Lesson Title	Geocaching in Geometry
Length of Lesson	2 Days
Created By	Shane A Irvin
Subject	Geometry, Geospatial
Grade Level	9^{th} – 12^{th}
State Standards	4b.
DOK Level	DOK 2
DOK Application	Solve real-world applications and mathematical problems to find missing measurements in right triangles by applying special right triangle relationships, geometric means, or trigonometric functions.
National Standards	Specify locations and describe spatial relationships using coordinate geometry and other representational systems
Graduate Research Element	Geocaching is imperative to my research because it allows me to collect data in the field and pin it directly to aerial photography. I use geocaching everyday and only wish I was introduced at a younger age.

Student Learning Goal:
The goal for this lesson is to teach the students about the importance of geocaching. Geocaching is in everything they do, whether it is getting to school or the collection of water quality points as in my research. The teaching goal within this lesson is to teach the students the importance of geocaching but also, get them to learn how to operate a GPS unit. While the typical GPS has a user friendly GUI, some GPS units that collect points do not provide the friendly programming.

The students will travel outside collecting points in a given area (as groups) the groups will write down what they collect including the object where the points were collected.

The teacher will then process the points and will show the students the next day in class.

Materials Needed (supplies, hand-outs, resources):
GPS units, handouts, writing utensil

Lesson Performance Task/Assessment:
The assessment for this lesson is to test the students' ability to adapt to a GPS and understand what the GPS actually does. The task and assessment will allow the students to conduct basic geocaching and response. The geocaching will involve the students in collecting *in situ* GPS points. Once the points are collected, the points will be processed

in Google Earth or ArcMap Explorer and will be presented to the students in the second part of the lesson.

The presentation of the points to the students will allow them to connect GPS point collection to interpretation, something very important in many career fields.

Lesson Relevance to Performance Task and Students:
The students are all actively settled into Geometry. GPS and point collection works directly with geometric principles and learning how to operate and use a GPS unit is important to success as an educated person. This lesson is important because it will show them applications in geometry. It is also a great experience for the students.

Anticipatory Set/Capture Interest:
The idea of going outside is always a capturing tool for the students. Also allowing them to utilize technology that they may or may not understand inspires the students to work through the problem.

Guided Practice:
DAY 1:
The students will be introduced to the GPS units and be stepped through how to use them. Once they get the understanding of how the units work they will be shown the worksheet and be paired up into groups. This first part of the lesson needs to be done in less than 10 minutes due to the short 50 minute periods.

DAY 2:
The students will be reintroduced to the data collection techniques done on the prior day as well as asking them what they felt about the exercise. They will be asked the following questions:

What does GPS stand for?

How does the unit work?

What do the numbers mean?

Independent Practice:
DAY 1
The students, under supervision will be in charge of collecting the data points via the GPS. They can and are encouraged to ask questions but must.

DAY 2:
The students, by individual group, will be called up to look at their points. This will give them an opportunity to see how close they got and if the unit was working or operated properly.

The students will use Google Earth to find their GPS points. The teacher can forget to put in the N and W ordinates and surprise the students.

Remediation and/or Enrichment:
Remediation:
In situations that remediation is needed the student can see the instructor for one on one tutoring. The student can also be paired with a high performing student with full understanding of the lesson.

Enrichment/Extension:
All of these extensions depend on the students' ability and knowledge of the subject matter. The student will have the opportunity to explain how to properly write down degrees (degrees, minutes, and seconds). They will also have the opportunity to guess why the points may be off (See GPS notes).

Check(s) for Understanding:
What does GPS stand for?

How does the unit work?

What do the numbers mean?

Closure:
The closure will be a quick discussion on how similar my research is to their completed task as well as a quick discussion on why the units could be off. It could be caused by overestimations on the satellites, bad timing issues, or objects around the units effect the accuracy.

Possible Alternate Subject Integrations:
Geography, physics

Teacher Notes:
Be prepared for a fast and busy lesson. This will keep the students involved.