

Support Materials for Geocaching 360: Ins and Outs

Objective: The learner will describe how the GPS system works and how it is a game of geocaching.

Background Reading:

In the past, people used the positions of the sun and the stars, maps, and compasses to find their way. Today, satellite navigation systems such as GPS (Global Positioning System) allow people to figure out exactly where they are and how to get to where they want to go. A system of 30 satellites circling the earth makes up the Global Positioning System. These satellites constantly send out signals.

Most smartphones or tablets have a GPS receiver. As your GPS receiver picks up satellite signals, the distance between the receiver and the satellites is calculated through the use of trigonometric equations. Once the receiver calculates its distance from four or more satellites, it uses small differences between the satellites' signals to determine exactly where you are. A GPS receiver can calculate its position many times in one second. So, from miles up in space, your location on the ground can be determined with great precision -- within a few yards of your actual location.

GPS systems have many uses in navigation on land, in the air, and at sea. Not only does a GPS receiver show where it is located, but it may also show how fast it is moving and which direction it is going. Some GPS receivers also show automobile travel data or nautical charts.

A fun use of GPS is the treasure-hunting game called geocaching. Geocaches are cleverly hidden containers of all shapes and sizes that have been hidden all over the world. Sometimes they contain small trinkets, such as keychains or magnets. To find them, people download a geocaching app to look over the geocaches that are hidden nearby, and then select the one they want to find. Using GPS satellite information, the app compares the searcher's location with the cache's location to tell them how far away the container is. Then people can navigate their way to the hidden geocache. When they find it, they sign their name in the geocache's logbook and place the container back so that other treasure-hunters can search for it.

Learn more at <https://sciencetrek.org/topics/satellites>.

Discussion Questions:

- How do GPS systems work to pinpoint a person's location?
- How can GPS satellites help people find their way better than a map alone?
- What are some of the reasons people enjoy the game of geocaching? How is it different from using a treasure map?
- Can you think of other uses for GPS satellites?