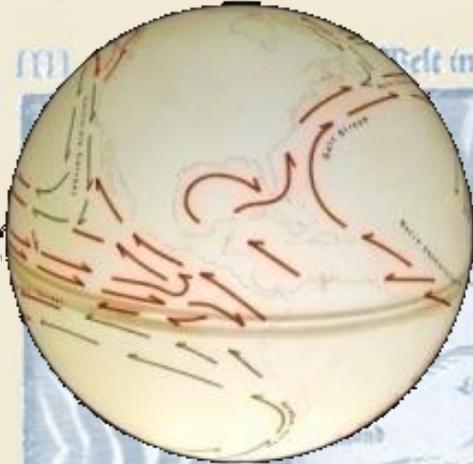


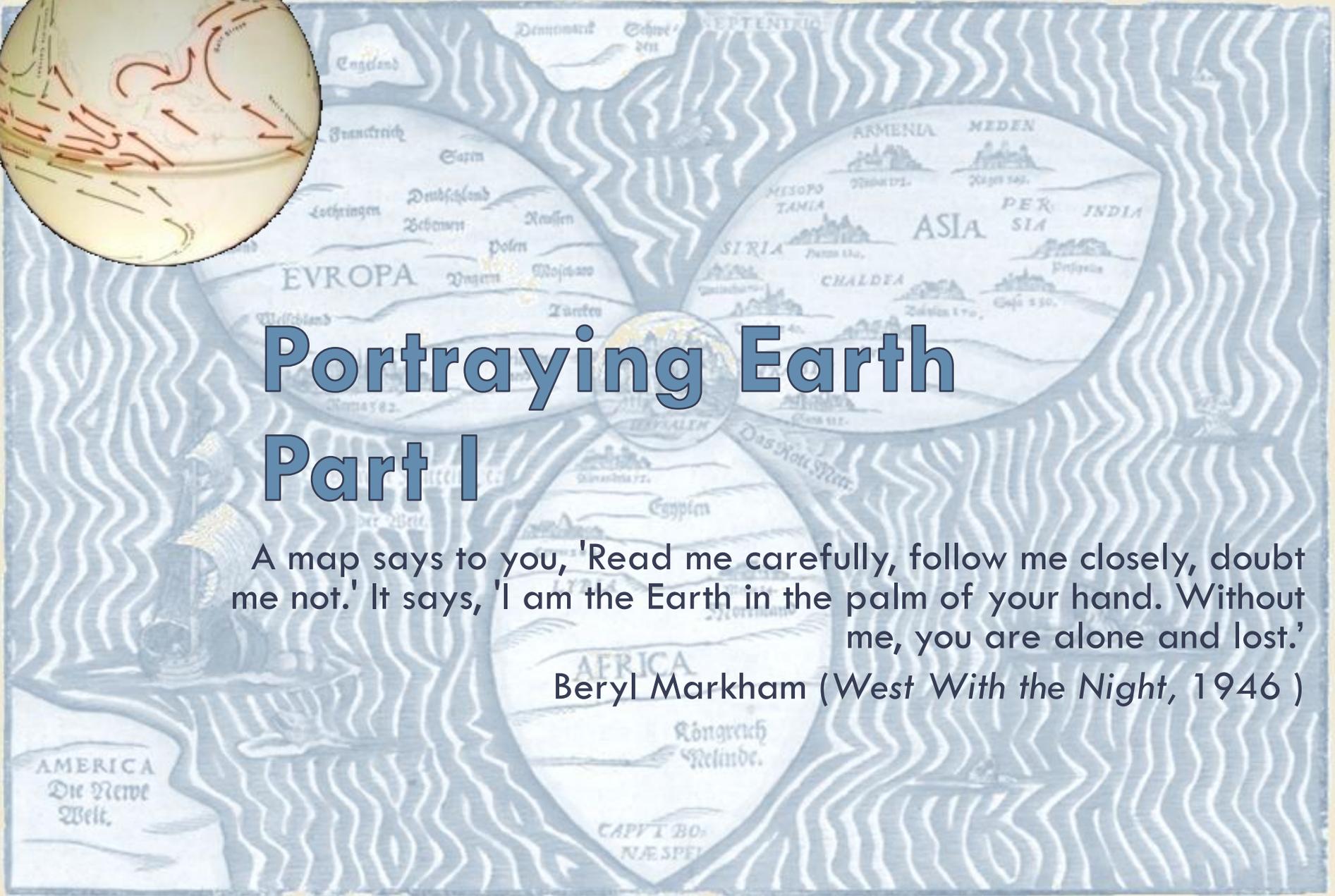
Welt in einem Kleberplac Felches die Stadt Hannover meines lieben Vaterlandes Bayern.



Portraying Earth Part I

A map says to you, 'Read me carefully, follow me closely, doubt me not.' It says, 'I am the Earth in the palm of your hand. Without me, you are alone and lost.'

Beryl Markham (*West With the Night*, 1946)





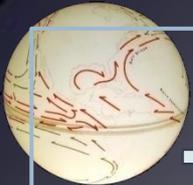
Portraying Earth Part I

- The Nature of Maps
- The Geographic Grid
- The Role of Globes
- Map Essentials
- Map Scale

Students often have trouble with geographic names and terms. If you need/want to know how to pronounce something, try this link.

[Audio Pronunciation Guide](#)

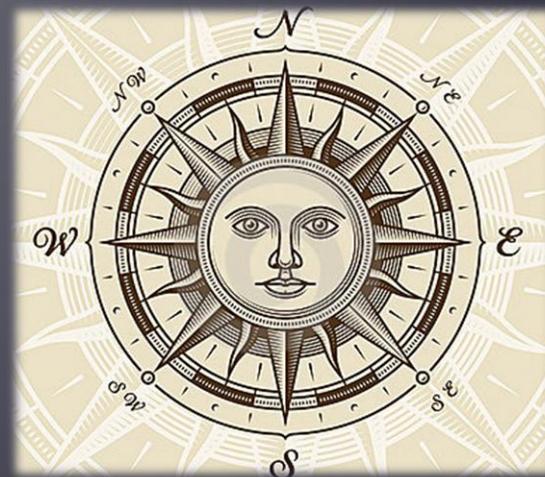
The site doesn't list everything but it does have the words with which you're most likely to have trouble.

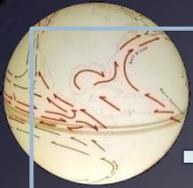


The Nature of Maps

Map:

- A two-dimensional representation of the Earth's surface features ... Simplification of reality
- Both spatial and non-spatial (ie, descriptive, alphanumeric, attribute) aspects are found on most maps. For example, a river will have attribute information associated with it (such as its name and length) together with its physical description.
- Basic attributes of features:
 - Distance
 - Orientation
 - Size
 - Shape





The Nature of Maps

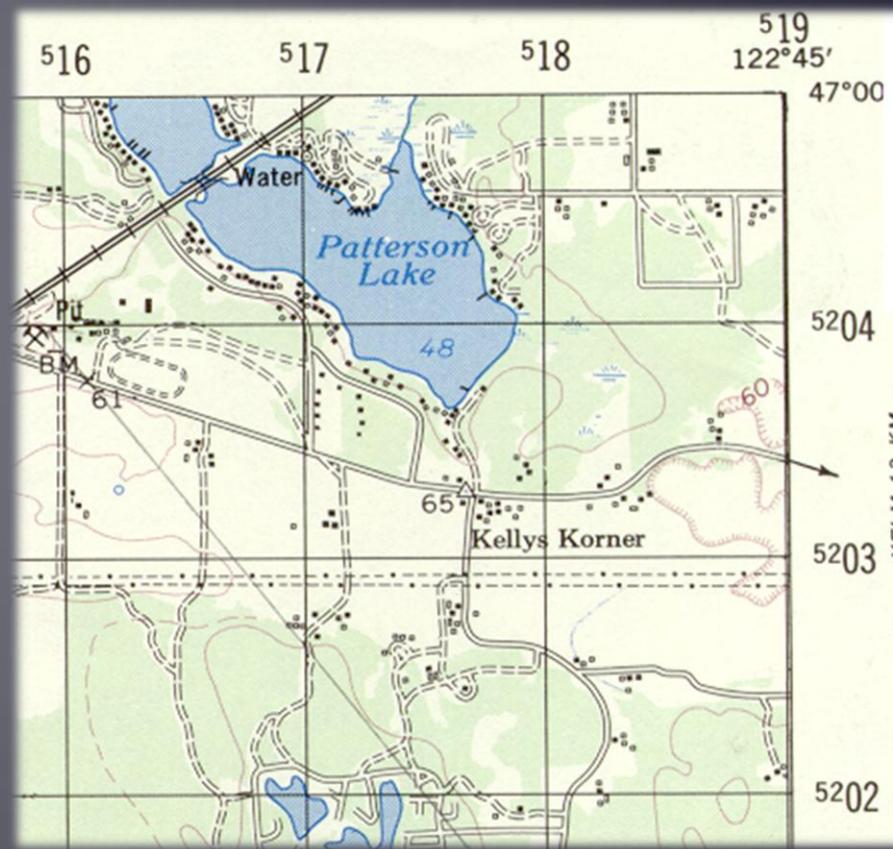
Map:

- A graphic representation of the geographic setting
- A representation, normally to scale and on a flat medium, of a selection of material or abstract features on or in relation to the surface of the earth or other celestial bodies
- Maps are vital tools that have been in use for thousands of years and, with evolving technology, are becoming more useful. They are a way of generalizing the surrounding world and presenting the information in an understandable fashion.



The Nature of Maps

JB Harley defined maps as *social constructions* and argued that maps are not simple representations of reality but exert profound influences on the way space is conceptualized and organized. A central theme is the way in which power becomes inscribed on the land through cartography.



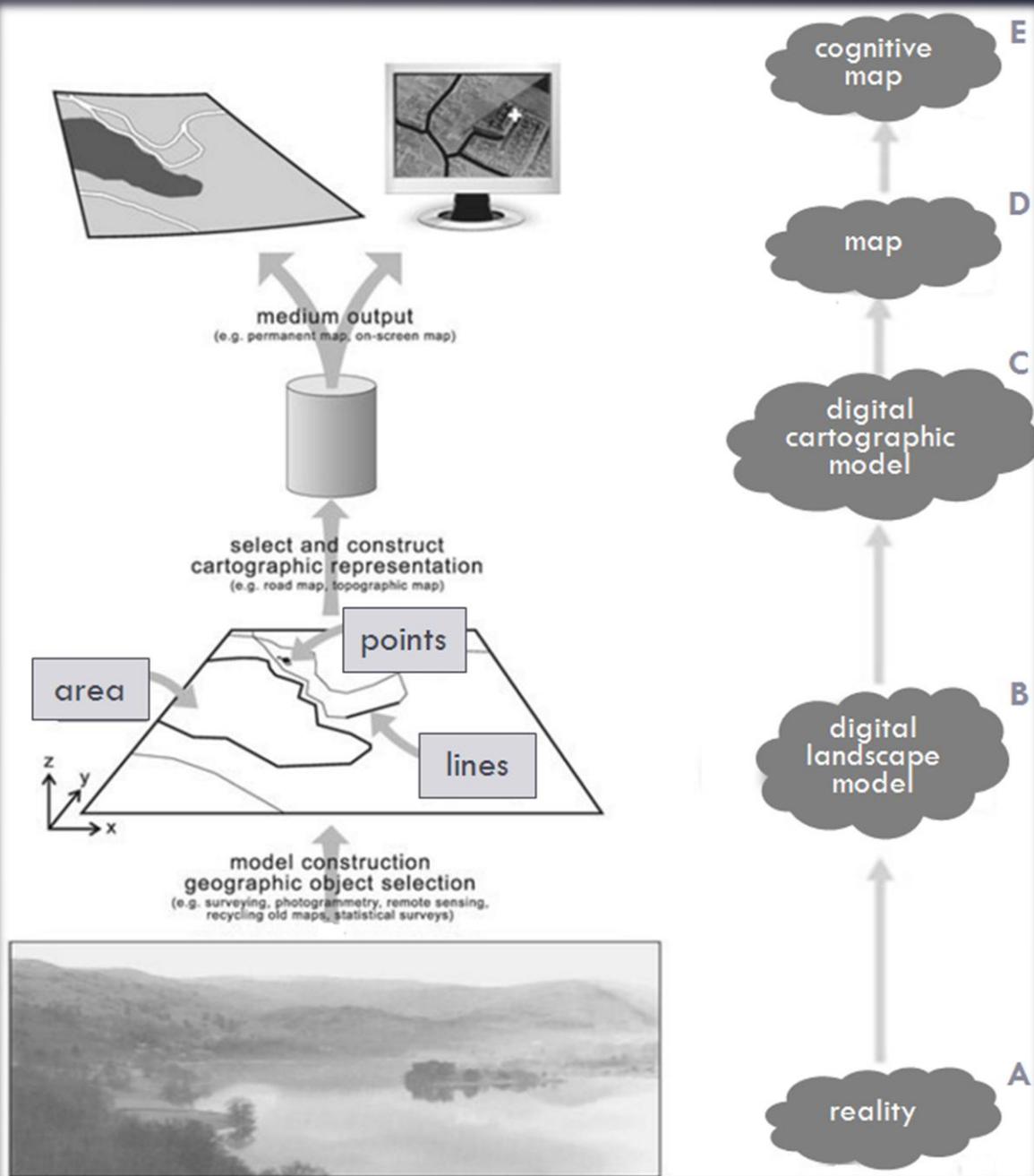
Source: Tenino Quadrangle, MR 6 (Washington 1:50,000, Sheet 1477 IV, Series V791). Washington, D.C.: U.S. Defense Mapping Agency Topographic Center, 1975.

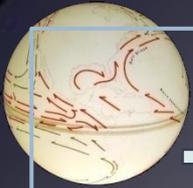


The Nature of Maps

The nature of spatial data: from reality (A), via model construction and selection to digital landscape model (B), followed by selection and construction to a cartographic representation towards a digital cartographic model (C), presented as a map (D), which results in the user's mental map (E).

From Kraak and Ormeling, 1996

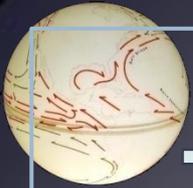




The Nature of Maps

Maps:

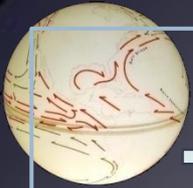
- Reduce the spatial characteristics of a large area and put it in map form to make it observable.
- Carefully designed instruments to record, calculate, display, analyze and understand the interrelation of things
- Communicate spatial information more efficiently than linear communication
- At a fundamental level, bring things into view.



The Nature of Maps



- Store geographical information.
- Serve mobility and navigation needs.
- Serve analytical purposes, eg *measuring* and *computing*. Analyze complex collections of data - topography, soil, land use, direction, etc.
- Summarize statistical data to assist forecasting and spotting trends.
- Visualize the invisible.
- Stimulate spatial thinking ... Powerful tools for spatial analysis.
- Aid in understanding the world and one's place in it.

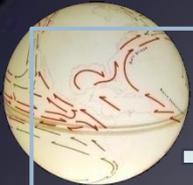


The Nature of Maps

It's never been easy to create a taxonomy for maps, and clearly any single map can fall into multiple categories, but we used to be able to define a map by:

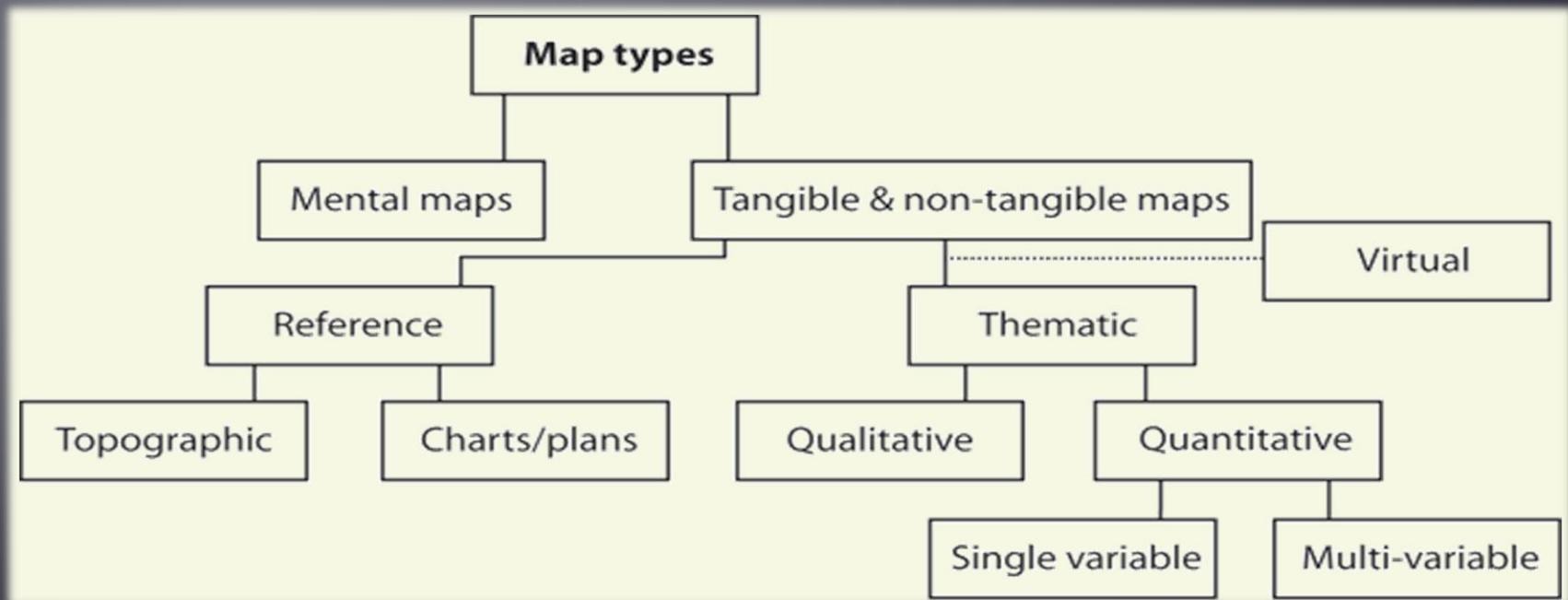
1. **scale** - small-scale map, large-scale map
2. **function** - general reference maps, topographic maps, thematic maps, charts
3. **type** - choropleth, dot density
4. **medium** - real maps, virtual maps, mental maps ...

The first three used to adequately provide a way we might categorize types of maps but does it still work for the multitude of new forms of maps, new map-makers and new mapping techniques?

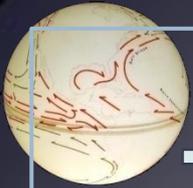


The Nature of Maps

The diagram of map types below uses the “old” terminology. Technology has brought about a revolution in cartography but are the new maps *that* different? Aren't they just maps?



If you're interested, you can find an expanded list with most of the “new” terminology at www.whatsgrowing.com/growblog/?p=1009.

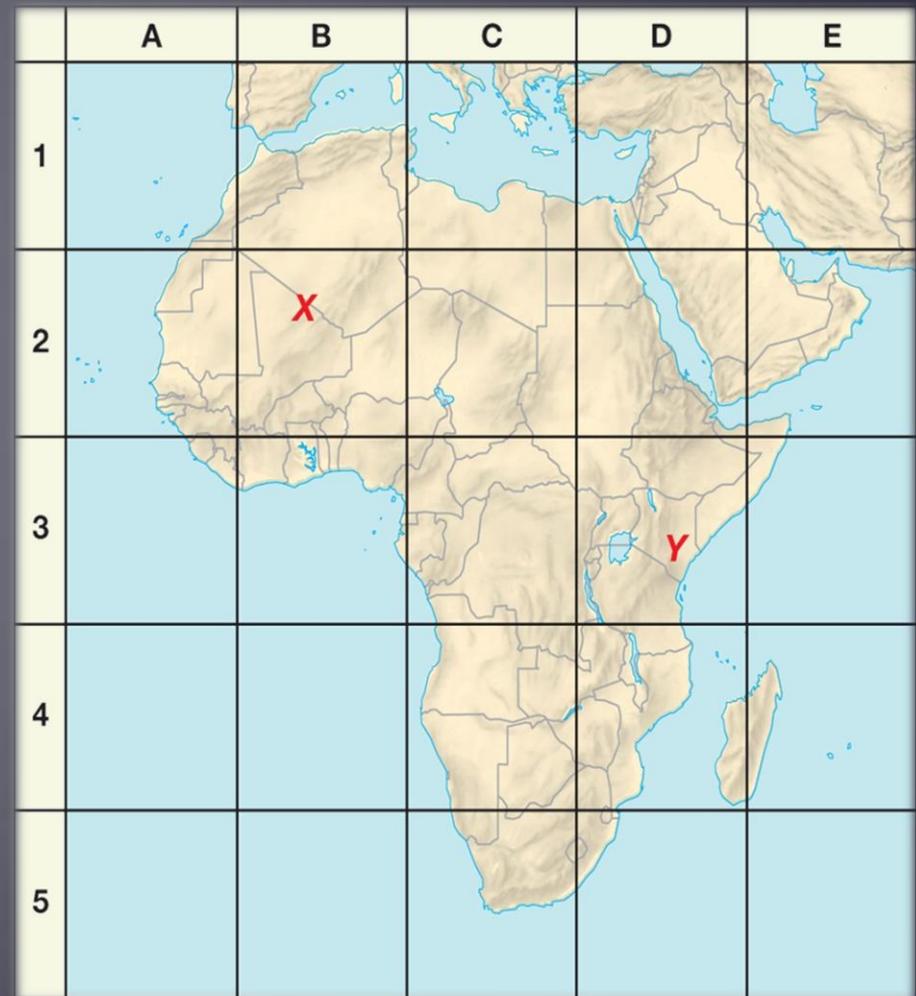


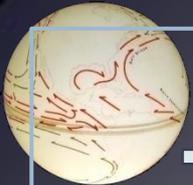
The Geographic Grid

A geographic coordinate system is a system that enables every location on the Earth to be specified by a set of numbers, letters or symbols.

In order to measure accurately the position of any place on the surface of the earth, a grid system has been set up. It pinpoints location by using two sets of intersecting lines: latitude and longitude.

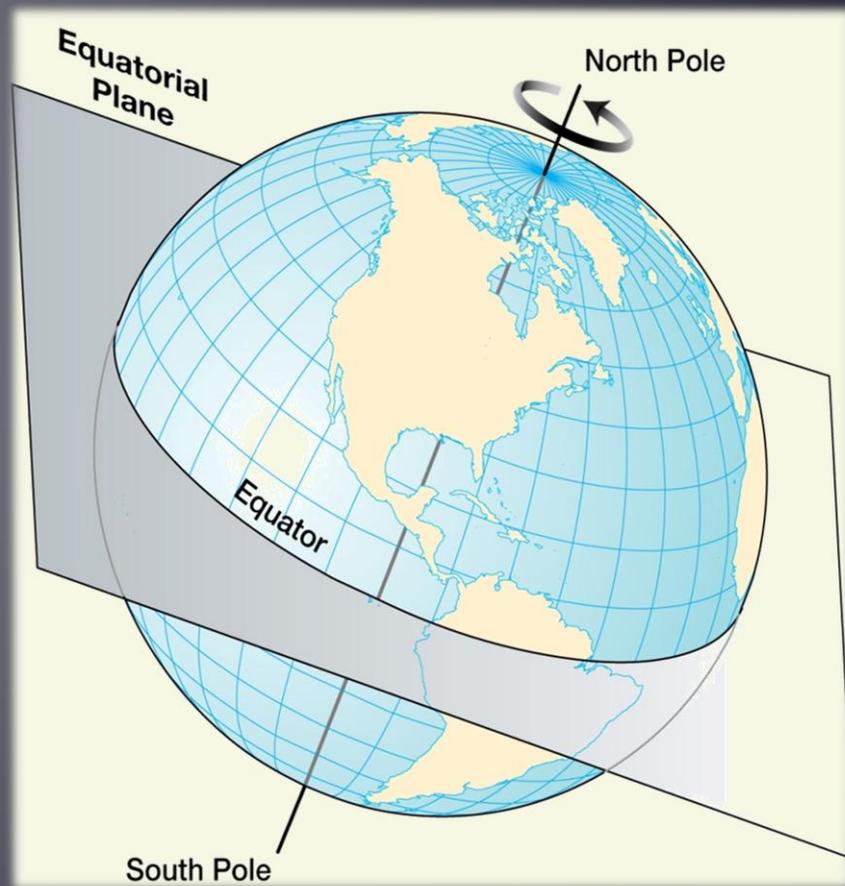
The combination of these two specifies the position of any location on Earth, disregarding altitude and depth. The grid thus formed by latitude and longitude is known as the graticule.

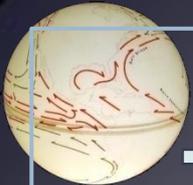




The Geographic Grid

The geographic grid is purely a human invention, but it is tied to four Earth features that provide the set of reference points essential to establish an accurate locational system: the North Pole, the South Pole, Earth's rotation axis and its equatorial plane. They are the spatial references for the grid.



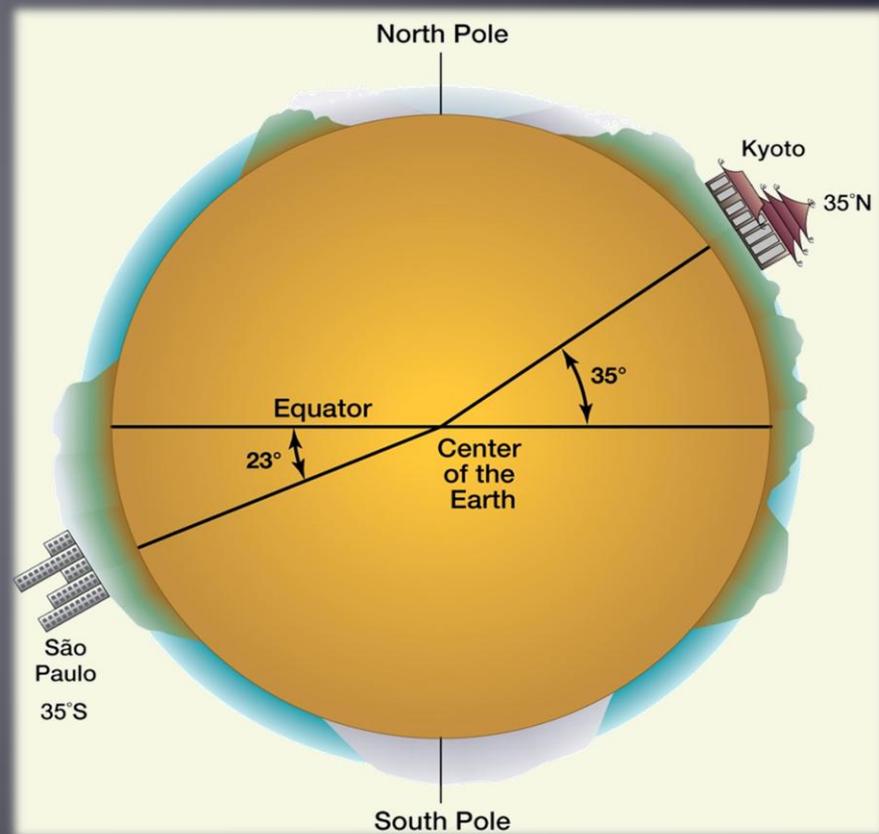


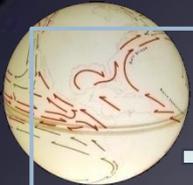
The Geographic Grid

Latitude represents north-south location, and is shown by a series of east-west running lines that parallel the equator, which marks the midpoint between the two poles around the earth's circumference. These lines of latitude are called **parallels**, because they are always parallel to each other.

Latitude is reckoned in both directions from the **equator**, so the equator is numbered 0° and the poles 90°N and 90°S . Except for the equator, the suffix "N" or "S" must appear after the number given for the latitude.

Latitude is represented in **degrees**, **minutes** and **seconds**, a system of measure by sixes that goes back to the ancient Chaldeans and Babylonians, the same system we use to reckon time.

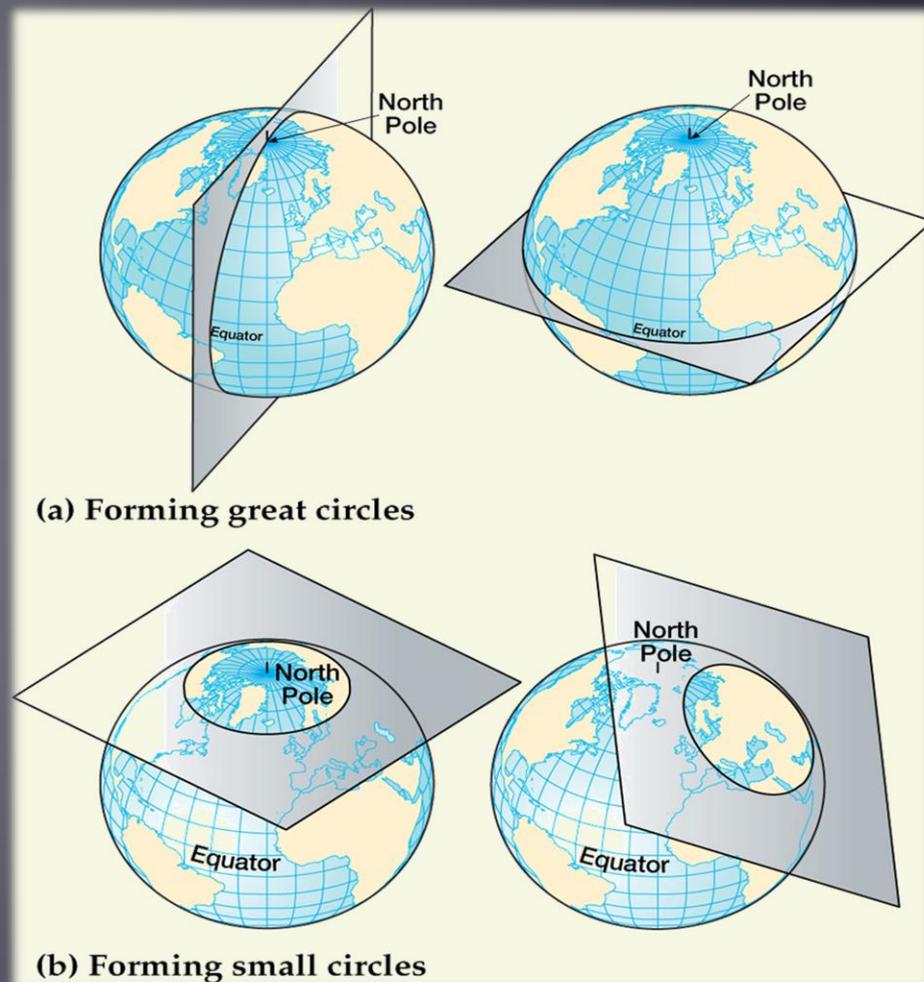


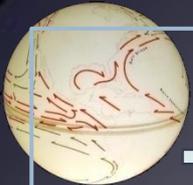


The Geographic Grid

A **great circle** is created whenever a sphere is divided **exactly in half** by a plane (imaginary flat surface) passing right through its center. The intersection of the plane with the surface of the sphere is the largest possible circle you could manage to draw on that sphere's surface.

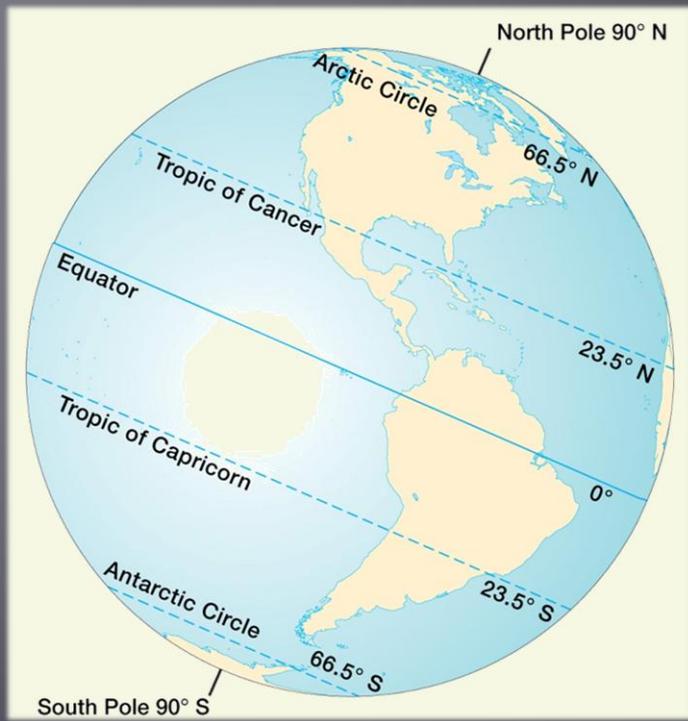
A **small circle** is any circle produced by planes passing through a sphere anywhere except through its exact center. It will of necessity be smaller than a great circle, hence the clever name.

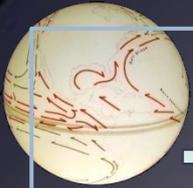




The Geographic Grid

Seven significant latitudes – includes 1 great circle, 4 small circles and two single points
(Check the illustration!)

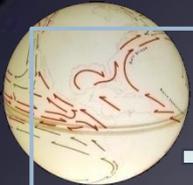




The Geographic Grid

Regions of the Geographic Grid (Latitude bands)

- Low latitude » 0° – 30° N and S
- Mid latitude » 30° – 60° N and S
- High latitude » 60° – 90° N and S
- Equatorial » within a few degrees of the equator
- Tropical » between 23.5° N and 23.5° S
- Subtropical » 25° – 30° N and S
- Polar » within a few degrees of the North and South Poles

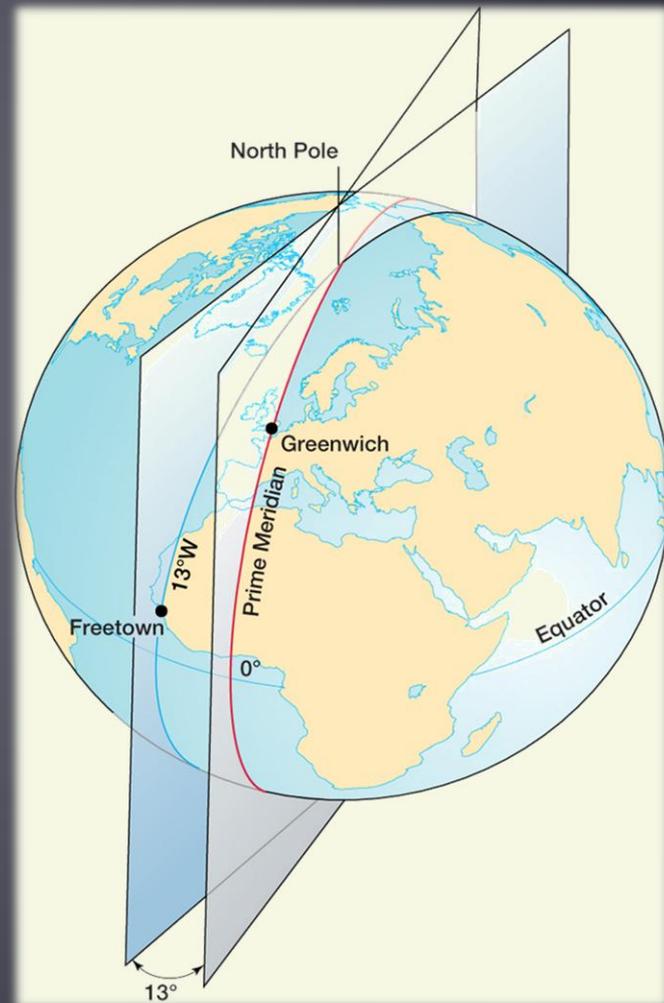


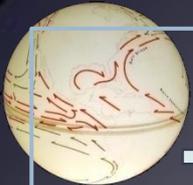
The Geographic Grid

Longitude represents east-west location, and it is shown by a series of north-south running lines that all come together at the North Pole and at the South Pole and are the widest apart at the equator.

These lines of longitude are called meridians and measure the distance east or west of a base line or prime meridian.

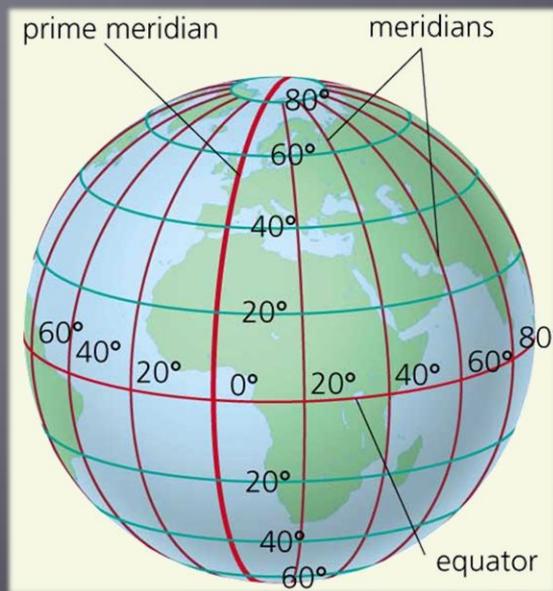
Latitude is reckoned in both directions from the Greenwich Meridian (the prime meridian), which is numbered 0° , and the suffix "E" or "W" must appear after the number given for the longitude. We use the same units for pinpointing longitude as we do for latitude: degrees, minutes and seconds.

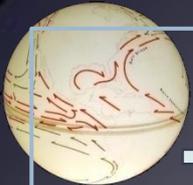




The Geographic Grid

Unlike latitude, meridians are not parallel to each other. They are spaced the farthest apart at the equator and converge closer and closer together until they actually touch at each pole.

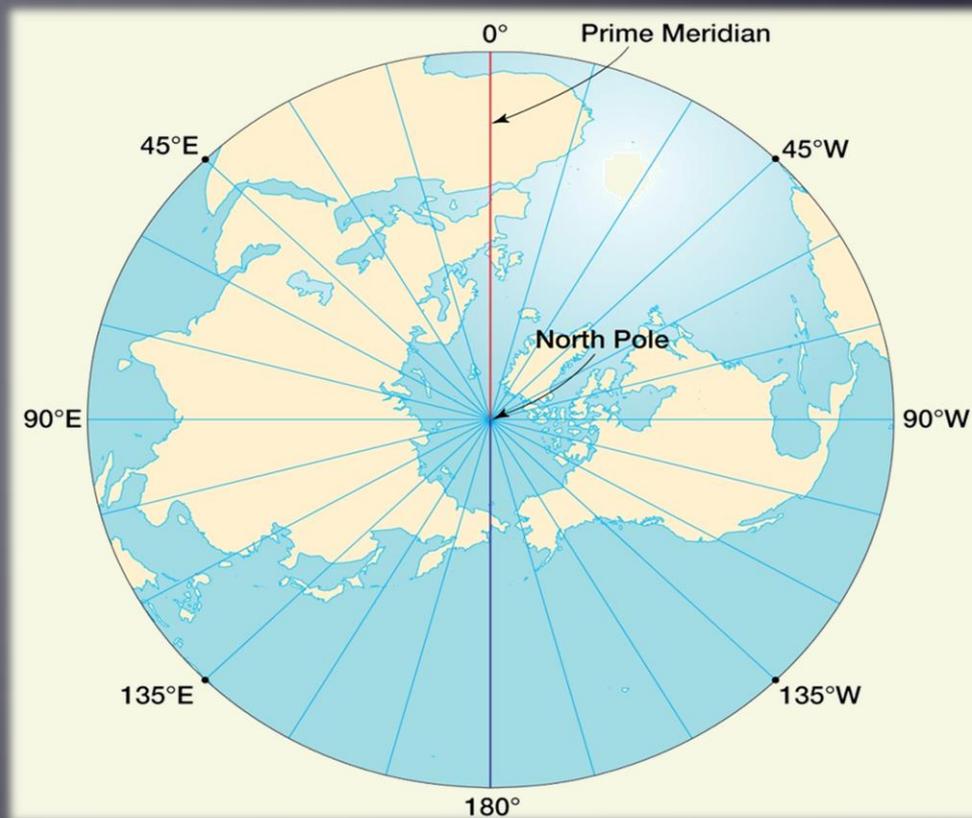


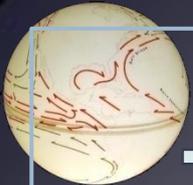


The Geographic Grid

Picking a base line from which to begin numbering longitude was not the easy matter that it was with latitude, which uses the equator. After years of debate, it was finally agreed that the meridian passing through the old (1675) Royal Observatory in Greenwich, England (a borough of London) should be the common zero, or the Prime Meridian.

The antipodal (or opposite) meridian makes a convenient International Date Line at 180°. It is in the middle of the Pacific Ocean, where the date issue inconveniences few people in the sparsely settled mid-Pacific.





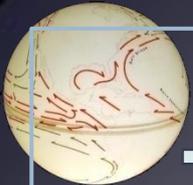
The Geographic Grid

There is an infinite number of latitude and longitude lines because every place on Earth is at the intersection of a particular parallel and a particular meridian.

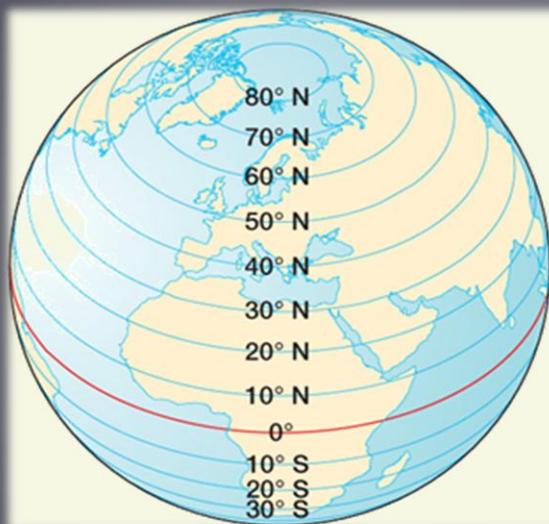
Maps and globes generally only show a few selected parallels and meridians -- by tens or fifteens or thirties. Otherwise, they would be unreadable.

(By the way, the zero/zero point of the grid is located in the Gulf of Guinea about 390 miles south of Tema, Ghana.)

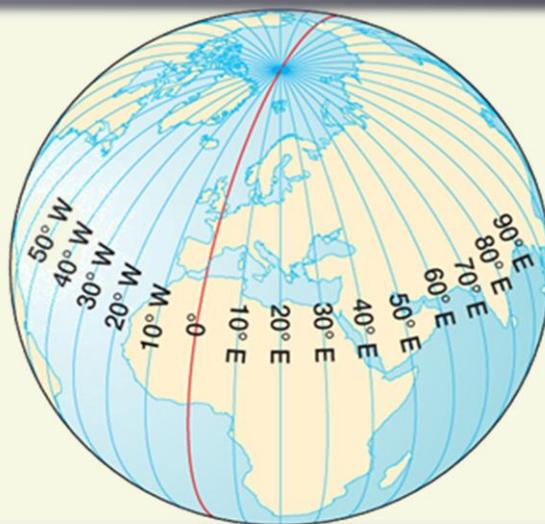




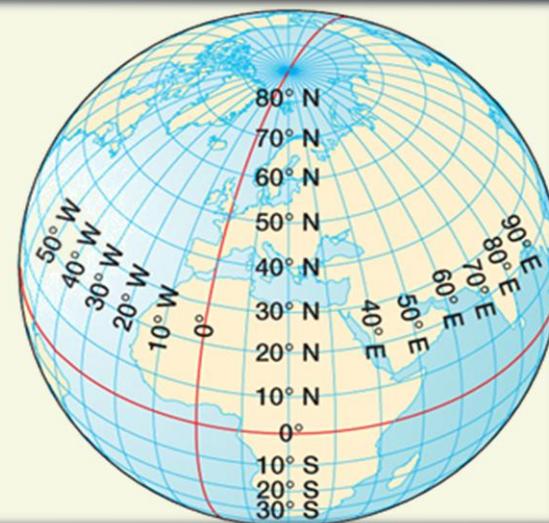
The Geographic Grid



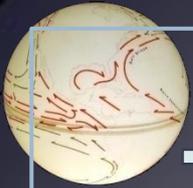
parallels
longitude
N-S locations
run E-W



meridians
latitude
E-W locations
run N-S



the graticule,
geographic
grid



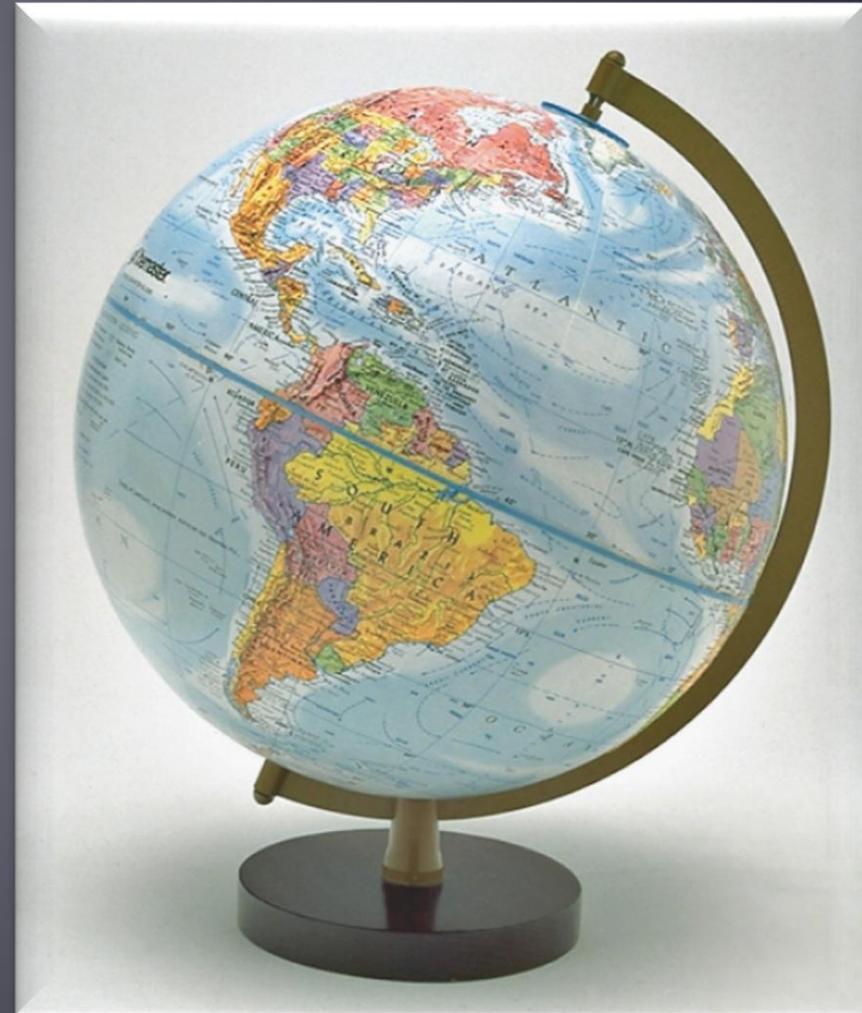
The Role of Globes

- Advantages

A globe is the only accurate way to study the whole Earth. A globe has no distortion. Shape, size, distance and direction are all shown accurately on a globe. Globes promote visual accuracy.

- Disadvantages

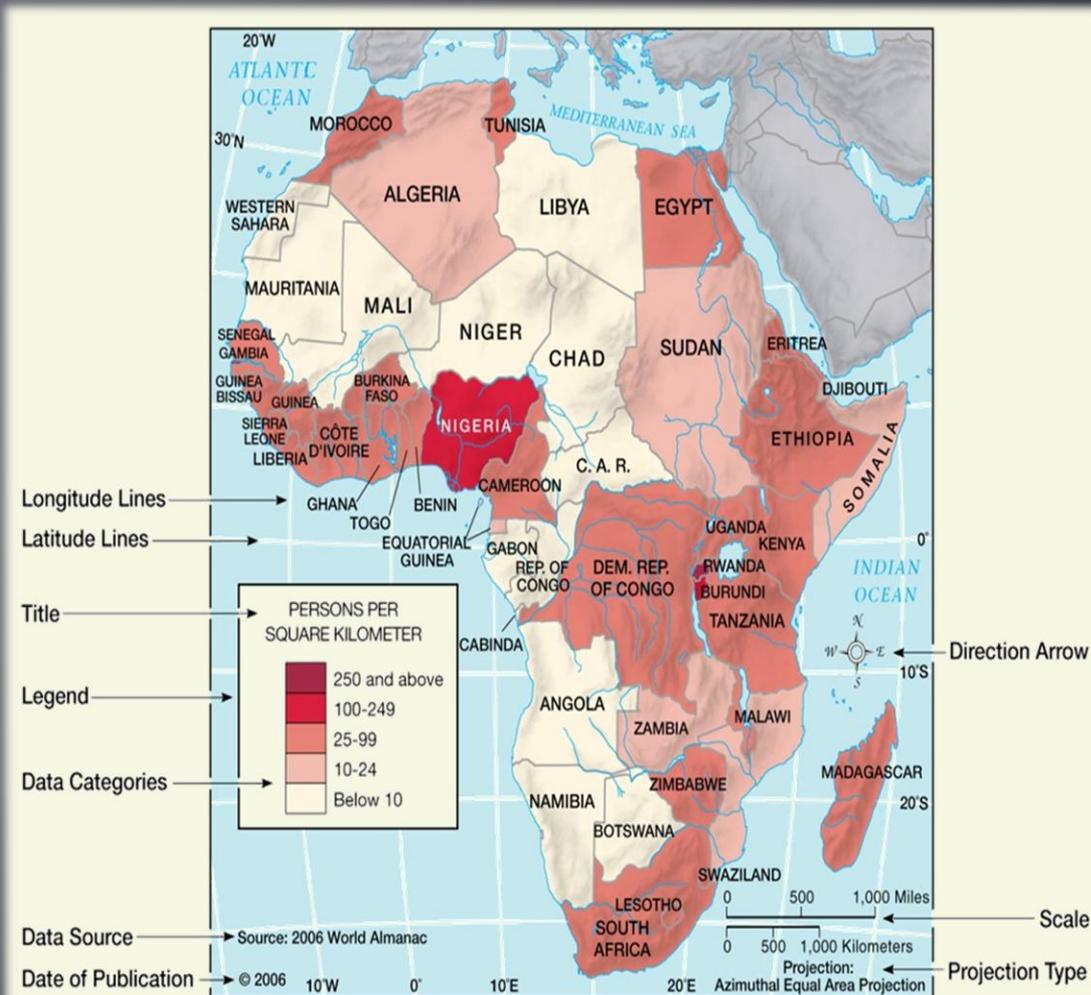
Globes cannot provide detail on a large scale; even very large globes. They are more difficult to create than maps and less portable. They also give a false impression of the relative curvature of the earth because the radius of a globe is much smaller than the radius of the earth.





Map Essentials

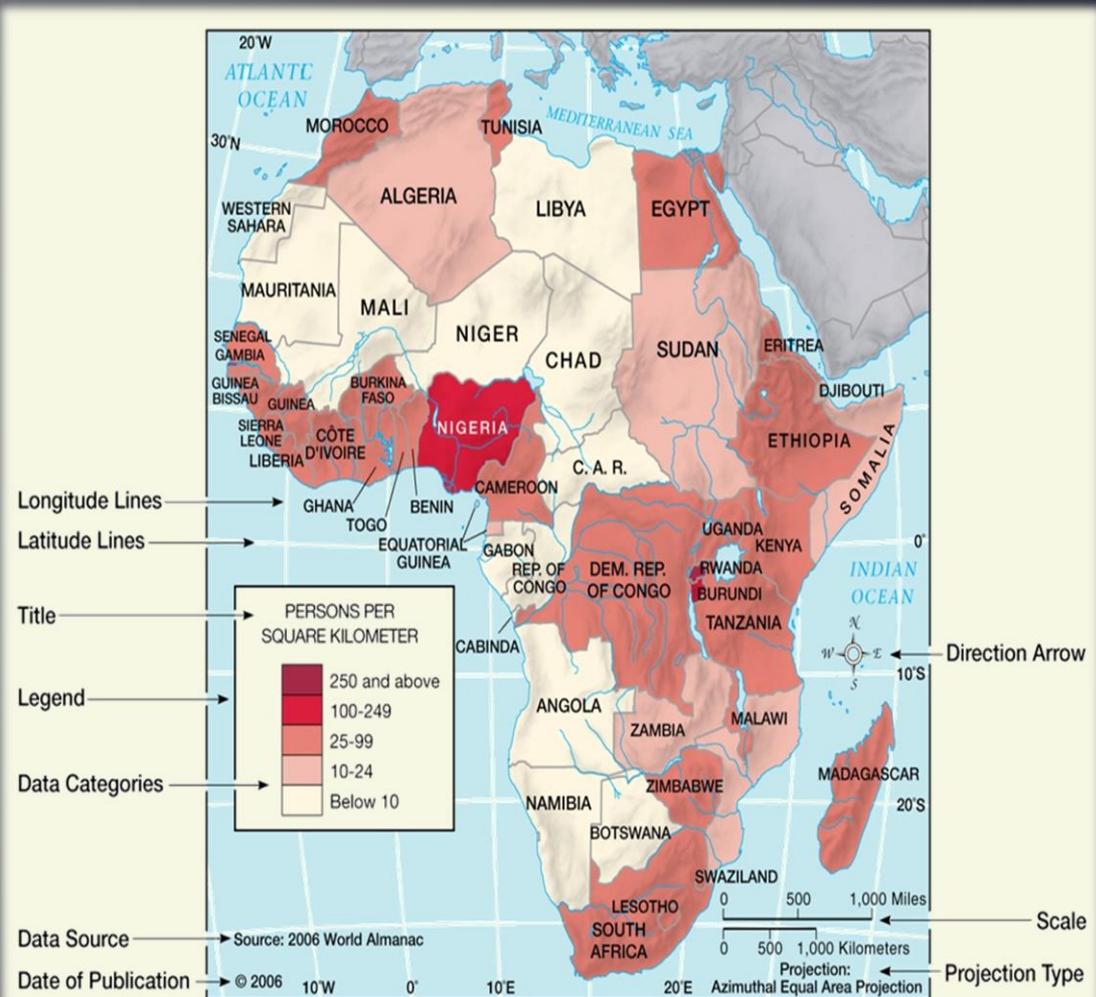
- Title - briefly summarizes the map's content or purpose and identifies the area covered
- Date - the time span in which the map's data were collected
- Legend - explains any symbols used in the map to represent features and quantities





Map Essentials

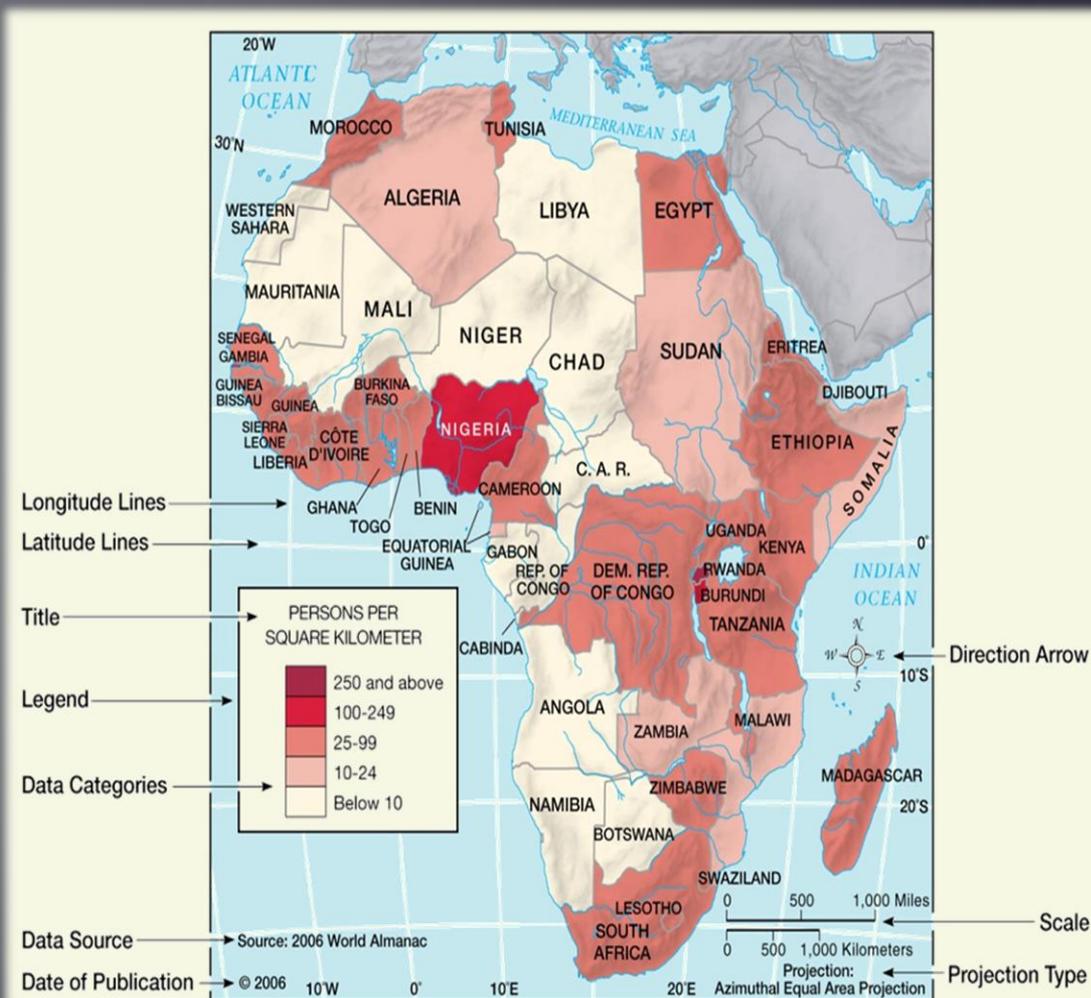
- **Scale** - a graphic, verbal or fractional scale to indicate the relationship between length measured on the map and the corresponding distance on the ground
- **Orientation** - shows direction either through geographic grid or a north arrow

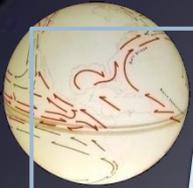




Map Essentials

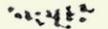
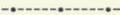
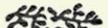
- Location - a grid system, either a geographic grid using latitude and longitude or another system that is expressed like the x and y coordinates of a graph
- Data Source - the source of the data shown on thematic maps
- Projection Type - the type of projection, particularly for small-scale maps





Map Essentials

- All geographical maps are reductions - Scale.
- All maps involve geometrical transformations - Map projection.
- All maps are abstractions of reality - Generalization.
- All maps use symbols to represent elements of reality - Symbolism.

Point features	Linear features	Area features
Tower 	Highway 	Moraine 
Lighthouse 	Railway 	Coral reef 
Bridge 	Powerline 	Lake 
Building 	Trail 	Swamp 
Campsite 	Boundary 	Tidal flat 
Survey marker 	River 	Mangroves 



Map Scale

Scale is the relationship between the length measured on a map and the actual distance that length represents on Earth.

The concepts of “large” and “small” as related to scale are comparative, not absolute.

Ratio

Map distance : Ground distance

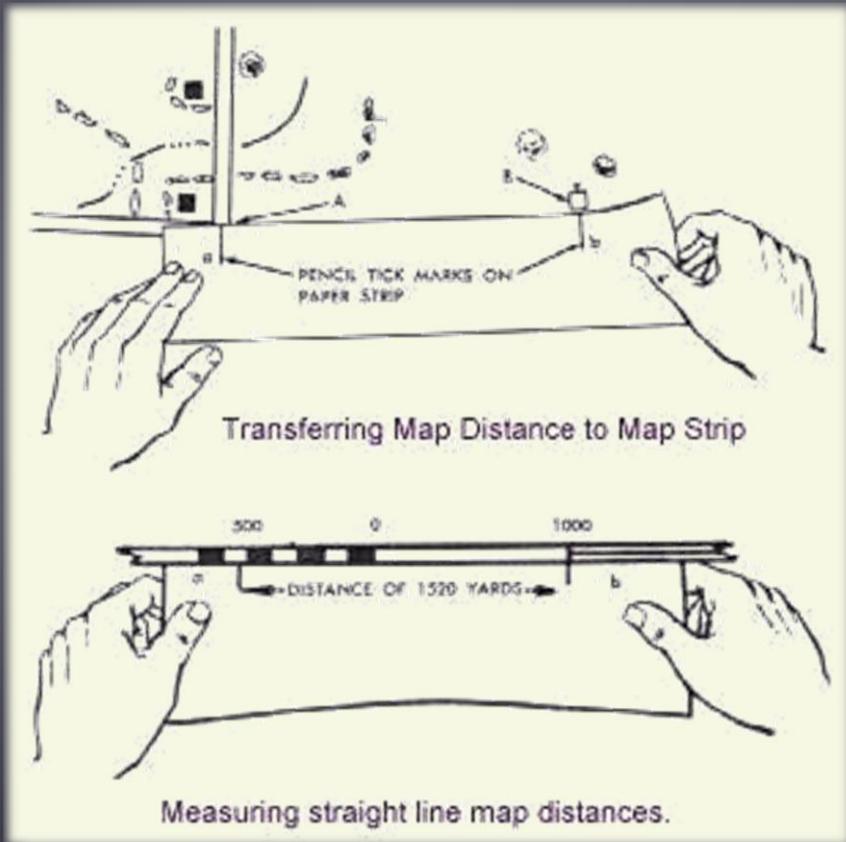
1:1000 - 1:5000 very large

1:5000 - 1:25000 large

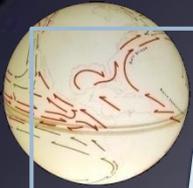
1:25000 - 1:100000 medium

1:100000 - 1:1 mil small

1:1 mil - <1:1 mil very small



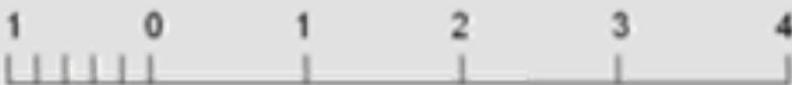
Source: Map Reading, Department of the Army Field Manual, FM 21-26. Washington, D.C.: U.S. Government Printing Office, 1969, p. 4-3.



Map Scale

- There are three expressions of scale.
 - **Ratio/Fractional** - a ratio or fraction that expresses the comparison of map distance with ground distance
 - **Graphic** - a line marked off in graduated distances
 - **Verbal** - words to give the ratio of the map scale length to the distance on the ground

Ratio (Fraction) scale: 1:62,500 or $\frac{1}{62,500}$

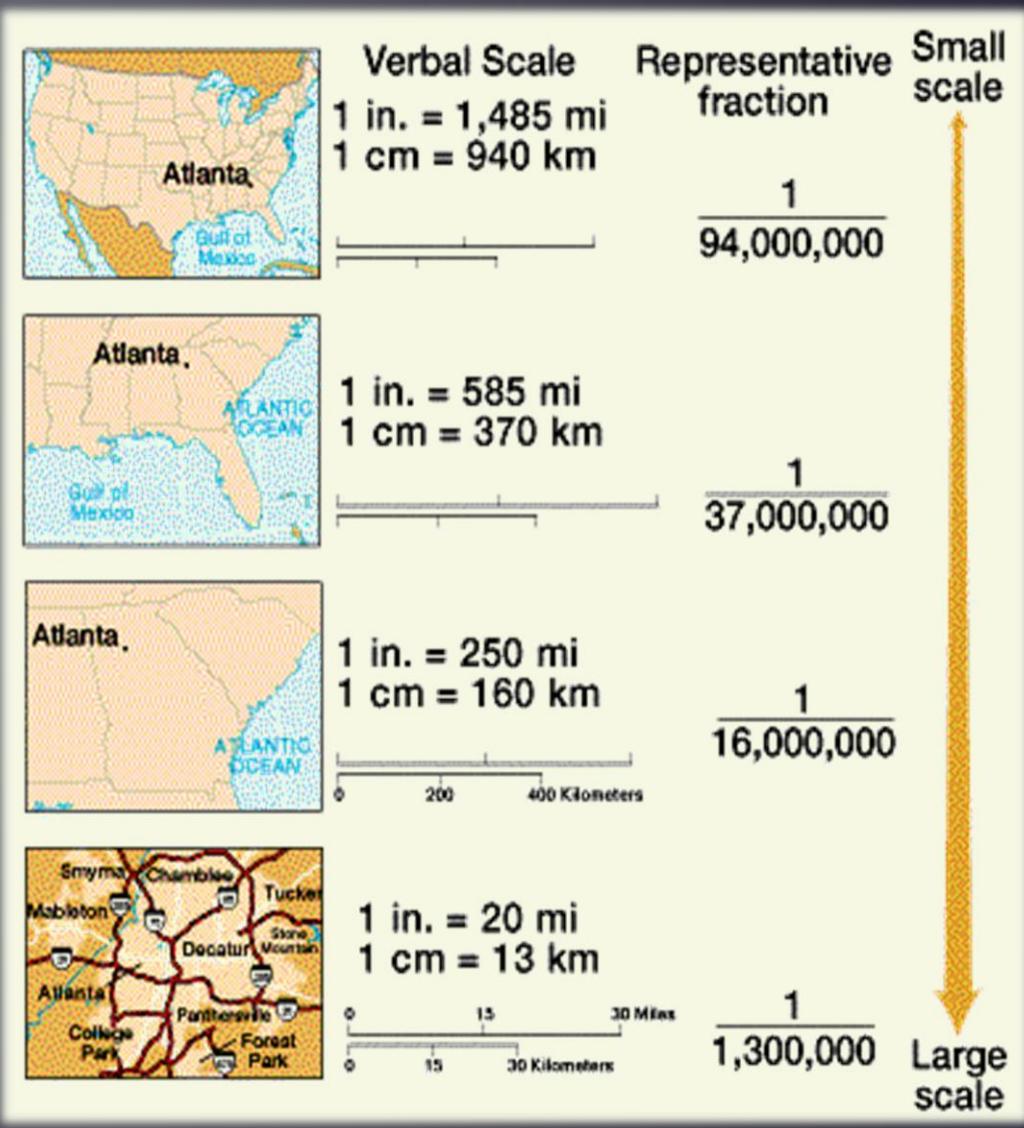
Graphic scale:  1 0 1 2 3 4 Miles

Verbal scale: 1 inch equals 1 mile



Map Scale

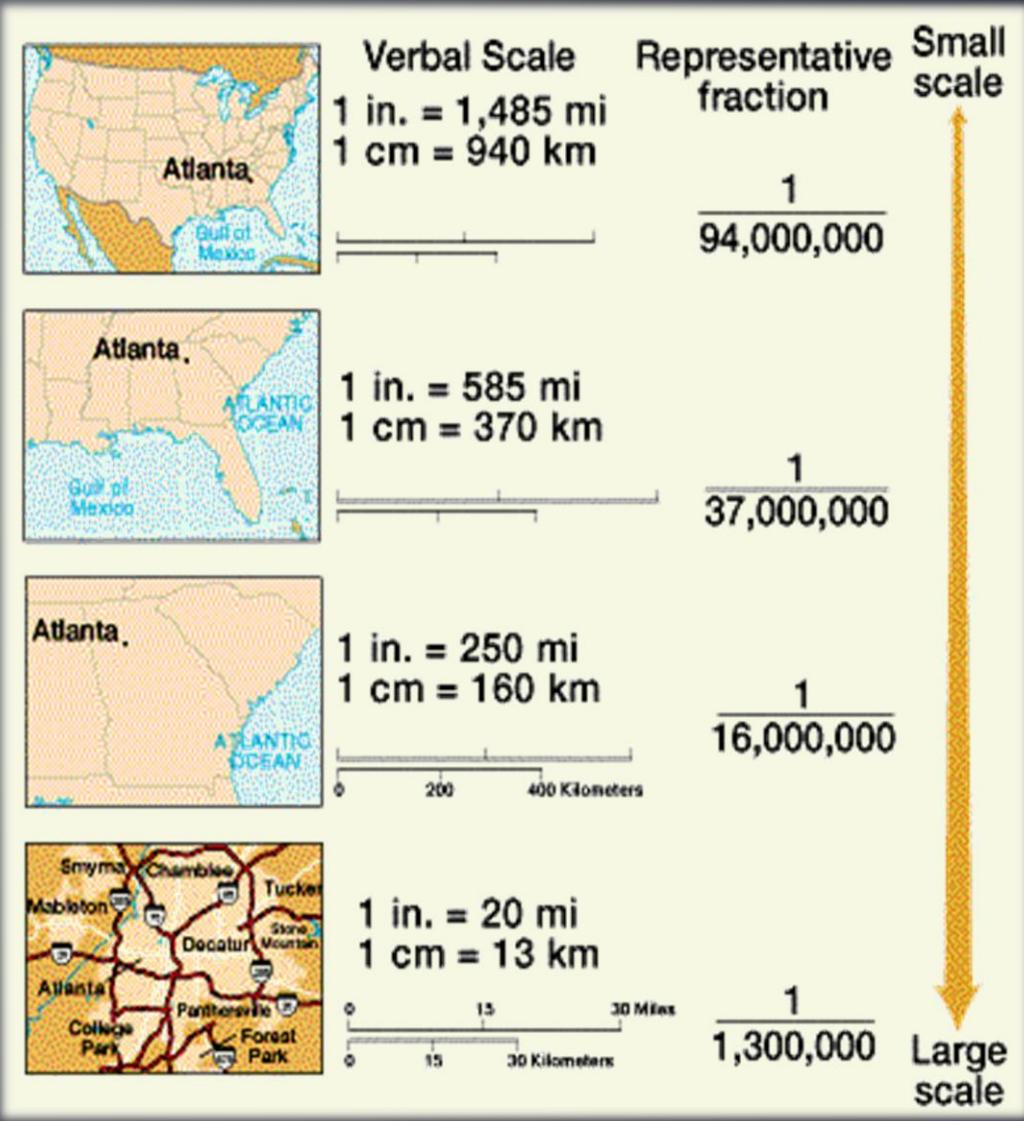
Small scale maps show large areas of land at a small scale. They are called small scale because the representative fraction is relatively small. A map depicting a large area, such as an entire state, is considered a small scale map. In order to show the entire state, the map is scaled down until it is much smaller. A small scale map shows more territory, but is less detailed.





Map Scale

Large scale maps show smaller areas in more detail, such as county or city maps. When you see a ratio of 1:1,300,000, it means that the objects portrayed on the map are drawn at 1/1,300,000 their actual size. 1/1,300,000 is a larger fraction than 1/94,000,000, and thus the 1:1,300,000 map is of a larger scale.





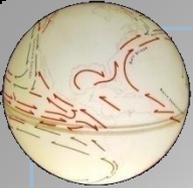
Map Scale

Small-scale map



Large-scale map





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"Google map shows that we have a lot of interesting things to see on this island."

Continued in
Portraying Earth Part II