Introduction to the Geographic Grid

**Created by:**

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**Purpose:**

The purpose of this exercise is to become familiar with the latitude-longitude geographic grid used to describe location on the Earth’s surface.

**Essential Learning Outcomes:**

Determine the latitude and longitude of a location

Determine a location based on latitude and longitude

Calculate distance using latitude and longitude

Convert between decimal degrees and degrees, minutes, seconds

**Equipment supplied:**

Calculator

World atlas

Globe

**Instructor notes:**

For this exercise I ask students to get into pairs to complete the assignment. Lab enrollment is typically 32 students per section, requiring 16 globes and 16 atlases. You could easily have students work independently if you have enough resources or in larger groups if you are limited by the number of globes and atlases. If you prohibit the use of cell phones or other technology in class, you will want to also supply calculators – very basic ones will suffice.

**Exercises:**

**Part 1 – Latitude and Longitude**

Use a globe and atlas to answer the following:

1. What are the location, latitude, and longitude of the southernmost point in the conterminous United States? Report your answer in degrees, minutes, seconds and in decimal degrees. (*Tip: There are 60 seconds in 1 minute, and 60 minutes in 1 degree.*)
2. What are the location, latitude, and longitude of the southernmost point in all of the United States? Report your answer in degrees, minutes, seconds and in decimal degrees.
3. Which is at higher latitude, the border between the state of Washington and Canada or the border between Maine and Canada? What is the approximate latitude of each?
4. What are the location, latitude, and longitude of the northernmost point in all of the United States? Report your answer in degrees, minutes, seconds and in decimal degrees.
5. What are the location, latitude, and longitude of the westernmost point in the conterminous United States? Report your answer in degrees, minutes, seconds and in decimal degrees.
6. What are the location, latitude, and longitude of the westernmost point in all of the United States? Report your answer in degrees, minutes, seconds and in decimal degrees.
7. What are the location, latitude, and longitude of the easternmost point in the conterminous United States? Report your answer in degrees, minutes, seconds and in decimal degrees.
8. Which ten countries does the equator pass through?
9. Which eight countries does the Prime Meridian pass through?
10. Using a globe, locate three cities near the Tropic of Cancer. Determine the approximate longitude of each city.

**City and Country** **Longitude**



1. Using a globe, locate three cities near the 30th E meridian. Determine the approximate latitude of each city.

**City and Country** **Latitude**



1. Using a globe, locate three cities in three different countries at similar latitude as your campus. Determine the approximate longitude of each city.

**City and Country** **Longitude**



1. Using a globe, locate three cities in three different countries at similar longitude as your campus. Determine the approximate latitude of each city.

**City and Country** **Latitude**



1. Using an atlas, locate three cities in three different states in the U.S. at similar latitude as your campus. Determine the approximate longitude of each city.

**City and State Longitude**



1. Using an atlas, locate three cities in three different states in the U.S. at similar longitude as your campus. Determine the approximate latitude of each city.

**City and State**  **Latitude**



1. Determine the following location of these major world cities based on the approximate latitude and longitude:

**Latitude and Longitude** **Location**

* 1. 42° N, 87.5° W
  2. 40.4° N, 3.5° W
  3. 30° N, 31° E
  4. 23° S, 43° W
  5. 34° S, 151° E
  6. 14.5° N, 121° E
  7. 33° N, 44.5° E
  8. 34° S, 18.5° E
  9. 12° S, 77° W
  10. 60° N, 10.5° E

**Part 2 – Calculating distance using longitude and latitude**

Lines of latitude are parallels so distance between any two lines is nearly constant at ~69 miles/degree. There are slight variations due to the Earth being oblige (i.e., not a perfect sphere), so distance ranges from 68.71 miles/degree at the equator to 69.41 miles/degree at the poles. Lines of longitude converge at the poles, so distance between lines of longitude vary with latitude and ranges from 69.17 miles/degree at the equator to 0 miles/degree at the poles.

***Table 1. Linear distances represented by one degree latitude and longitude***

|  |  |  |
| --- | --- | --- |
|  | **1 Degree Latitude** | **1 Degree Longitude** |
| **Latitude** | **Length (miles)** | **Length (miles)** |
| 90° (poles) | 69.41 | 0 |
| 60° | 69.23 | 34.67 |
| 45° | 69.06 | 48.81 |
| 30° | 68.89 | 59.96 |
| 0° (equator) | 68.71 | 69.17 |

***Use Table 1 to answer the following:***

1. From your campus, if you traveled west one degree and then north 1 degree, approximately how many miles have you travelled?
2. What is the approximate distance in miles between your campus and the equator?
3. What is the approximate distance in miles between your answer to 14B and the equator?
4. What is the approximate distance between your campus and the Prime Meridian?

1. What is the approximate distance between your answer to 15B and the Prime Meridian?