

Student Exploration Guide:

Geocaching and Earthcaching: Learning to Use GPS



No road signs here! How will you find your way?



Get Ready to Explore!

This guide will prepare you to learn how to use GPS: Global Positioning Systems. These hand-held units will help you find your way ...and even to go on a “treasure hunt!” As a bonus, you’ll also discover amazing animals, plants and land features during your stay with us.

What will happen on your Field Trip?

Your bus will arrive at one of our Nature Centers. You and your classmates will be working together with one of our naturalists.



Caumsett Environmental Center

A naturalist is an outdoor educator who has studied many topics about the outdoors and they know lots of great ways to help you understand the subjects you may be learning in school. But now, you will get to see it first hand - not just from a book. It’s a great and fun way to learn!

Don’t forget to dress for the weather and the season! Dressing in layers is the best way to make sure you will enjoy your day. And bring along your good observational skills and a questioning mind!



Brookville Environmental Education Center

What is GPS?



The Global Positioning System is a worldwide navigation system that uses 24 satellites in orbit 12,000 miles above the earth. The satellites travel at speeds of about 7,000 miles per hour and circle the earth twice a day, powered by solar energy.

GPS was originally developed for military use in the late 1950s. In 1983, it was allowed for civilian use because President Reagan saw its importance to commercial airlines. Today it has many uses including navigation, surveying, exploring, mining, and building.

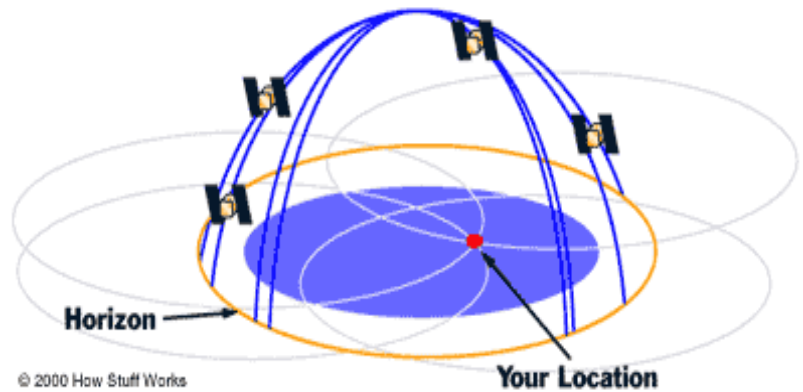
And by 2001, the receivers became smaller and cheaper making it very popular for personal and recreation use. In fact – you and your classmates will be going on a “treasure hunt” once you learn how to use the GPS units!



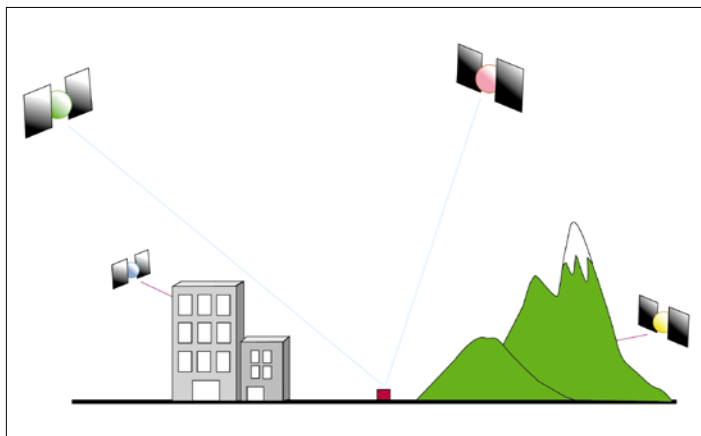
How Does GPS work?

GPS works by measuring time.

- Satellites send coded signals indicating their position in space and the exact time the signals are being sent
- Receivers use the time it takes the signal to travel from the satellite to the receiver to determine how far away the satellite is.
- Information from multiple satellites is used to determine position through 'triangulation.'



A GPS receiver is designed to locate four or more satellites, figure out the distance to each, and use this information to determine its own location.



The receivers will work in any weather conditions, anywhere in the world, 24 hours a day.

But... they require clear line-of-sight. This means that they won't work indoors, underwater or where tall objects like buildings or mountains block the sky or even in a under a dense forest.

What is Geocaching?



Geocaching is a high-tech version of an old-fashioned treasure hunt. **Did you say treasure?** No...not the pirate-kind of treasure! You'll use the GPS receivers or the GPS app on a Smartphone to find a container or "cache" hidden in the woods. Your naturalist will help you learn how to use a hand-held GPS unit like the yellow one at right. You will be entering coordinates (the latitude and longitude for an exact location on our planet) like these:

N 40 55.877'

W 73 28.067'

Caches come in a variety of shapes and sizes. They can be boxes, plastic containers or any other waterproof container. But caches can be tricky to find. Your GPS unit may only get you to within 15-20 feet and not the exact location. The caches can be hidden inside tree trunks, underneath a playground see-saw or park bench, or even under water.



What is in a cache? The container may be filled with a few small trinkets, along with a log book and pencil to leave your name and date. So you will need to bring along some good observation skills, too! And remember that true geocachers like to “take some stuff, leave some stuff,” so you may see your naturalist add something to the cache that your group finds or log in to a journal to record your group’s “find”.



Example of a geocache hidden in a hollow log

What is Earthcaching?



The logo from www.earthcache.org

If you are studying geology and earth science in school, your teacher may have selected Earthcaching as one of your field trip activities. This is a type of treasure hunt too, but now the hunt is for clues about how our Earth was formed.

You will learn all of the steps to using a GPS unit just like in geocaching described earlier in this booklet. But, now you will be entering coordinates to lead you to one of Earth’s treasures. You may know that Long Island was formed by a glacier over 60,000 years ago! The glacier left lots of evidence behind so many of the earthcaches will be about glacial geology.

Earthcaching has a policy of **Leave No Trace**. This means that you leave only footprints. The 7 Principals are listed at right. So the only way you can prove that you found the exact spot is to answer questions that the creator of the earthcache has posted on the website:

www.earthcache.org



- Plan ahead and prepare
- Travel and camp on durable surfaces
- Dispose of waste properly
- Leave what you find
- Minimize campfire impacts
- Respect wildlife
- Be considerate of other visitors



Here is an example of an earthcache at Caumsett: it is the one of the **glacial erratics** found along Caumsett’s shoreline. A glacial erratic is a large rock or boulder that was transported by a glacier and then left behind after the glacier melted. These boulders continue to fall out due to the erosion of the cliffs after a major rainfall and roll down to the beach. But there are many along the shore – you will need to answer a question to prove you found the right one!

Another special earthcache is finding the location of a **seismometer**! A seismometer is the device that geologists use to measure and record earthquakes. You may have noticed that windows and even buildings sometimes shake when a big truck or a subway train rolls by. Good seismometers are usually put in an isolated location and connected to bedrock to prevent this sort of "data pollution."

But even though the one at Caumsett is located in a remote area, it too, may experience data pollution when big tractors pass by every few weeks to mow the grass!

What Happens If...

People who go hiking in the woods often think that they are prepared because they have all of the latest devices and technology. But a veteran hiker will make sure that they have a back-up plan in case a problem arises: the batteries could wear down; a storm comes up causing very heavy cloud cover making it hard for the unit to pick up a signal; the unit could break after being dropped – there are many reasons why something could go wrong!



Seismometer at Caumsett

But there are other means of finding your way. Other skills you should have include knowing how to read a map and how to use a compass. (But that is a field trip for another day!)





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