

Mapping (*Guided Inquiry*)

How will we locate Oaxaca and El Palmillo?

Concepts: Scale, Ratio, Grid Systems

Skills: Measuring, Making Models, Planning Investigations, Interpreting Data

Materials: Graph paper, measuring tape, string, compass, writing utensils, student atlases or printouts of United States and Mexico maps with latitude/longitude marks, computer with Internet access.

Duration: 1-2 hours

Objectives/Enduring Understandings:

1. Maps are drawings of a particular place that help locate particular places.
2. Maps usually show what a place looks like from overhead.
3. Maps have symbols that represent a feature or object, and a legend that explains what the symbols represent.
4. Scale is the relationship between distance on the map and distance on the ground.
5. Latitude and longitude are an example of a grid system that allows us to locate a place on the map.

Guiding Questions:

1. What are some different types of maps you have seen?
2. Why is it important to have symbols and a legend on a map?
3. Why do maps use a scale?
4. What kind of situation would it be helpful to know your latitude and longitude?

Critical Content:

Archaeologists use many different types of techniques to map a potential archaeological site. The most basic technique is to set up a meter-square grid. Features are then plotted within the grid and the site is surveyed in a systematic process. Latitude and longitude coordinates can be used in conjunction with Global Positioning Systems and compasses to pinpoint a spot at the site.

Skills:

See state standards.

Instructional Activities & Methods:

Stimulus/Modeling Phase:

1. Begin by reviewing/brainstorming map vocabulary with students: globe, equator, cardinal directions, and our location on the globe/map. Have

students glance through their student atlases and note interesting features of maps.

2. Ask students "How would you describe where I am standing in the classroom right now?" Elicit responses from students that illustrate the concept of directionality on a map by posing additional questions. Am I closer to the door or the library? How would you direct someone who wasn't in our class to the behavior charts? Suggest that it might be easier if we had a map to follow or to post in case there ever was a sub, or if they had a visitor in the classroom.
3. Brainstorm the things you need to include in your map of the class. How will we measure the class? How will we show the desks? List these clearly on the board to be left up during the activity. A map should have:
 - A label or title
 - A rosette that shows north
 - A legend that lists the symbols used
 - A scale that shows the ratio
 - Distinct features of the area
4. "First, I suppose we should figure out which way is north. Does anyone have an idea how we might do that?" Using the compass, guide the students into finding magnetic north in the classroom. Notes this on the board and from here, ask the class to fill in east, west and south.
5. "Now that we have our directions, how are we going to draw our map? Where will we start? Will our map look down on the classroom or look in from the door? Why? How are the maps in your atlas looking at the information?" Note that this is termed 'perspective' and there are benefits to each way of drawing, but most maps you'll see are drawn from overhead and this may be the most intuitive for the students.
6. Next, we need to decide how to measure the classroom. What are some ways we can do this? (Tape measure, count paces) Both of these are good suggestions, but it's very important that we are accurate. Our graph paper is made up of tiny square and we'll need to decide how many squares equals an inch, or how many paces equals a square. Lets do one side of the room both ways and see which we like better. (Walk the class through this step together.) This is our scale.

Independent Practice:

7. Divide the class into groups. Write or handout directions to Map Making assignment. The group will need to decide:
 - A. How to measure the room (Scale)

- B. Where to place the rosette.
 - C. What features will be on the map
 - D. What symbols will represent the features
 - E. How to construct the legend
 - F. A title
8. The mapping section should take about 20-30 minutes and there will likely be many questions that require support and guidance. Once the groups are finished, have each one choose a feature on their map and write a question that can be answered by using their map. (Example: What is east of the computer center by 5 paces?)
 9. Groups should then exchange maps and try and answer the question by using only the map. What would make this task easier? (Use a street map to illustrate the Letter-Number grid system. These are in the front of most phone books.) See how we can find any street on the map by looking up the Letter and Number? Abbey, what street do you live on? Lawson Lane is located in square G, number 2. Can you try and find it? (Let others practice)
 10. Since we've been following Dr. Feinman's research in archaeology, let's see how archaeologists use maps in their work. (View 'Mapping' video report and peruse the interactive map section.)

(Day 2)

Culminating Performance Assessment

What? Locate local area (Chicago, IL) and Mitla, Mexico on a map using latitude and longitude coordinates.

Why? Analyze maps with a specific purpose (to gather information) and make inferences based on this information.

How?

1. Let's take our maps back to our groups and then come up with a letter number grid system and write it on the top and left side of the map, just like the one in the phone book. (10 minutes) Now, exchange with another group and each group give me the coordinates for where the computer area on the map they have.
2. Who can think of other grids you might have seen, on the globe for instance? Latitude and longitude are a grid system that helps us locate places on the Earth. Latitude is the distance, measured in degrees, North or South of the equator, which is 0 degrees. Can you all find the equator on your student atlas? What do we know about the climate at the equator? (Warmer) Now, find the north and south poles. Here, you'll find lines that go up and down, these are longitude lines and they measure how far east or west of the Prime Meridian a place is. The Prime Meridian is the line that divides the Earth into East and West and it starts at 0 degrees. Can you find it on your atlas?
3. Now, everyone look for Chicago on his or her atlas. Start by looking for latitude number that goes from left the right. You might have to estimate if it's between two numbers. Write this number in degrees next to Chicago.

Are we north or south of the equator? Make sure you write this with your answer as well. Now, everyone try longitude on your own.

4. Now, let's see if we can find where Dr. Feinman is working in Mexico. The site is called El Palmillo and its in Oaxaca, which is a state like Illinois. But we'll need to find a large town that we can look for on the map. (Check the website with the class, under About the Expedition, or Expedition Map. - if you have great maps look up Santiago Matatlan, otherwise use the town of Mitla.) Now, everyone try and find the latitude and longitude coordinates and raise your hand when you're finished so I can check your work.