01 – Basic Concepts

Key Issue #1

How do geographers describe where things are?

Geography vs History

In his framework of all scientific knowledge, the German philosopher Immanuel Kant (1724 – 1804) compared geography and history.

Geography vs History

Geographers –

- identify the location of important places and explain why human activities are located beside one another.

Geography vs History

Historians –

- identify the dates of important events and explain why human activities follow one another chronologically.

Geography vs History

Geographers –

- ask where and why.

Geography vs History

Historians –

- ask when and why.

Geography vs History

Geographers –

- Organize material spatially.

Geography vs History

Historians –

- Organize material chronologically.

Geography vs History

Geographers –

- recognize that an action at one point on Earth can result from something happening at another point, which can consequently affect conditions elsewhere.

Geography vs History

Historians –

- recognize that an action at one point in time can result from past actions that can in turn affect future ones.

Learning Outcomes

- 1.1.1: Explain differences between early maps and contemporary maps.
- 1.1.2: Describe the role of map scale and projections and making maps.

Learning Outcomes

- 1.1.3: Explain how latitude and longitude are used to locate points on Earth's surface.
- 1.1.4: Identify contemporary and analytic tools, including remote sensing, GPS, and GIS.

How Do Geographers Describe Where Things Are?

- **Geography** is the study of where things are found on Earth's surface and the reasons for the locations.

How Do Geographers Describe Where Things Are?

- Human geographers ask two simple questions…
  1. Where are people and activities found on Earth?
  2. Why are they found there?

Maps

- A **map** is a two-dimensional or flat-scale model of Earth's surface, or a portion of it.
- **Cartography** is the science of mapmaking.

Maps

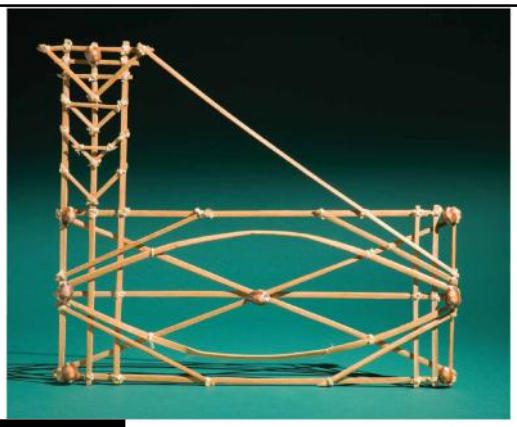
- Maps serve two purposes…
  1. As a reference tool to identify an object's absolute and relative location.
  2. As a communications tool to convey the distribution of human activities or physical features.

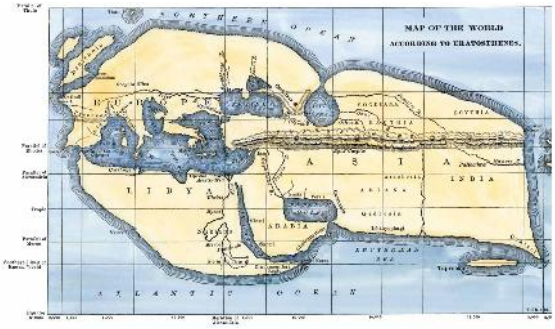
Early Mapmaking

- Earliest maps were reference tools—simple navigation devices to show a traveler how to get from Point A to Point B.
- First world map prepared by Eratosthenes (276–194 B.C.)

Early Mapmaking

- Improvements to world map later made by Ptolemy.
- After Ptolemy, advancements in cartography primarily made outside of Europe by Chinese and Islamic world.
  - Mapmaking revived during the Age of Exploration and Discovery.




MAP OF THE WORLD
ACCORDING TO ERATOSTHENES.
NORTHERN OCEAN
ASIA
INDIA
LIBYA
ARABIA
ATLANTIC OCEAN

Contemporary Mapping

- Shift from simply a tool that provides location reference to a tool used by geographers to communicate complex geographic phenomena.

Map Scale

- Level of detail and the amount of area covered on the map depend on its **map scale**.
  - Relationship of a feature's size on a map to its actual size on Earth

Map Scale

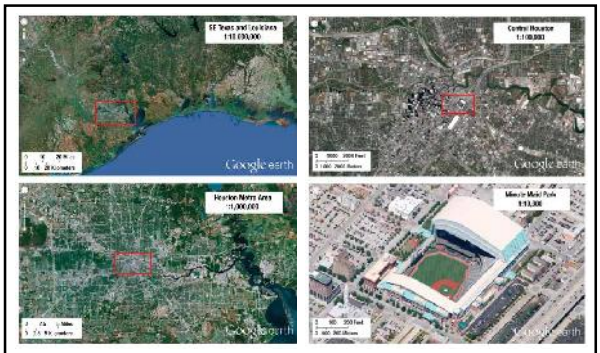
- Map scale is presented in three ways…
  1. Ratio or Fraction Scale: Ex. 1:24,000 or 1/24,000
     - Number on left is one unit of distance, while number on right represents same unit of distance on Earth's surface.

Map Scale

2. Written Scale: Ex. 1 inch equals 1 mile
   - Number on left is one unit of distance, while number on right represents a different unit of distance on Earth's surface.
   - Problems with scaling up and down

Map Scale

3. Graphic Scale: Usually consists of a bar line marked to show distance on Earth's surface
   - Distance between two points can be overlaid on the scale bar to determine the distance on Earth's surface.

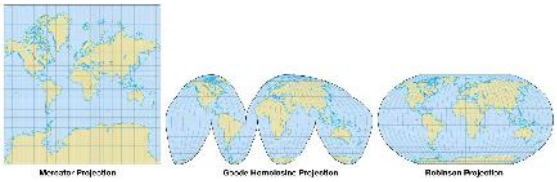


Projection

- Scientific method of transferring locations on Earth's surface to a flat map is called **projection**.
- Earth's spherical shape causes distortion when drawing it on a flat piece of paper.

Projection

- Four types of distortion
  - **Shape** of an area can be distorted.
  - **Distance** between points may become increased or decreased.
  - **Relative size** of different areas can be altered.
  - **Direction** between points can be distorted.



Choropleth Map – Etymology?

- A **choropleth map** is a thematic map that uses differences in shading, coloring, or the placing of symbols within predefined areas to indicate the average values of a property or quantity in those areas.

Choropleth Map

Isoline Map – Etymology?

- An **isoline** map has continuous lines joining points of the same value. Isoline mapping is used to interpret the information on some thematic maps.

Isotherm Map – Etymology?

Isotherm Map – Etymology?

i·so·therm

Origin

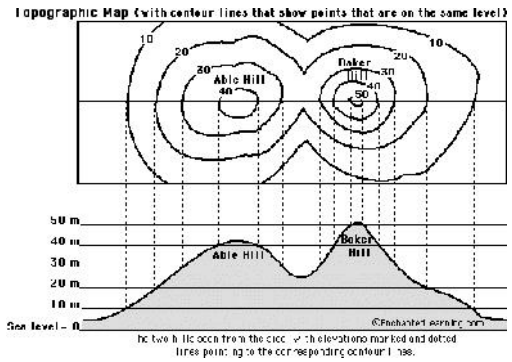
GREEK
isos
equal

GREEK
thermē
heat

FRENCH
Isotherme → Isotherm
mid 19th century

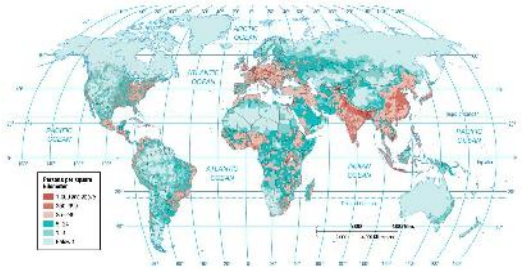
mid 18th century: from French *isotherme*, from Greek *isos* 'equal' + *thermē* 'heat'

Topographic Map – Etymology?



Choropleth or Isoline?

Choropleth or Isoline



Choropleth or Isoline

Which better for population density? Why?

Choropleth or Isoline Map?

Geographic Grid

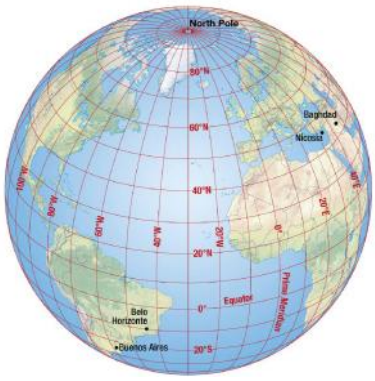
- Geographic grid is a system of imaginary arcs drawn in a grid pattern on Earth's surface.

Geographic Grid

- **Meridians** are arcs drawn between the North and South poles. Each is numbered, according to a system known as **longitude**.
  - Values range from 0º (**prime meridian**) to 180º east or west longitude.

Geographic Grid

- **Parallels** are arcs drawn parallel to the equator and at right angles to meridians. Each is numbered, according to a system known as **latitude**.
  - Values range from 0º (**equator**) to 90º north or south.



Geographic Grid

- Points on Earth's surface can be communicated by referencing points of latitude and longitude intersection.
  - Ex. Denver, Colorado's location is 40º north latitude and 105º west longitude.

Geographic Grid

- Further accuracy can be achieved by dividing each degree into 60 minutes and each minute into 60 seconds.
  - Ex. Denver, Colorado's state capital building is 39º 42' 2" north latitude and 104º 59' 04" west longitude.

Telling Time

- Earth as a sphere is divided into 360º of longitude.
  - Divide 360º by 24 time zones (one for each hour of day) equals 15º.
    - Each 15º band of longitude is assigned to a standard time zone.

Telling Time

- **Greenwich Mean Time (GMT)** is…
  - Located at the prime meridian (0º longitude).
    - Passes through Royal Observatory at Greenwich, England
  - Master reference time for all points on Earth.

Telling Time

- The **International Date Line** is…
  - Located at 180º longitude.
    - Position deviates from 180º longitude at times to accommodate various nearby nation-states.

Telling Time

- You move the clock back 24 hours (one day), if you are heading eastward toward America.
- You move the clock ahead 24 hours (one day), if you are heading westward toward Asia.

Contemporary Tools

- **Geographic Information Science (GIScience)** involves the development and analysis of data about Earth acquired through satellite and other electronic information technologies.

Contemporary Tools

- Collecting Data: Remote Sensing
  - Acquisition of data about Earth's surface from a satellite orbiting Earth or from other long distance methods is known as remote-sensing.

Contemporary Tools

- After sensors scan Earth's surface, the individual pixels are transmitted to a receiving station on Earth where a computer assembles each of them into an image.

Contemporary Tools

- Map created using remotely sensed data is essentially a grid of rows and columns of pixels; each representing the radiation being reflected on Earth's surface at a specific point.

Contemporary Tools

- Pinpointing Locations: GPS
  - **Global Positioning System (GPS)**
    - System that accurately determines the precise position of something on Earth
    - Selective availability turned off 1 May 2000.

Contemporary Tools

- GPS in the U.S. includes three elements
  - Satellites placed in predetermined orbits
  - Tracking stations to monitor and control satellites
  - Receiver that can locate at least four satellites, figure out its distance from each, and use the information to calculate its precise location

Contemporary Tools

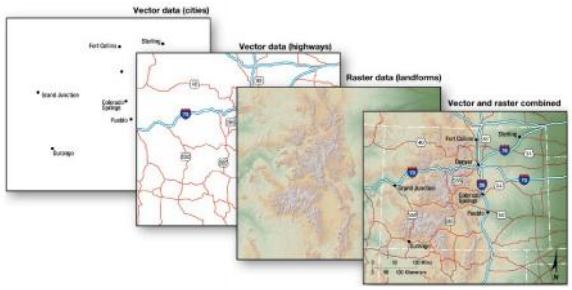
- Applications
  - Turn-By-Turn directions in vehicles
  - Navigational aid to pilots and ship captains
  - Provide location for social media applications in a smartphone

Contemporary Tools

- Layering Data: GIS
  - A **geographic information system (GIS)** is a computer system that captures, stores, queries, analyzes, and displays geographic data.
  - Data are stored in layers. (Google Earth)

Contemporary Tools

- Layers can be compared to show relationships among different kinds of information.
- Data can be overlaid in one GIS from a variety of different sources through a process known as a **mashup**.



The End