Location, Location, Location!

Author(s): Helen Arceneaux

Course Description: Longitude and Latitude

Grade Level: 10, 11, & 12 grade

Honors or Regular: Regular

Lesson Source: Lesson is based on geology field work and is not based on any outside lesson source.

Concepts: Maps of the Earth consist of longitude and latitude lines that help locate specific areas of the map. Every position on the globe has a 'global address' due to the intersections of these lines. They are similar to the grid on a graph and to the grid pattern of some cities.

Performance Objectives:

Students will be able to:

- Interpret the Earth's coordinate systems and cardinal directions
- Explain and show how to translate latitude and longitudinal lines to pinpoint locations on a map.

State Standards:

Concept TEKS:

ESS (11) Solid Earth. The student knows that the geosphere continuously changes over a range of time scales involving dynamic and complex interactions among Earth's subsystems. The student is expected to:

(C) Interpret Earth surface features using a variety of methods such as satellite imagery, aerial photography, topographic and geologic maps using appropriate technologies.

Process TEKS:

ESS (3) Scientific Processes. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:

(A) In all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so to encourage critical thinking by the student.

English Language Proficiency Standards (learning strategies, listening, speaking, reading or writing)

(C) Cross-curricular Student Expectations

(1) Cross-curricular second language acquisition/learning strategies. The ELL uses language learning strategies to develop an awareness of his or her own learning processes in all content areas. In order for the ELL to meet grade-level learning expectations across the foundation and enrichment curriculum, all instruction delivered in English must be linguistically accommodated (communicated, sequenced, and scaffolded) commensurate with the student's level of English language proficiency. The student is expected to:

(A) use prior knowledge and experiences to understand meanings in English;

(C) use strategic learning techniques such as concept mapping, drawing, memorizing, comparing, contrasting, and reviewing to acquire basic and grade-level vocabulary;

Ex: compare and contrast

- I learned that latitude and longitude lines are similar to a math grid because:
- I learned that latitude and longitude lines are unlike a math grid because:

Materials List and Advanced Preparations:

- Colored tape in latitude and longitude lines on classroom floor
- Map of a grid plan city (Map of both the Manhattan Borough in New York is used as example in lesson plan)
- A blow up model of the Earth

Safety:

- There are no significant safety concerns.

Accommodations for Learners with Special Needs (ELL, Special Ed, 504, GT, etc.):

This lesson contains peer partnering, chunked directions, a jigsaw activity and a think-pair-share activity.

ENGAGEMENT		**Time: 15 Minutes**
What the Teacher Will Do	**Probing/Eliciting Questions**	**Student Responses and Misconceptions**
Toss the Earth model to several students and ask each to try to locate where they are. Discuss that the Earth has been assigned imaginary lines that make a grid that help locate position. These lines are called latitude and longitude lines. We use the intersection of these lines to pinpoint where locations are. In other words, the lines give each point on the planet a global address. The teacher will say, "longitudes are 'long' and are also called parallels, and latitudes 'lay flat'. Latitudes are also called meridians."	Where are you on the Earth? Discuss how to find a longitude: 1. Go to your starting line (the Equator). 2. Determine which direction you must go (north or south). 3. Determine the distance in degrees you must go. Discuss how to find a latitude: 1. Go to your starting line (the Prime Meridian). 2. Determine which direction you must go (east or west). 3. Determine the distance in degrees you must go.	[I don't know] (Students may not be able to visually connect the planet Earth with the blow up version) [I'm not on this map] (While the students may be aware of what city and state they live in they may not be aware of the larger concepts of a map) [I can't read a map](Students may have never seen or been taught how to read a map.)
Evaluation/Decision Point Assessment	**Assessment**	**Student Outcomes**
If you hear that the grid lines are a permanent fixture to the map then move ahead. If you hear that the Earth's gridlines change over time then you may have to explain some concepts of mapping. This explanation will have to include that cardinal directions and grid lines are the same over time but what we 'draw' on the map may differ.	Do the Earth's grid lines stay the same over time?	[Yes, as we map the grid lines stay the same but the area that we map at those gridline may change.] [No, the grid lines change as we map.] [I'm not sure.]

EXPLORATION		**Time: 15 Minutes**
What the Teacher Will Do	**Probing/Eliciting Questions**	**Student Responses and Misconceptions**
The teacher says: "on the floor I have taped out a smaller version of longitudinal and latitude lines. Longitude is taped in one color and latitude is taped in another." This taping method works well on tiled floors. Count off the students into groups. Each student should get a worksheet. Show the students how the coordinate system works by doing the first example together. Tape the following locations with a city picture: 1. London, England 2. Madrid, Spain 40N 4 W 3. Paris, France: 48N 2E They should be ready to share with the class!	For the activity: <u>Circulate among the students and ask:</u> So how do you find the locations I gave you on the worksheet? What do the latitude and longitude line remind you of? How are they alike and how is it different? Are these lines on the Earth? How do I find a location using these lines? How do you say these coordinates without saying longitude and latitude?	[Coordinate the longitude and latitude](There is no set 'way' to coordinate for a location like 'rise over run' in math) [Graphing in math](We do not have a 0,0 point and the grid is all around the Earth with no 'beginning' and no 'end'. Latitude and longitude lines are also curved unlike graph lines due to the curvature of the Earth.) [I don't know because I have always see them on globes.](Although these lines were assigned [These answers will vary](Make sure that the students say the latitude first and then the longitude. For example: 35 degrees North, 77 degrees West".)
Evaluation/Decision Point Assessment	**Assessment**	**Student Outcomes**
If students do not understand the orientation of longitude lines versus latitude lines you may need to re-explain these terms. The students also need to know that the 'permanent' lines bisect each other to form points on a map.	Do the longitude and latitude lines move over time?	[No.](Students need to understand that, although the lines aren't written on the Earth, they were designated to give every point on the planet a global address.)

EXPLANATION		**Time: 10 Minutes**
What the Teacher Will Do	**Probing/Eliciting Questions**	**Student Responses and Misconceptions**
The Teacher says: "So let's think on this map for a second."	Is this floor model accurate? Why are the real latitude lines and longitude lines curved? When I walk around all day I don't see a curve of the Earth….	[Yes] (Student may not understand that the scale is much smaller than the actual longitude and latitude lines. They should also remember that the lines should be curved not straight.) [It just is because you say it is.] (While they might repeat that the Earth is curved it is important for the students to understand that the Earth is very big so the curvature is too tiny for us to detect if we are just looking from our personal perspectives. The curvature can be seen over long distances and from space.)
Evaluation/Decision Point Assessment	**Assessment**	**Student Outcomes**
Students may not understand that there are many lines in between the major latitude and longitudinal lines.	How do I know where I am if I am not on one of the major lines?	[I guess] [If I am in between lines I use an 'in between' location on the map.]

ELABORATION		**Time: 10 Minutes**
What the Teacher Will Do	**Probing/Eliciting Questions**	**Student Responses and Misconceptions**
The teacher will say, "let's see how this helps us as science students". Show map of Manhattan 	What can comparing longitude/latitude lines with a street map tell us? What do you already know?	[That sometimes our city streets are also set in a grid pattern.] (Students should be able to understand that a grid pattern reoccurs in many examples including streets, math, etc.)
Evaluation/Decision Point Assessment	**Assessment**	**Student Outcomes**
The students may be confused as to where and how a local map may fit it with latitude and longitude. Make sure to emphasize that they find local sites in a similar way to finding latitude and longitude.	How do find a place here in town that we have never been to before?	[I just know where it is] (While they will include landmarks in their answer ultimately they must know what street to turn on to find a location. They may even have to read a map!)
EVALUATION		**Time: 5 Minutes**
What the Teacher Will Do	**Probing/Eliciting Questions**	**Student Responses and Misconceptions**
The teacher will say "On your student sheet I would like you to answer the last section of question and turn your sheet in at the end of class. It is your ticket out of the room."		