

GPS and Intersecting Circles

1. Every object on the earth has a precise location on the Earth. The location of any object on Earth can be identified by GPS coordinates.
What does GPS stand for? _____

 2. GPS Coordinates correspond to the location of an object in terms of latitude and longitude on Earth. Go to <https://www.google.com/earth/> and Launch Google Earth. Then, search to find the exact GPS coordinates for:
 - a) 1500 Sullivan Rd, Aurora, IL 60506: _____
 - b) The St. Louis Gateway Arch: _____

 3. Determine the GPS coordinates, in terms of degrees only, for the following:
 - a) Tucson, Arizona: _____
 - b) Boise, Idaho: _____
 - c) Minneapolis, Minnesota: _____
What is the altitude of Minneapolis in terms of meters? _____
What is the altitude of Minneapolis in terms of feet or miles? _____

 4. In order for GPS receivers to identify their precise location, a mathematical principle called trilateration is used to identify the location of an object. While 3D trilateration can be difficult to visualize with 3 or more intersecting spheres, the following scenario provides a 2D example involving 3 circles where cities are used instead of satellites. Use <https://www.geocachingtoolbox.com/index.php?lang=en&page=CircleIntersection&status=result> to answer the following:
 - a) If you are 1110 km from Minneapolis and 1000 km from Boise, what are the two potential states in which you are located? _____

 - b) Additionally, if you are 990 km from Tucson. Where is your location?
City/State: _____
GPS Coordinates: _____
Altitude: _____
- ** Note: An additional resource for the above problem found at:
NasaSciFiles (2007) "Case of the Technical Knockout - How Does GPS Work?"
Retrieved from <https://youtu.be/3zRlbb0Mvb0>