

UCLA Ocean Globe

GPS Treasure Hunt **TEACHER'S GUIDE**

Purpose: This is a field exercise in which students must be able to navigate and find 3 targets given their latitude and longitude, and also store the location coordinates of 3 additional geographic sites for which the latitude and longitude are unknown.

Materials: one portable GPS (per team) hand held compass
 campus or area map data sheets

Teacher Notes:

1- Before starting, take the time to delete any landmarks, waypoints or routes that may have previously been stored in the GPS.

2- This investigation requires about an hour of set up time during which the instructor identifies the six locations to be used in the treasure hunt by students.

--All of these locations should be in an area of campus that has a relatively wide open exposure to the sky, outdoors, away from tall buildings, overhangs, large trees, etc.

--Students should be able to easily walk between the six locations in the time you have available.

--Locations should be at least 100 yards apart to provide useful and discrete latitudes and longitudes.

--Once set up, the same locations can be used year after year.

3- Three of the locations will be designated as target "instruction locations" because they are indeed targets for students to find by navigating to them, and they contain instructions for the next location. The teacher must walk around, pick out these spots and use your GPS and record the latitude and longitude of each target instruction location so they can be given to the students.

4- The other three locations should be easily recognized points that students can find with or without a campus map. Students will be instructed to go to each of these points and store their coordinates in the GPS memory, only if they find these instructions attached to one of the 3 targets.

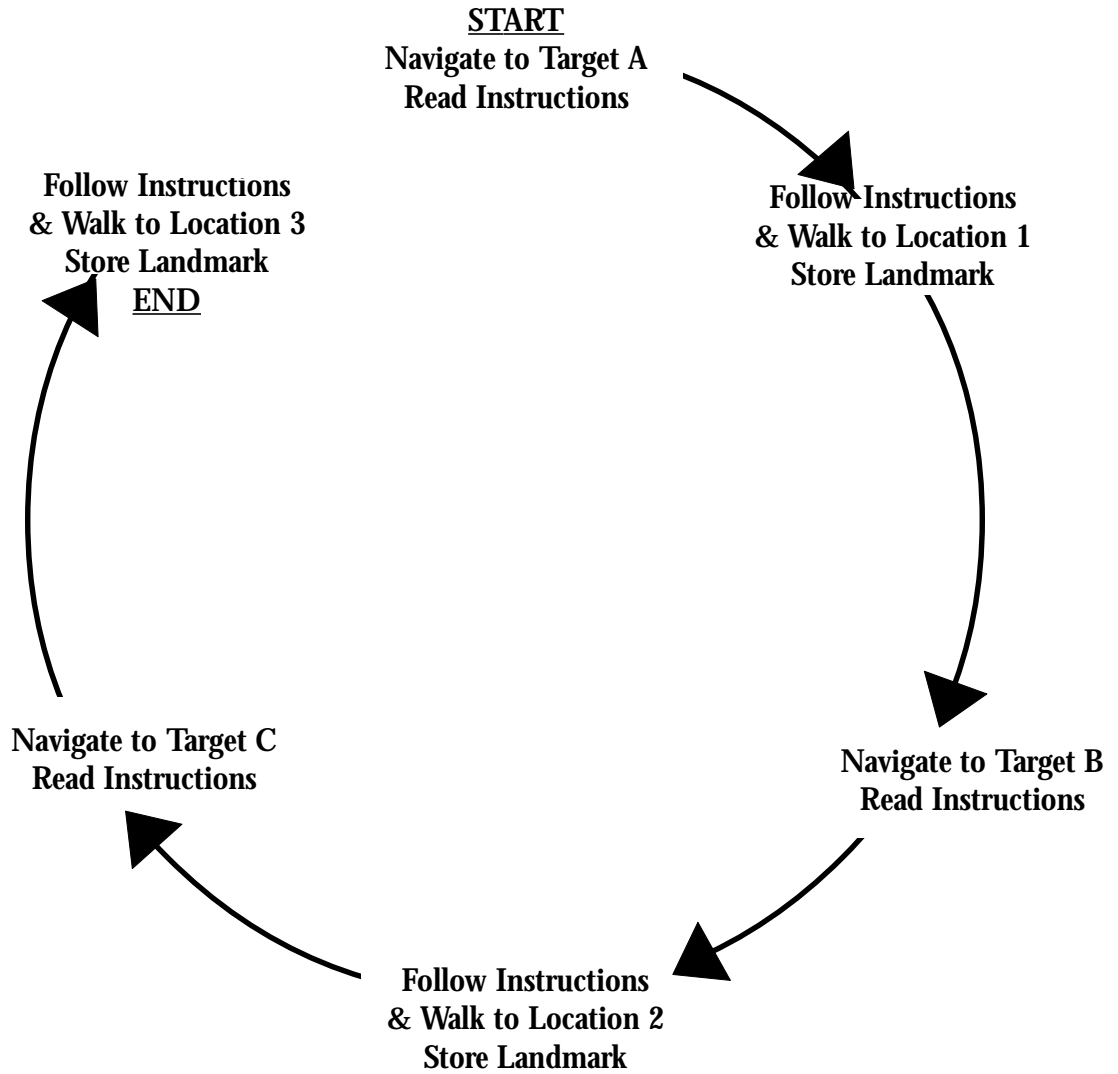
5- Place an easily seen marker at each of the three target instruction locations. (I like to use small bright orange cones). Underneath each marker you should tape instructions for the students to walk the closest campus location (given the name) and to store its location as a landmark or waypoint in their GPS.

6- To start the investigation, divide students into groups. Group size depends on the age and maturity of your students, available time and the number of GPS units you own or can borrow for the exercise. Teams of between 2 and 4 students have been successful in the past.

7- Distribute one data sheet to each student and ask them to write down the latitude and longitude coordinates for their three target instruction locations.

8- Ask each team to enter the latitude and longitude coordinates into their GPS. Before releasing your teams on to the campus to navigate to each target, you might consider distributing the targets among the teams so they don't all converge on target #1 at the same time.

Flowchart of Expected Student Actions





GPS Introduction Treasure Hunt (student instructions)

Student Name _____

Date _____ Period _____

Purpose: To demonstrate your knowledge and skills in using a GPS to (a) find as many “secret targets” as possible, and (b) to follow the hidden instructions beneath each target.

Materials: one GPS per team
campus or area map (optional)
pencil or pen

Procedures:

- 1- Copy the latitude and longitude coordinates for your secret targets on to your Field Data Sheet. Also copy the Ending Time for the treasure hunt so your team will know when you are expected to return to the classroom.
- 2- MARK these coordinates into your GPS as landmarks or waypoints.
- 3- Your instructor will tell each team which target to find first. As soon as your team has these instructions you may move outdoors and let the hunt begin!
- 4- Press the GOTO button on your GPS and use the LEFT/RIGHT arrows to select your first secret target name. Press the ENTER or GOTO button to display the navigation screen. Work with your team to follow the navigation information and walk to your destination.
- 5- As you approach the location of your first target, your group should scan 360^o around the vicinity, keeping your eyes open for the orange cone target.
- 6- When you find the target, turn it upside down and read the hidden instructions beneath. You will be told to walk to a new location that you are familiar with (or can find on your campus map easily). Follow these instructions. Walk to that location and MARK its coordinates into your GPS.
- 7- Repeat the procedures above for each of the remaining secret targets. Navigate to the next target, turn it over and follow the hidden instructions, etc. When you have found all targets and followed their hidden instructions, return immediately to class. If you do not find all the targets, please return to class at the ending time you have been given.

Analysis:

- 1- (a) Did your team successfully locate all the targets? (b) What procedures did your team use to achieve your target goals? (c) What procedures did your team find as obstacles that may have frustrated your efforts?

- 2- Was there anything about the physical location of this treasure hunt that may have affected the operational accuracy of your GPS receiver? Explain.
- 3- With the help of your instructor, make a record of the coordinates other teams marked into their GPS for one of the campus locations your hidden instructions contained. Use the Lab. Data Sheet on the back of your Treasure Hunt data.
- 4- Use a calculator to compute the averages for latitude, longitude and number of satellites.
- 5- (a) Were the coordinates for every team identical? (b) Why/why not ?
- 6- Study the coordinates from all the teams listed on your data sheet and the averages you have computed. (a) What patterns do you see in latitude and longitude coordinates? (b) Which do you think would be the best coordinates for a location: the individual readings from one team, or the average taken from all the teams? Explain. (c) What patterns do you see in the number of satellites that were being tracked?

DISCUSSION:

Imagine a group of your friends are going on a long hike in the Maryland woods to film a documentary about an old witch. Write a paragraph explaining how, exactly, they should use their GPS to make their trip more safe and enjoyable. What should they do? What should they avoid?



GPS Treasure Hunt Field Data Sheet

ENDING TIME: _____ (Return to Classroom)
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Data Recorded By: _____

Date: _____

General Location _____

<u>Target Locations:</u>			
Loc. #	Latitude Deg. Min.	Longitude Deg. Min.	Describe General Location:
A			
B			
C			

Data Point #1: Location Name: _____		
Latitude Deg. Min.	Longitude Deg. Min.	# of Satellites
Data Point #2: Location Name: _____		
Latitude Deg. Min.	Longitude Deg. Min.	# of Satellites
Data Point #3: Location Name: _____		
Latitude Deg. Min.	Longitude Deg. Min.	# of Satellites



GPS Investigation Lab. Data Sheet

Location Description: _____

Observation #	Latitude		Longitude		# of Satellites
	Degrees	Minutes	Degrees	Minutes	
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
Averages					