

Zoom, Zoom: Using Geographic Scale to Apply Spatial Reasoning

Author Denise Dorn
Grade Level 8
Duration 1 class period

National Standards

GEOGRAPHY

Element 1: The World in Spatial Terms

1. How to use maps and other geographic representations, geospatial technologies, and spatial thinking to understand and communicate information

AZ Standards

MATHEMATICS

Expressions and Equations (EE)

8.EE.A.4. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities.

Arizona Social Science Standards

GEOGRAPHY

The use of geographic representations and tools helps individuals understand their world.

8.G1.1 Use geographic tools and representations to analyze historical and modern political and economic issues and events. Key tools and representations such as maps, globes, aerial and other photos, remotely sensed images, tables, graphs, and geospatial technology

Overview

The use of electronic mapping systems such as Google Maps or Google Earth is commonplace with today's students. Their familiarity with the + symbol meaning "zoom in" and – symbol meaning "zoom out" comes with knowing how to use such electronic maps.

Purpose

In this lesson students will apply spatial thinking skills by "zooming in and out." They will do this by measuring with a map scale, converting between measurements, and using scientific notation.

Materials

- Rulers
- How to Convert within the Metric System
- How to Change Numbers from Standard form into Scientific Notation and Back
- Math Worksheet and Answer Key
- What Would You Pick—Besides Google Earth and Answer Key

- Images (laminated if possible)
- Water-based markers for acetate sheets (if possible)
- Strips of paper so students can reproduce the graphical scale
- Using Map Scale to Calculate Distance (1.27 min)
<https://www.youtube.com/watch?v=V3QxrX0MYu4>

Objectives

The student will be able to:

1. Analyze images by using map reading skills.
2. Measure distances between features in meters and kilometers given a scale and convert those measurements to scientific notation.

Procedures

Prerequisite Knowledge: Students should have experience in place values from millionths to millions. Students should also be familiar with scientific notation and the metric system.

Zoom: Using Geographic Scale to Apply Spatial Reasoning

Prior to Lesson: Print and laminate (or insert into plastic sleeves) all of the maps and images.

Students will want to mark on the pages and the plastic will ensure multiple classes can use the materials. If possible, also give them water-based markers meant for acetate sheets so markings can be removed with water.

1. Ask students, "Who uses Google Earth or another kind of mapping program to find their way from one place to another?"
2. Ask students, "Do you ever look at the scale on the mapping program?"
3. Project the first image of Chase Field. Explain these images were taken by Google. Explain the difference in the views (aerial v. oblique).
4. Project all the images and maps. Be sure to point out the scale for each image or map. Show students the features they will be measuring when they get their own set of maps. Tell them to keep in mind the four questions they will need to answer at the end of the worksheet.
5. Clarify that for this lesson, distance will be measured using a straight line between the points. This is the distance sometimes called "as the crow flies." To find the actual distance between two points, students will use the scale. Note: If students do not know how to take a piece of paper and create a scale used for measuring on a map watch YouTube Video Using Map Scale to Calculate Distance (1.27 min) <https://www.youtube.com/watch?v=V3QxrX0MYu4>
6. Distribute rulers, water-based markers, images laminated (or encased in plastic sleeves), and strips of paper. Use the aerial photograph of Chase Field to demonstrate the use of scale.
7. Have students practice measuring different parts of the image.
8. Distribute the Math Worksheet and model how to fill out the Column 1 (Distance in Meters) on the

student worksheet. Have students complete the first column for all of the images.

9. Distribute How to Convert within the Metric System and How to Change Numbers from Standard form into Scientific Notation and Back. Discuss or review the material on those handouts. Have students complete the examples.
10. Model how to do Columns 2-4 using Chase Field. Have students complete the rest of the worksheet.
11. Project the What Would You Pick—Besides Google Earth? Have students discuss, as a whole group, the problems proposed and their solutions.

Assessment

Geography and Mathematics

The Math Worksheet can be graded. Mastery would be considered a score of 80% or higher.

Extensions

Have students bring in maps. Use those maps to explore issues of scale, spatial reasoning, and what maps/images are best to use for different purposes.

Return to the idea of "bird's eye view" or looking directly down on something v. oblique view or looking from an angle at something. Project more aerial images and ask if they are birds eye or oblique.

Sources

Google Earth and Google Images
USGS