

Geo-caching

Grade level: 4 - 12

Duration: 90 – 120 minutes

Location: Outdoors

Theme:

Geo-Caching is a popular treasure hunting game that uses Global Positioning System (GPS) units to find hidden items.

Objective:

Students will learn the basic functions of the handheld GPS Units while learning how to navigate.

Concepts:

- Scale
- Distance
- Area
- Cardinal Points
- Latitude / Longitude
- Topography
- Contour Lines

Materials:

- GPS Units / Smart Phones
- Extra Batteries
- Compass
- Sun screen
- Drinking water bottle

NYS Standards: *SS.1.3.1B,*
 MST2.1.1s.1
 MST4.C.ES.PS1.1c
 MST4.C.ES.PS2.1q
 MST4.C.ES.PS2.1q
 MST6.C.ES.MS3.1c

Instructions:

1. Hide several geo-caches around the schoolyard of varying sizes and difficulty.

2. Show introductory slideshow that discusses Geo-caching basics, types of geocaches, GPS units, etc.
3. Take students outside and go over cardinal points using a compass.
4. Pass out GPS units and show students the different buttons and explain what each one does.
5. Cycle through the functions of the GPS unit to get to the page that shows your real time latitude and longitude coordinates. Ask the students, "What will happen to the North Coordinate when they walk North"? The North coordinate should get larger. If you walk South, the North Coordinate will get smaller. Ask the students, "What will happen to the West Coordinate when they walk West"? The West coordinate should get larger. If you walk East, the West Coordinate will get smaller.
6. Pass out coordinates for the first Geocache. Explain that the students will need to make both the North and West coordinates on the GPS unit match those on the paper. So if the GPS unit has a North coordinate smaller than on the paper, they must walk North to match the coordinate. If the GPS unit has a West coordinate larger than on the paper, they must walk East to match the coordinate. So they will need to walk North East. Have the students point in the general direction of North East. It is helpful to talk this out with the students for the first cache.
7. Before sending them off to find the cache, make sure that students are not walking around with their face glued to the GPS unit.
8. Encourage students to walk up to you and whisper that they found the cache, so that others have a chance to find it.

Ideas for challenges when they find the cache:

- Measuring the area of a parking lot, baseball diamond, building, garden, small patch of forest, or something nearby cache.
- Estimating the height of a tree. Measure height of partner. Have partner stand at bottom of the tree and move so that you can clearly see the top of the tree. Hold up a pencil and cover the length of the body of your partner with the pencil. The eraser will be at the top of their head and you will mark your thumb on the pencil where their feet are. You can now visually stack the student's height up the tree using your pencil.
- Have students use a dichotomous key to key out a tree or plant near the cache.
- If there is a stump nearby, students can measure the diameter, calculate the circumference, count the annual rings, etc.

Extensions:

- Have a friendly competition with students where students hide a cache in groups and write down the coordinates, and then have another group find it.
- Do you have any notable geological formations in your schoolyard that may be a possible "Earth Cache"?
- Geocaching has cross-curricular opportunities spanning, physical education, science, math, English and Social Studies. Are there opportunities for you to

work with other teachers in different subject areas to collaborate on a geocaching lesson?

- GPS Units can be used to plot points of invasive species or measure the area of an infestation. Visit www.imapinvasives.org/ to learn about ways to contribute to this citizen science program to map out locations of invasive species.
- English / Social Studies connections: Students can write their own geocache description for an imaginary geocache they would like to hide. Some people will hide caches in places with interesting history and the description will include history about the site. Students could also write about their schoolyard adventure or their observations of any wildlife they saw.
- You can have students solve puzzles, riddles, take measurements or complete challenges when they find a cache.

Resources:

Geocaching Website:

<https://www.geocaching.com/play>

<https://www.geocaching.com/education/>

Geocaching education forums:

<http://forums.groundspeak.com/GC/index.php?s=3ec289f2d095fc9acbbba3457c9cd7d8d&showforum=103>

How to find coordinates on a Smart phone:

<http://www.northshorerescue.com/wp-content/uploads/2014/03/How-to-Find-Coordinates-on-Common-Smartphones.pdf>

iMAP Invasives:

www.imapinvasives.org/

GPS and Geocaching in Education *by Burt Lo*

https://www.amazon.com/GPS-Geocaching-Education-Burt-Lo/dp/1564842754/ref=sr_1_1?s=books&ie=UTF8&qid=1470248590&sr=1-1&keywords=geocaching+in+education

Geocaching for Schools and Communities *by Kevin Taylor*

https://www.amazon.com/Geocaching-Schools-Communities-Kevin-Taylor/dp/0736083316/ref=sr_1_3?s=books&ie=UTF8&qid=1470248590&sr=1-3&keywords=geocaching+in+education

http://www.cyberbee.com/gps_sites.html