

GPS & Hydrology

By Sue Yates & Eric Lowry

Target Concept: Students will understand how to use a GPS and map a local watershed.

Grades 7-12

State Standards:

Math – D1.4.1, A6.4.1, A5.4.7

Science – A7, B1, B3, D3

BSSD Math and Science Educational Standards:

Math – MA 12.5: uses mathematical induction

MA 9.20: uses appropriate technology to defend ones answer

MA 9.17: interprets and analyzes information

MA 9.14: constructs geometric model, transformations, an scale drawings used a variety of methods.

Science – Content Knowledge: SC 5/6.13 Energy in the earth system

Process: SC 5.A **Developing Questions:** Forms a testable hypothesis from a question.

SC 5.B **Designing Investigations:** Identifies the variables in an experiment. Designs an investigation.

SC 5.C **Conducting Investigations:** Conducts self designed investigations that demonstrate safe use of equipment.

SC 5.D **Communicating Results:** Applies sound logic when forming explanations; recognizes and openly evaluates alternative explanations. Uses appropriate scientific language in explanations.

SC 5.E **Other:** Uses scientific process to test a hypothesis with minimal help.

Materials:

- GPS's

Topographical Maps

Preconception:

The students will have their own preconception as to their own watershed (the village of Wales). Students will also have their own preconception of the heights of various places around Wales.

Gear Up:

- Ask students, if they have ever noticed how the water runs into the ocean? Where does it originate?
- Have the students write a guess as to the height of Cape Prince of Wales. Then have the students take their guess and compare with other students.

Explore:

Pair the students up and have them use a GPS to hike to the top of the Cape and verify their guesses with what the GPS states. Record findings on data entry sheet.

Generalize:

Have students compare the results of their explorations. Ask: How can you find a way to be more accurate?

Explore:

Using a topographical map locate the highest points around the village. Have the students take their GPS (in teams) to those points and verify. Record findings on data entry sheet.

Generalize:

Have students share the results of their explorations. Asking them to explain why it is they think the GPS is so close to what is on the map. List reasons why the GPS and the topographical map are so close. List ideas for class generalization/discussion.

Using the generalizations, the teacher will talk about Triangulation and what happens with the satellites and the GPS.

Apply:

The teacher will explain how the GPS works and how this relates to the previous study of the watershed. Each student will go out with a GPS and topographical map to locate the village watershed.

Assessment:

Each student will need to construct a scale, 3-dimensional model of Wales' watershed. Each model will also show latitude and longitude marks, as an overview of the village.
Criteria for Evaluating Student Projects

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Scoring Guide:

Scientific Thought (possible 40 points)

An attempt to design and construct the project with importance to detail.	An attempt to design and construct the project, but without importance on detail.
40 35 30 25	20 15 10

Originality (possible 16 points)

Original, resourceful, novel approach; creative design and use of equipment.	Imaginative, extension of standard approach and use of equipment	Standard approach of good treatment of current topic.	Incomplete and unimaginative use of resources.	Lack of creativity in both topic and resources.
16 12	8	4	2	

Presentation (possible 24 points)

Clear, concise, confident presentation; proper and effective use of vocabulary and terminology; complete understanding of topic; able to extrapolate.	Well-organized, clear presentation; good use of scientific vocabulary and terminology; good understanding of topic.	Presentation acceptable; adequate use of scientific terms; acceptable understanding of topic.	Presentation lacks clarity and organization; little use of scientific vocabulary; poor understanding of topic.	Poor presentation; cannot explain topic; scientific terminology and vocabulary lacking or confused; lacks understanding of topic.
24 20	16	12	6	

Exhibit (possible 20 points)

Exhibit layout self-explanatory and successfully incorporates a multi-sensory approach; creative and very effective in use of materials.	Layout logical, concise, and can be followed easily; materials used appropriate and effective.	Acceptable layout; materials used appropriately.	Organization of layout could be improved; materials could have been chosen better.	Exhibit layout lacks organization and is difficult to understand; poor and ineffective use of materials.
20 18 16	14	12	10	8