

GPS/Navigation CURRICULUM

USING GARMIN "GPSmap 76S" MODEL GPS UNITS



The Pennsylvania State University

Phillip Hoy

Paul Webster

Carlee DiMarzio

Teresa Batterson

Dr. Daniel F. Perkins

**Youth Engaged in Technology Program
(YET)**



PA New Community Project: Youth Engaged in Technology

Navigation: Compass and GPS Site Coordinator Preparation

Preparation is the key to effectively teaching youth about the use of compass and GPS. Several different types of documents and media will be used throughout this curriculum. Please review the documents and media to make sure they work in the room you will be presenting in. To help you prepare, we have provided some background information and documentation to help keep you ahead of the members while teaching this curriculum.

Here is a list of site coordinator preparation documents that you need to review before working with the members:

- CompassHistReview.pdf
- CurrOverview.pdf
- GPSGuideforBeginners_Manual.pdf
- GPSMAP76S_QuickStartGuide.pdf
- GPS-Primer.pdf
- HistOfNavHandout.pdf
- HowDiffCompWorkHand.pdf
- ParcNavTips.pdf
- SpecNavAids.pdf

These PDF documents can be found on the Brunton Navigation Curriculum CD. The Brunton Navigation Curriculum can be ordered from at <http://www.brunton.com/product.php?id=134>

You will also need to review the two PowerPoint presentations used with the curriculum and the video “Lost At Sea: The Search for Longitude”. The PowerPoint presentation are located on the YET Team SharePoint under Shared Documents/GPS Curriculum. The video “Lost at Sea: The Search for Longitude” can be purchased at the WGBH website found at: <http://www.wgbh.org/>. Here is a list of the PowerPoint presentations used for this curriculum, the PowerPoint presentations can be downloaded from the YET website at: <http://cyfar.cas.psu.edu/YET/Resources2.htm>

- 2006_compass_4hYET_all.ppt
- 2006_gps4hYET.ppt

Resources

Youth Engaged in Technology (YET): <http://cyfar.cas.psu.edu/>

The YET project is a program that uses technology as a tool to engage young people in learning and contributing. Through YET involvement, youth enhance their marketable job skills as well as develop leadership skills. The major focus of the meetings is technology such as robotics, GPS/GIS, web page development, and nano-fabrication. Club members participate in community service activities related to technology. The YET program also increases the likelihood that the youth will be successful and have a sense of belonging to their community.

Navigation Curriculum CD (Brunton)

The ultimate tool for teaching navigation, our easy-to-use CD explores all facets of navigation on a platform everyone can understand. Topics range from history, types of compasses, map and compass use, orienteering, map making, GPS use, field games, orienteering game, map coordinate systems, pacing, contour lines and more.

The CD is appropriate for all types of students: K-6, junior high, high school, college, scouts, outdoor programs, adult education, hunter education, family and search and rescue.

You can order this CD from the following link:

<http://www.brunton.com/product.php?id=134>

Lost at Sea: The Search for Longitude

Before global positioning systems, modern map making- even before America was America- finding longitude was just a dream. Without its guidance, navigation in the 1700s was both unpredictable and deadly... until one man solved the mystery. Richard Dreyfuss narrates this dramatic recreation of longitude's difficult discovery, and the remarkable history-making life of a humble, ingenious country carpenter named John Harrison.

This video can be purchased at the WGBH website found at: <http://www.wgbh.org/>

Teamwork & Teamplay

Cain, J., & Jolliff, B. (1998). *Teamwork & Teamplay*. Dubuque, IA: Kendall/Hunt Publishing Company

A Guide to cooperative, challenge and adventure activities that build confidence, cooperation, teamwork, creativity, trust, decision making, conflict resolution, resource management, communication, effective feedback and problem solving skills

<http://www.teamworkandteamplay.com/>

United States Geological Survey: <http://www.usgs.gov/>

The USGS serves the Nation by providing reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.

As an unbiased, multi-disciplinary science organization that focuses on biology, geography, geology, geospatial information, and water, we are dedicated to the timely, relevant, and impartial study of the landscape, our natural resources, and the natural hazards that threaten us.

Geocaching: <http://www.geocaching.com/>

Geocaching is an outdoor treasure-hunting game in which the participants use a Global Positioning System (GPS) receiver or other navigational techniques to hide and seek containers (called "geocaches" or "caches") anywhere in the world. A typical cache is a small waterproof container containing a logbook and "treasure", usually toys or trinkets of little monetary value.

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Navigation: Compass and GPS Week 1

1st Session

- *Team Building Activities* – start off with some team building activities to get the members to know each other and so they will be comfortable working with each other. Here are some examples of activities to use. They are found in the book “Teamwork & Teamplay” by Jim Cain and Barry Jollif.
 - Human Knot, page 107
 - Just one word, page 110
 - Line up, page 113
 - Moving towards extinction, page 140
 - Right where I belong, page 155
- *Basics of using a compass.* – start off with the PowerPoint presentation named “2006_compass_4hYET.ppt”. This PowerPoint talks about the basics of using a compass. This is a good start to teach the students about navigation and the principals for GPS. You will need a base plate compass and equipment to project the PowerPoint presentation.
 - Use “How a Base Plate Compass Works” (*HowCompassWorks.pdf*) from Brunton.
 - There are two reproducible documents for this lesson: (*make sure you have copies for all the members.*)
 - Compass Parts Worksheet (*CompPartsWorksheet.pdf*)
 - Brunton Compass Guide (*CompassGuide.pdf*)
 - **Topics for Discussion** – Lead the members through a discussion about compasses and how important they are to navigation

2nd Session

- *Navigation continued* – use the video “**Lost at Sea: The Search for Longitude**” to give the members an understanding of the history of navigation.
 - Review the 5 minute clip of the video tape “**Lost at Sea: The Search for Longitude**”.
 - Give the members 10 – 15 minutes to complete the “X Marks the Spot” exercise. You will need balloons and markers.
 - Use “Map Coordinate Systems” (*MapCoordSystems.pdf*) lesson plan from Brunton.
 - There are two reproducible documents for this lesson: (*make sure you have copies for all the members.*)
 - Brunton lat long locator template (*LatLongMeasure.pdf*)
 - Brunton location quiz (*CoordLocQuiz.pdf*)
 - **Topics for Discussion** – (1) Continue to talk to the members about compasses and how important they are to navigation. (2) Lead a discussion with the members about early navigation. (3) Lead a discussion as to why it was so important to find longitude on the sea. Use the location quiz as a group activity. Have the group answer the questions together instead of an individual quiz.

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Navigation: Compass and GPS ***Week 2***

1st Session

- *Navigation continued* – the USGS website has some excellent lesson plans on their Website related to Life Science, Geography: Maps, and Earth Science. These lesson plans can be downloaded at:
http://interactive2.usgs.gov/learningweb/teachers/lesson_plans.htm
- We will be using an *Exploring Maps: Location* lesson from USGS. This lesson explores how we know where we are. We will focus on activity 1 of this lesson which will introduce the students to “Tools of the Ancients”. This lesson can be found at: http://interactive2.usgs.gov/learningweb/teachers/exploremaps_lesson1.htm
 - Review background from the lesson. Through this lesson students will learn the key components to location.
 - After reviewing the lesson, students will work through activity 1 “Tools of the Ancients” where they will make a sextant to measure the latitude of their location. Detailed instruction for this activity can be found at:
http://interactive2.usgs.gov/learningweb/teachers/exploremaps_lesson1_1.htm
 - ***Topics for Discussion*** – Lead a discussion with the members about early navigation. Discuss why it was so important to find latitude when traveling.

2nd Session

- *Navigation continued* – It’s time to make the connection from compasses to GPS units. Use the Bearings lesson using both the compass and a GPS unit.
 - Use “Using Bearings” (*UsingBearings.pdf*) lesson plan from Brunton.
 - There is one reproducible document for this lesson: (*make sure you have copies for all the members.*)
 - Bearing practice data sheet (*BearingPracDataSheet.pdf*)
 - Repeat (or split the group so half is using compasses and the other half is using GPS units) the “Using Bearings” lesson using the compass page on the GPS unit. This will give the students an introduction to GPS units.
 - ***Topics for Discussion*** – Discuss with the members the importance of bearings in terms of getting to the correct landmark.

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Navigation: Compass and GPS ***Week 3***

- *What is GPS and Learning about the Garmin GPSMAP76S* – present to the members the PowerPoint presentation “2006_gps4hYET.ppt” to give the members an overview of GPS. Show the students the Garmin GPSMAP76S gps unit that they will be using. Remind the students to be careful using the gps units because they are delicate and expensive.
 - Present the PowerPoint presentation “2006_gps4hYET.ppt” to the members for an introduction of GPS.
 - Review the “Quick Start 76S Guide” (*gps_76S_guide_pg4_5.pdf*) to teach the members about the keys and display pages of the Garmin GPSMAP76S unit. After viewing the keys and pages portion take 5 minutes to review the keys to make sure the members understand what they are used for.
 - Take the members outside and have them turn on the gps units. Explain to them how the unit will look for available satellites. Show them that the gps unit identifies the satellites by numbers. Then have the members look at each of the five different pages. Allow the students to continue to play with the units and answer any questions they may have.
 - ***Topics for Discussion*** – Discuss differences and similarities of the gps unit versus the compass.

2nd Session

- *Learning about the Garmin GPSMAP76S (cont.)* – using the “Mapping with a handheld GPS” *Exercise 2: Collection Data* (pages 13-18). This exercise will take the members through the process of marking waypoints.
 - Make a copy of Exercise 2: Collecting Data for all the members.
 - Take the members outside and practice collecting waypoints. Have them mark landmarks around the school like the flag pole, front entrance, bus drop-off, etc. Also have the members mark their favorite spots around the school. These waypoints can be uploaded into MapSource to show the members all of the waypoints on a map.
 - ***Topics for Discussion*** – Discuss with the members how each of them marked the front door but each unit may have assigned different coordinates for the same waypoint. The point that needs to be made is that when members navigate to a waypoint using coordinates that the waypoint will be close but not exactly the same as posted.

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Navigation: Compass and GPS **Week 4**

1st Session

- *Learning about the Garmin GPSMAP76S (cont.)* – using the “Mapping with a handheld GPS” *Exercise 5: Navigation* (pages 35-38). This exercise will take the members through the process of marking waypoints.
 - Make a copy of Exercise 5: Navigation for all the members.
 - Give the members 20 – 25 minutes to complete the “Waypoint Scavenger Hunt exercise” (*Waypoint Scavenger Hunt.doc*). You will need gps units, a large outdoor area, and small items to be picked up by each team for the exercise.
 - ***Topics for Discussion*** – Use this time to talk to the members about geocaching and what they thought of the scavenger hunt.

2nd Session

- *Using the GPSMAP76S* – now that the students are comfortable with the gps units lets have them use them in some real world situations.
 - Have the members do a more advanced scavenger hunt. You will need the gps units and a large area outside. Identify 3-5 waypoints for the members. You will give the members the waypoints as coordinates. They will need to enter the coordinates then navigate to the waypoint. This would be the same way they would find a waypoint when they are geocaching. Give each group at a different starting point so their not all going to the same point at the same time.
 - ***Topics for Discussion*** – Use this time for the members to share their experience. Also have them talk about the differences of having the waypoints already in the gps unit versus finding a waypoint using coordinates.

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Navigation: Compass and GPS ***Week 5***

1st Session

- *Using the GPSMAP76S (cont.)* – now that the members have found waypoints from coordinates, it's time to geocache!
 - Talk about geocaching and what it is all about. Use this website:
<http://www.geocaching.com/about/>
 - For this activity you will need to do some prep work. Visit <http://www.geocaching.com/> to find geocaches in your area. Find one that is the closest to your school.
 - Have the members go to <http://www.geocaching.com/> to find geocaches in their area. Hopefully they will find several in your area. Have them pick the closest one to geocache. (Due to time it needs to be the closest one).
 - ***Topics for Discussion*** – Have the member's plan how they are going to find the geocache. They will actually try to find the geocache at the next session.

2nd Session

- *Using the GPSMAP76S (cont.)* – it's time to find the geocache.
 - Members will try to find the geocache.
 - ***Topics for Discussion*** – Members should give feedback on what it was like to find the geocache. Also someone should take a digital camera and get some picture of their experience.

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Navigation: Compass and GPS **Week 6**

1st Session

- *Creating their own geocache* – now that the members have found a geocache have them create their own.
 - Talk about geocaching and what it is all about. Use this website:
<http://www.geocaching.com/about/>
 - For this activity you will need to do some prep work. Visit <http://www.geocaching.com/> to find geocaches in your area. Find one that is the closest to your school.
 - Have the members go to <http://www.geocaching.com/> to find geocaches in their area. Hopefully they will find several in your area. Have them pick the closest one to geocache. (Due to time it needs to be the closest one).
 - ***Topics for Discussion*** – Have the member's plan how they are going to find the geocache. They will actually try to find the geocache at the next session.

2nd Session

- *Creating their own geocache (cont.)* – Put the geocache in place.
 - Members will create a geocache and place it on geocache.com.
 - You will have to set up a profile on geocache.com so the members can place their geocache on geocache.com.
 - ***Topics for Discussion*** – Discuss what needs to be done to maintain the geocache.