I am going?**

No! GPS devices do not actually broadcast your location. The satellites using radio frequencies actually broadcast their own position. Your GPS unit takes that information to figure out where you are (trilateration).

### **How it works:**

A geocacher can place a geocache in the world, pinpoint its location using GPS technology and then share the geocache's existence and location online. Anyone with a GPS device can then try to locate the geocache.

### **What are the rules in Geocaching?**

1. If you take something from the cache, leave something of equal or greater value.
2. Write about your find in the cache logbook.
3. Log your experience at [www.geocaching.com](http://www.geocaching.com).

### **Types of cache containers**

#### *Traditional Cache*

This is the original cache type consisting, at a bare minimum, a container and a log book.

Normally you'll find a tupperware container, ammo box, or bucket filled with goodies, or smaller container ("micro cache") too small to contain items except for a log book. The coordinates listed on the traditional cache page are the exact location for the cache.

The general rule of thumb is, "If you take an item, leave an item, and write in the logbook."

Some caches are themed, so make sure to read the description before going on a hunt.

#### *Multi-Cache*

A multi-cache ("multiple") involves two or more locations, the final location being a physical container. There are many variations, but most multi-caches have a hint to find the second cache, and the second cache has hints to the third, and so on. An offset cache (where you go to a location and get hints to the actual cache) is considered a multi-cache. ***Mystery or Puzzle Caches***

The "catch-all" of cache types, this form of cache can involve complicated puzzles you will first need to solve to determine the coordinates. Due to the increasing creativity of geocaching this becomes the staging ground for new and unique challenges.

#### *Letterbox Hybrid*

A letterbox is another form of treasure hunting using clues instead of coordinates. In some cases, however, the owner has made it both a letterbox and a geocache and posted its coordinates on Geocaching.com. If there is a stamp inside a letterbox hybrid, it is not an item intended for trade; the stamp is meant to remain in the box so that visitors can use it to record their visit. To read more about letterboxing, visit the [Letterboxing North America](#) web site.

#### *Cache In Trash Out Event (CITO)*

[Cache In Trash Out](#) is an activity intimately tied to geocaching. While out there on a cache hunt, we collect litter along the trails and properly dispose of it. Cache In Trash Out Events are much larger clean-up events that involve and benefit the larger community.

#### *EarthCache*

An EarthCache is a special place that people can visit to learn about a unique geoscience feature or aspect of our Earth. EarthCaches include a set of educational notes and the details about where to find the location (latitude and longitude). Visitors to EarthCaches can see how our planet has been shaped by geological processes, how we manage the resources and how scientists gather evidence to learn about the Earth. For more information about EarthCaches, visit <http://www.earthcache.org/>.

### **Glossary of terms**

#### **WGS84**

The most current geodetic [datum](#) used for GPS is the World Geodetic System of 1984 (WGS84). The significance of WGS84 comes about because GPS receivers rely on WGS84.

Geocaching uses the WGS84 datum by default. We also use the format HDDD MM.MM, which is a standard for GPS receivers (like the eTrex).HDD means Hemisphere and degrees. MM.MM are minutes in decimal format. It is critical that the format be correct, otherwise geocachers will be unable to find your cache!

TFTC – thanks for the cache

TNLN – took nothing, left nothing

TB – travel bug

FTF – first to find

DNF – did not find