ENV203/GEO205: Introduction to Geography

Lecture 03-04

MAP ELEMENTS...

Frame Line and Neat Line

Inset

Title and Subtitle

Legend

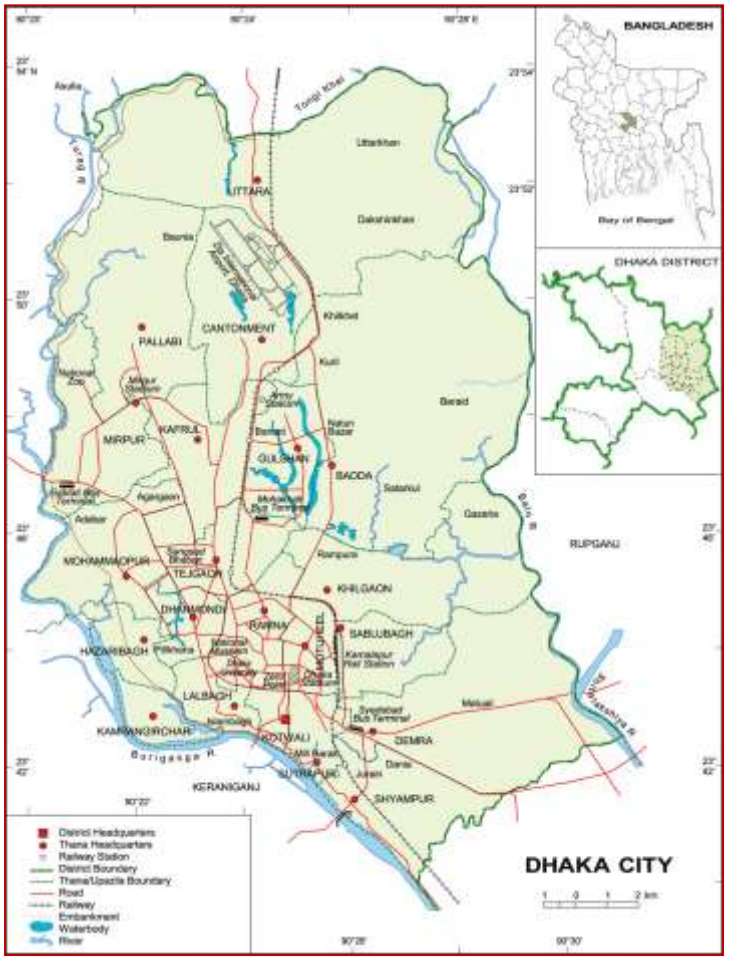
Data Source

Scale

Orientation/North Line

Latitude and Longitude

Labels



MAP ELEMENTS…

Frame Line and Neat Line

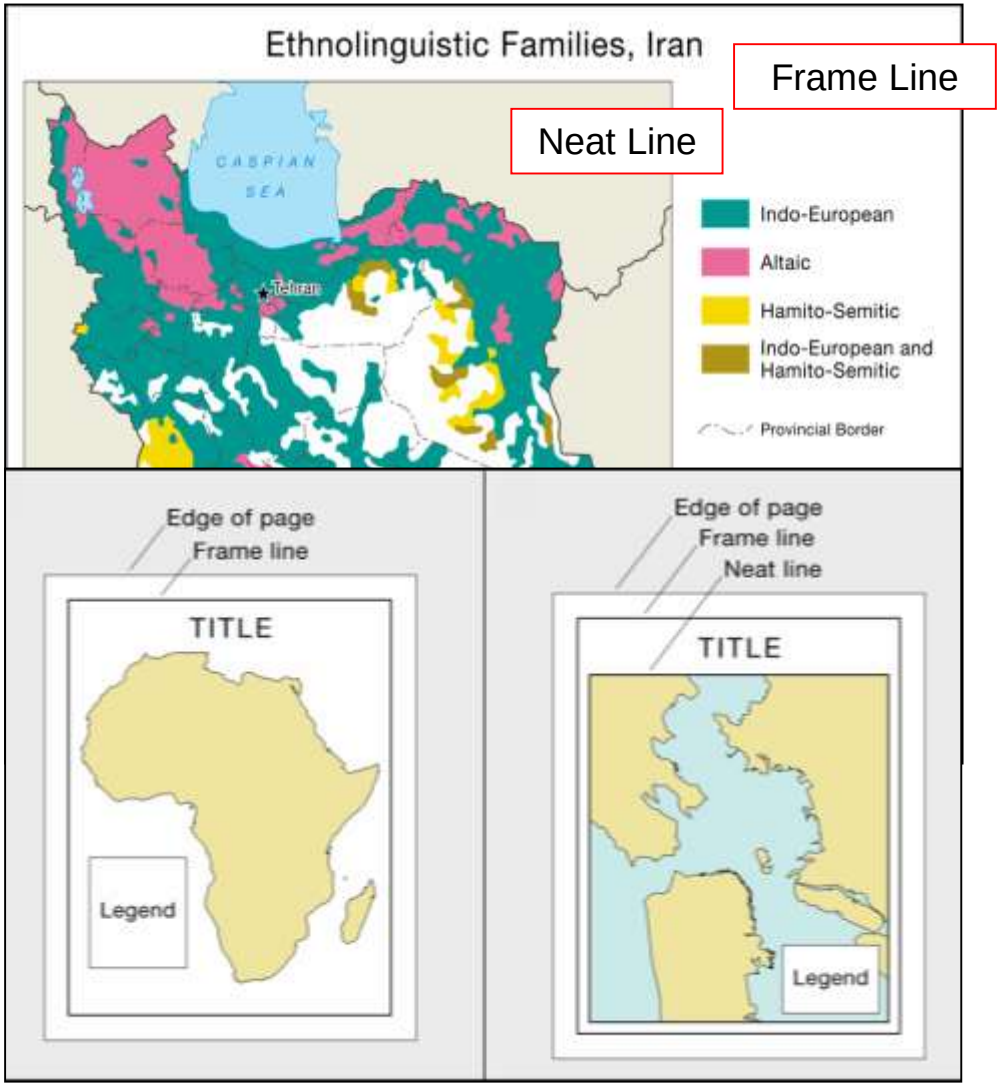
Frame Line:

Encloses all other map elements.

Neat Line:

Is used to crop (limit the extent of) the mapped area.

A Neat Line is used when the mapped area needs to be cropped.



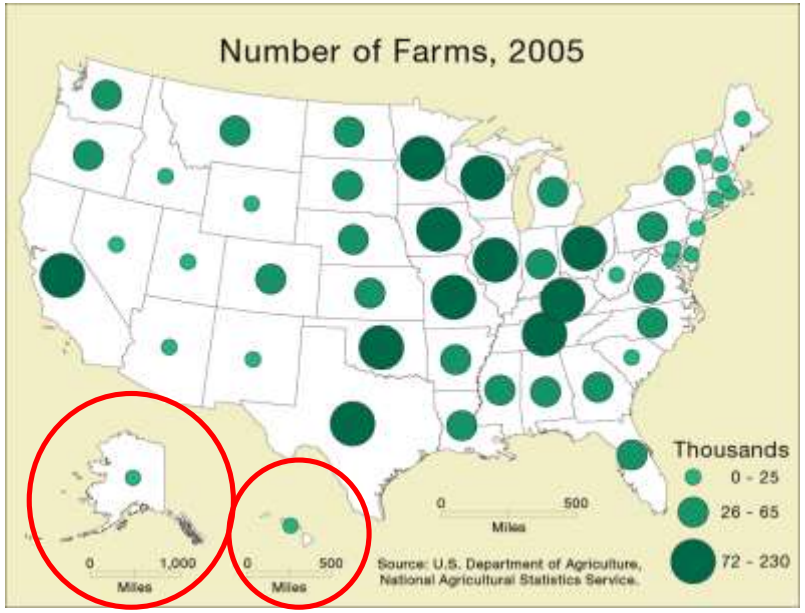
MAP ELEMENTS…

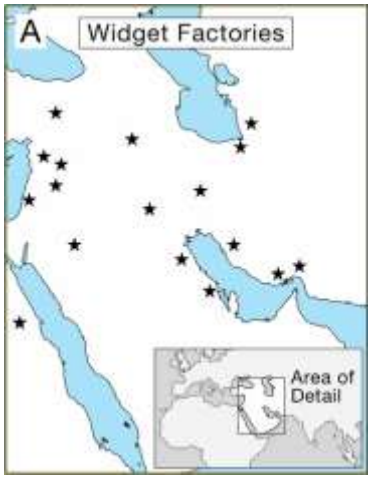
Inset

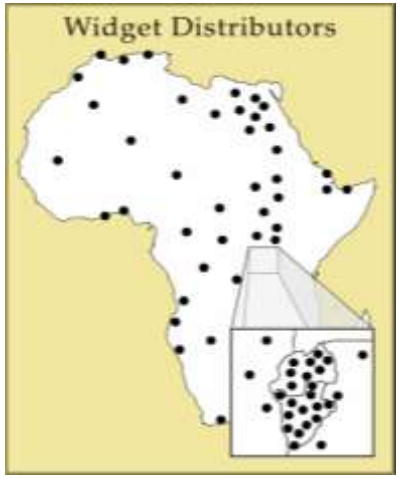
A smaller map included within the context of a larger map.

Can be used to show the primary mapped area in relation to a larger, more recognizable area (a locator map).

Can be used to enlarge important or congested areas (a zoom, or blow-up map).



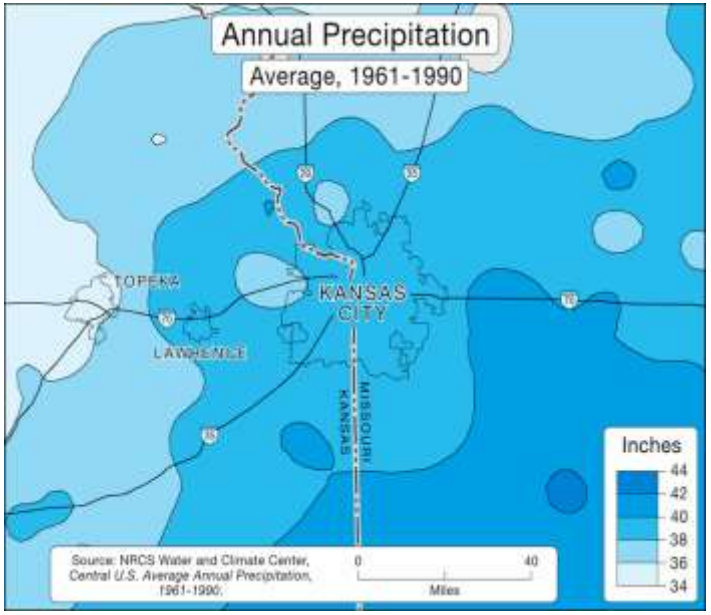


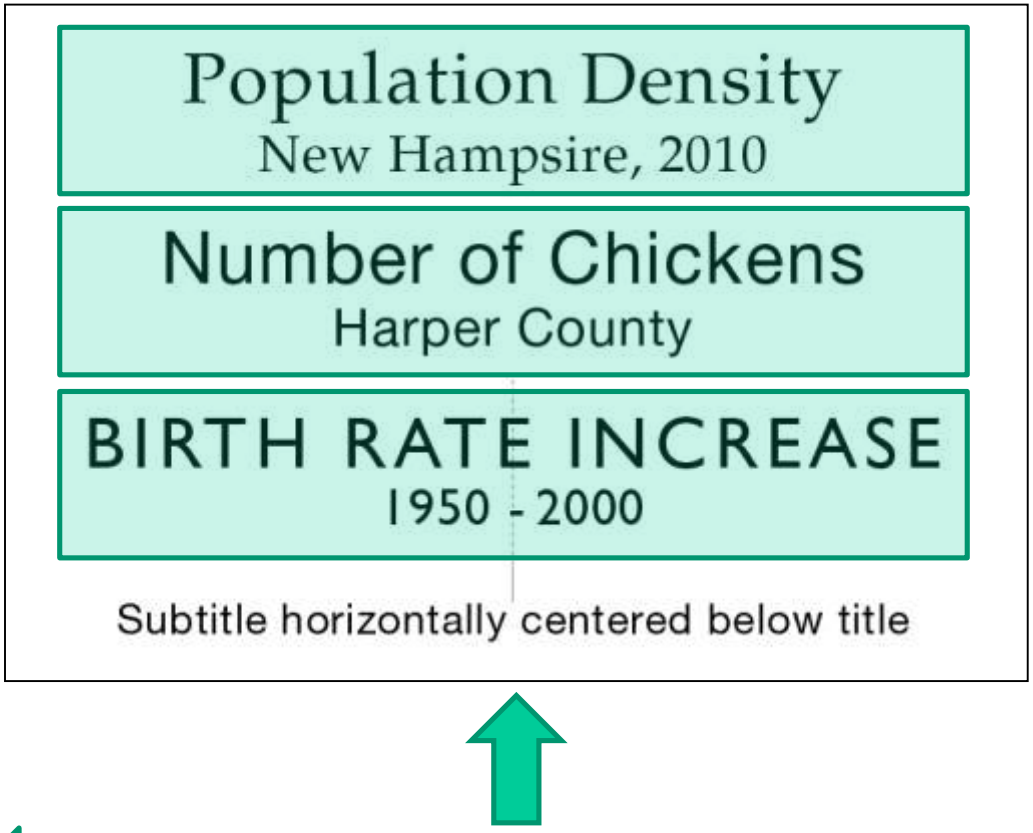


MAP ELEMENTS…

Title and Subtitle

The title and subtitle tell the map user what the map is about.



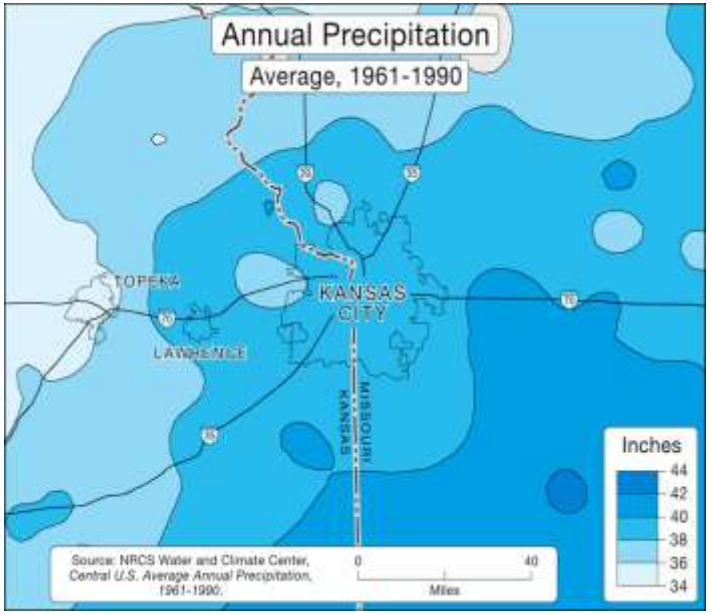


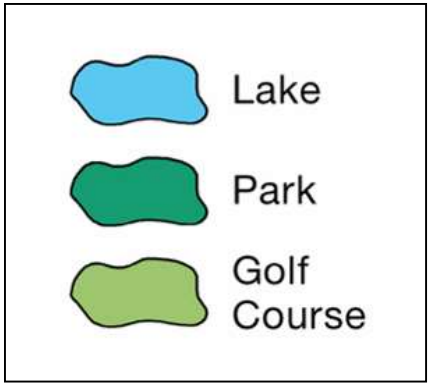
Titles with Subtitles

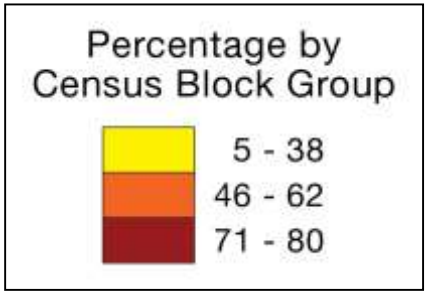
MAP ELEMENTS…

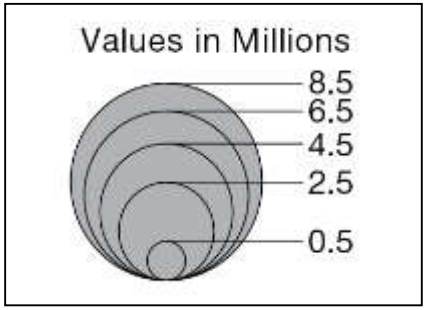
Legend

The legend defines the symbols found on a map.









MAP ELEMENTS…

Data Source

Allows the map user to determine where thematic data were obtained.

Some Examples…

Source: Census 2010, *Summary File 3*, U.S. Census Bureau.

Data Source: *ESRI Data & Maps*, 2007.

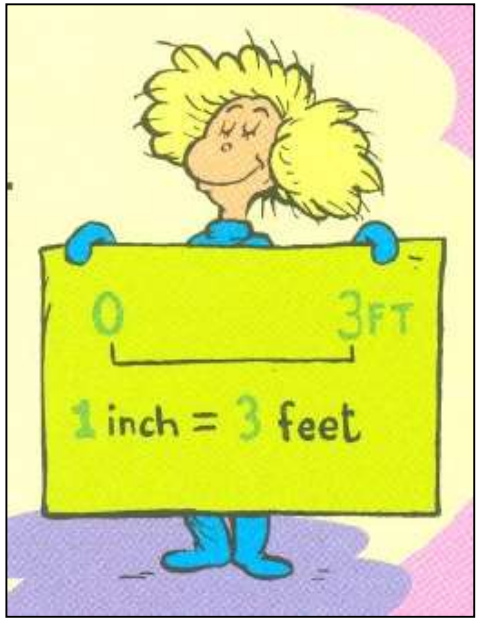
Source: United States Central Intelligence Agency.
Map File #505103 (547149) 2-82.

Data Source: National Atlas of the United States,
http://www-atlas.usgs.gov/mld/huralll.html

MAP ELEMENTS…

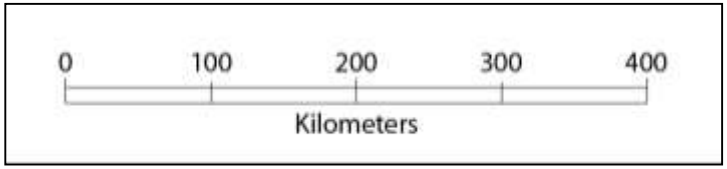
Scale

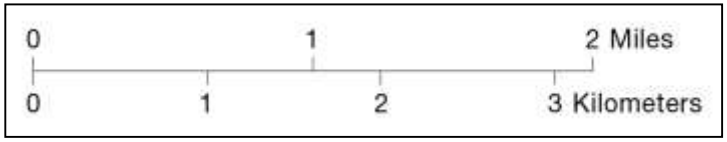
Indicates the amount of reduction that has taken place on a map, or allows the map user to measure distances.



Can take three forms

- **Representative Fraction (1:24,000)**
- **Verbal Scale (1 Inch to 1 Mile)**
- **Bar Scale or Scale Bar**





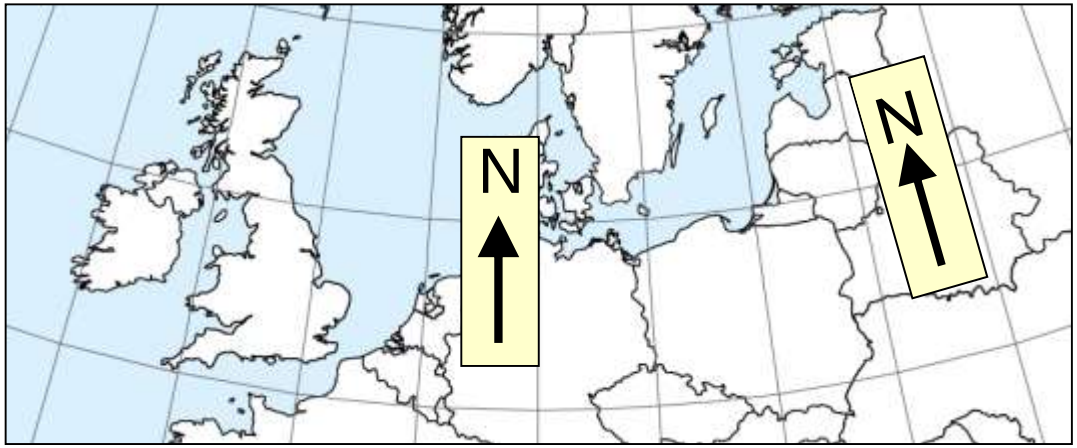
MAP ELEMENTS…

Orientation/North Line

The indication of North on a map.

It can be indicated by…

- North Arrow
- Graticule/Grid Lines/Lat. & Long.

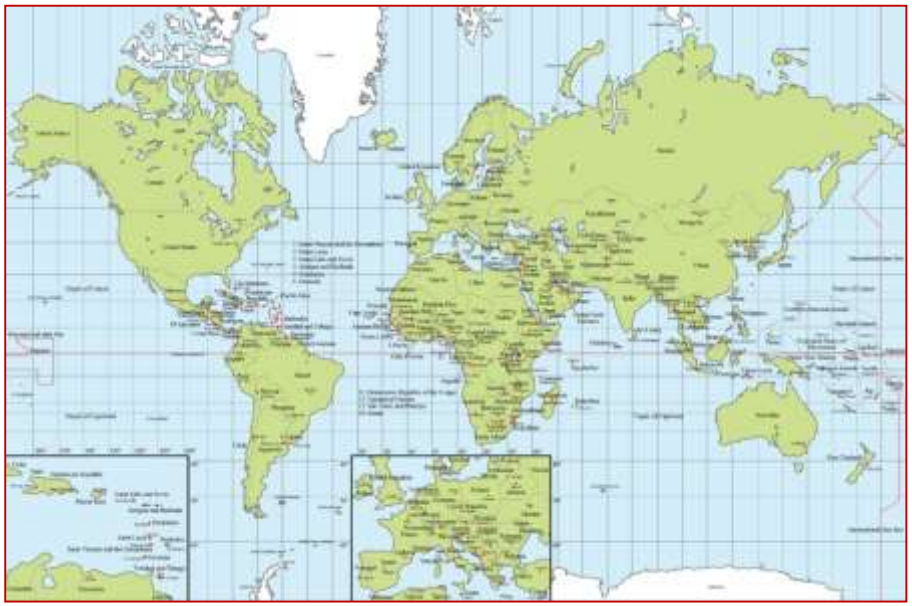


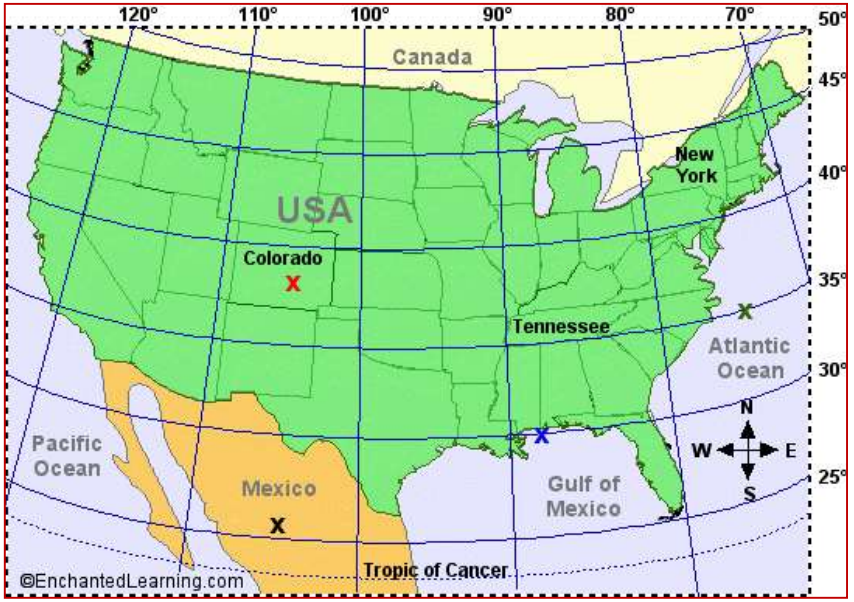
MAP ELEMENTS...

Latitude and Longitude

Represents Grid lines with different types of projection.

It represented by Degree, Minutes and Seconds.





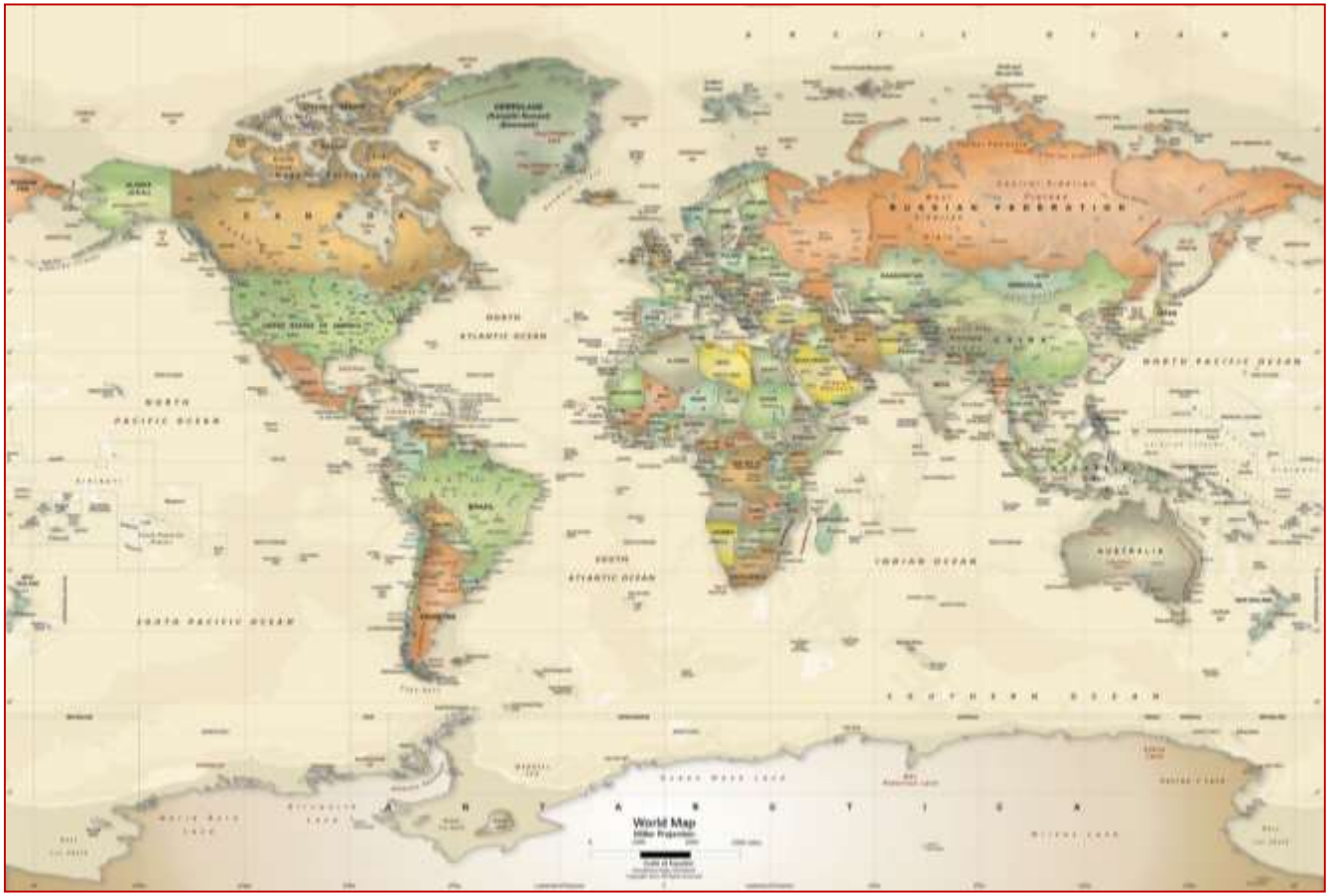
MAP ELEMENTS…

Labels

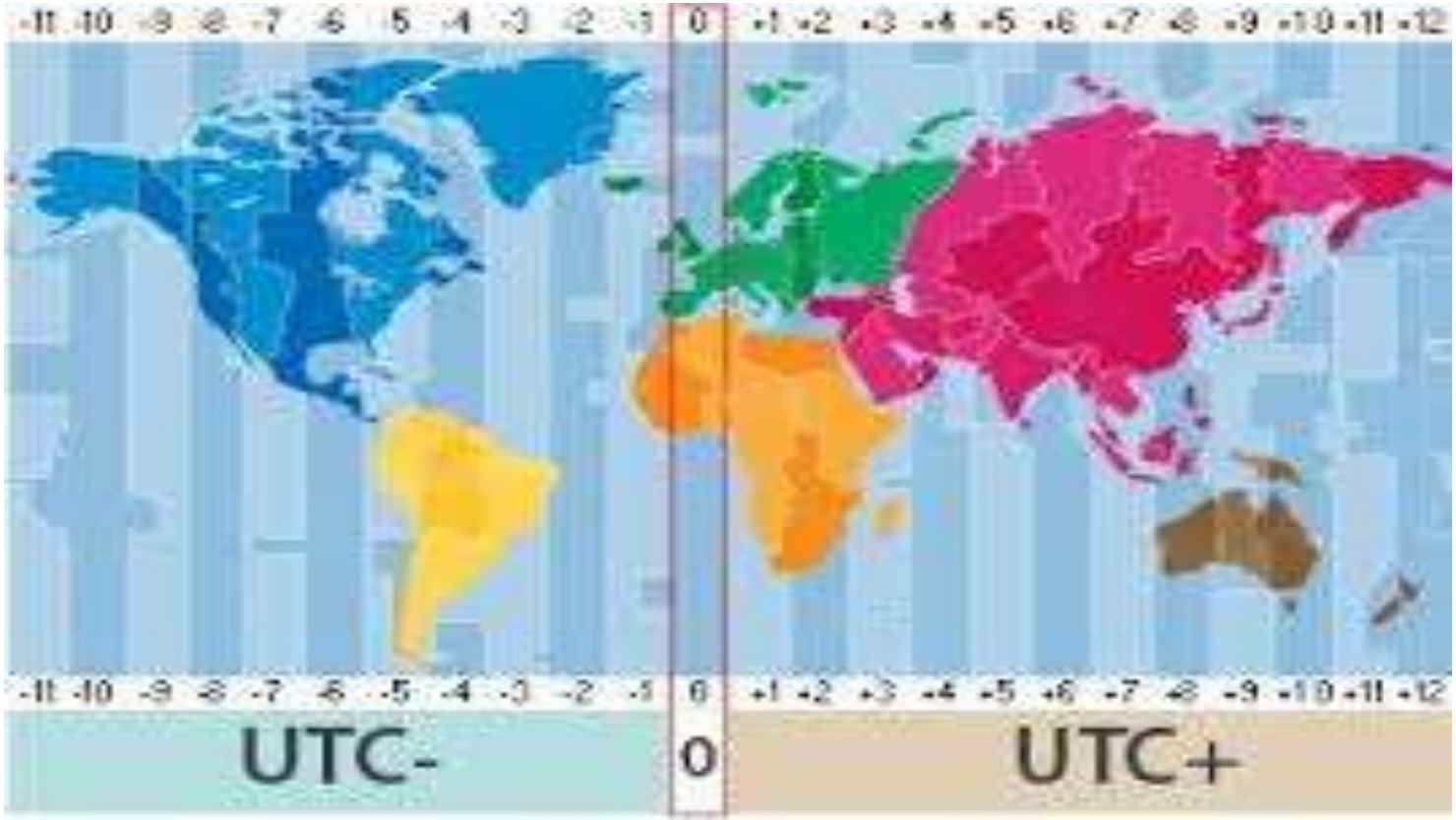
Font size should be taken into account.

Water bodies should be written in *Italics*.

Hierarchy of places should be reflected by text size.



Time Zone



TIME ZONES

- In the International Meridian Conference it was decided to use the **Time Zones System.**

The Royal observatory, Greenwich, is the home of the prime meridian of the world. Longitude 0hr 0min 0sec.

Time Zones

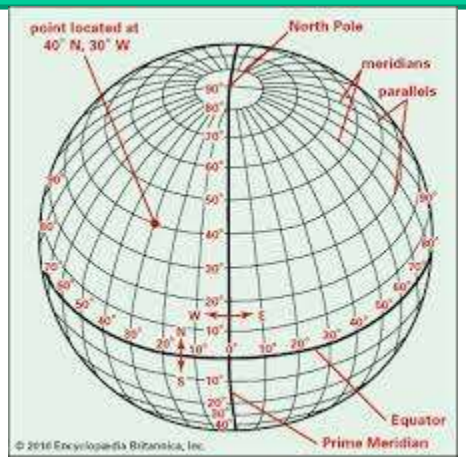
Greenwitch Mean Time

- GMT- Solar time (**time** measured by Earth's rotation relative to the **Sun)** at the 0 degree longitude (Prime Meridian)
- UTC (Coordinated universal time)
- Replaced GMT in 1972 as the time standard
- Time Zones- region on Earth that use the same local time/ standard time


GREENLAND
-3
-4
ALASKA (U.S.)
-9
CANADA
-4
-3.5
-8
-7
-6
-5
UNITED STATES
HAWAII (U.S.)
-10
MEXICO
CUBA
THE BAHAMAS
DOMINICAN REPUBLIC
JAMICA
HAITI
VENEZUELA
COLOMBIA
GALAPAGOS ISLANDS
-6
KIRIBATI
MARQUESAS ISLANDS -9.5
COOK ISLANDS -10
FRENCH POLYNESIA
PITCAIRN ISLANDS -8
EASTER ISLAND -6
PERU
BRAZIL
BOLIVIA
PARAGUAY
URUGUAY
CHILE
ARGENTINA
FALKLAND ISLANDS -4
SOUTH GEORGIA AND SOUTH SANDWICH ISLANDS -2
Greenwich Meridian
SVALBARD
JAN MAYEN (NORWAY)
ICELAND +0
NORWAY
SWEDEN
FINLAND
FRANZ JOSEF LAND
NOVAYA ZEMLYA
SEVERNAYA ZEMLYA
NEW SIBERIA ISLANDS
R U S S I A N F E D E R A T I O N
+3
+5
+7
+9
+10
+11
+12
UNITED KINGDOM
REP. OF IRELAND
POLAND
BELARUS
GERMANY
UKRAINE
FRANCE
ROMANIA
BULGARIA
ITALY
AZORES -1
PORTUGAL
SPAIN
GREECE
TURKEY
KAZAKHSTAN +6
MONGOLIA
CHINA +8
KOREA
JAPAN +9
IRAN +3.5
IRAQ
+4.5
PAKISTAN
SAUDI ARABIA +3
UAE
INDIA +5.5
MOROCCO
ALGERIA +1
LIBYA
EGYPT +2
WESTERN SAHARA +0
CAPE VERDE -1
MAURITANIA
MALI
NIGER
CHAD
SUDAN
YEMEN
OMAN
GUINEA BISSAU
SENEGAL
GUINEA
SIERRA LEONE
NIGERIA
CAMEROON
CONGO
SOUTH SUDAN
ETHIOPIA
SOMALIA
EQUATORIAL GUINEA
GABON
DEMOCRATIC REP OF THE CONGO
KENYA
SEYCHELLES
ASCENSION
ST. HELENA
TANZANIA
ANGOLA
ZAMBIA
NAMIBIA
BOTSWANA
MOZAMBIQUE
MADAGASCAR
MAURITIUS
REUNION
SWAZILAND
SOUTH AFRICA
LESOTHO
TRISTAN DA CUNHA
GOUGH ISLAND
PRINCE EDWARD ISLANDS
KERGUELEN ISLANDS
HEARD AND MCDONALD ISLANDS
LACCADIVE ISLANDS
MALDIVES
SRI LANKA +5.5
BRITISH INDIAN OCEAN TERR.
COCOS ISLANDS
CHRISTMAS ISLAND
THAILAND
VIETNAM
PHILIPPINES +8
MALAYSIA
BRUNEI
SINGAPORE
INDONESIA
MICRONESIA
NORTHERN MARIANA ISLANDS
MARSHALL ISLANDS 12
PAPUA NEW GUINEA
SOLOMON ISLANDS
KIRIBATI 12
TOKELAU +13
SAMOA -11
VANUATU
NEW CALEDONIA
FIJI 12
TONGA 13
A U S T R A L I A
+8
+9.5
+10
NORFOLK ISLAND 11.5
KERMADEC ISLANDS 12
LORD HOWE ISLAND
NEW ZEALAND
TASMANIA
ALEUTIAN ISLANDS
JOHNSTON ATOLL -10
International Date Line
Time Earlier
Time Later
©www.timetemperature.com

Calculating Time

Earth moves West to East



24 hrs=360°

1 hr=360/24=15°
1°= 4 mins
1hr=60mins=15°

It takes 24 hrs to complete the spin

BASICS OF GIS

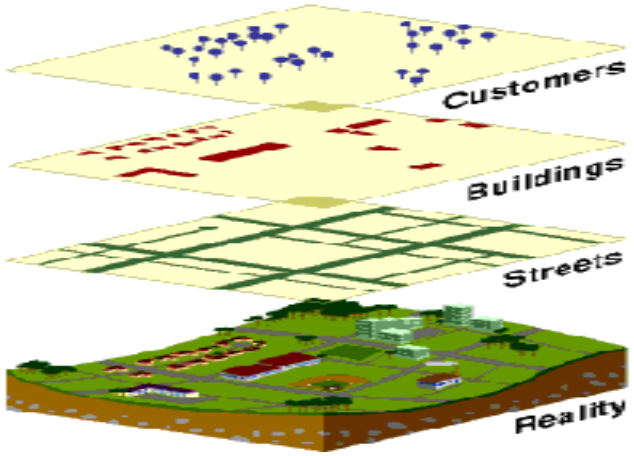
GIS: WHAT IS GIS?

A map connected to a database.

GIS is a system of hardware and software used for storage, retrieval, mapping, and analysis of geographic data.

GIS Combines Physical/Spatial Data and Attribute Data.

Physical Data : *Road,* Area, Building, Lake, etc.
Attribute Data : Width, Population, # of Plot Boundary, Depth, etc.



BASICS OF GIS

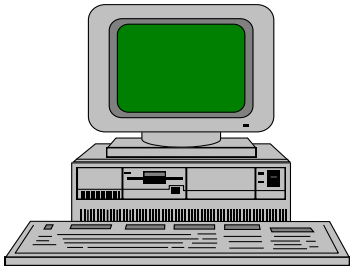
THERE ARE A NUMBER OF DEFINITIONS:

GIS is much more than a container of maps in digital form.

A GIS is a computerized tool for solving geographic problems.

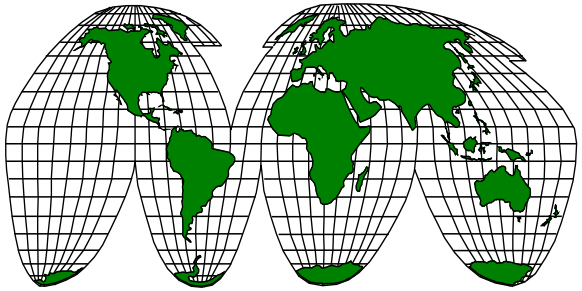
GIS is a spatial decision support system.

Information system used for capturing, storing, updating, manipulating & analyzing data.



Information System

+



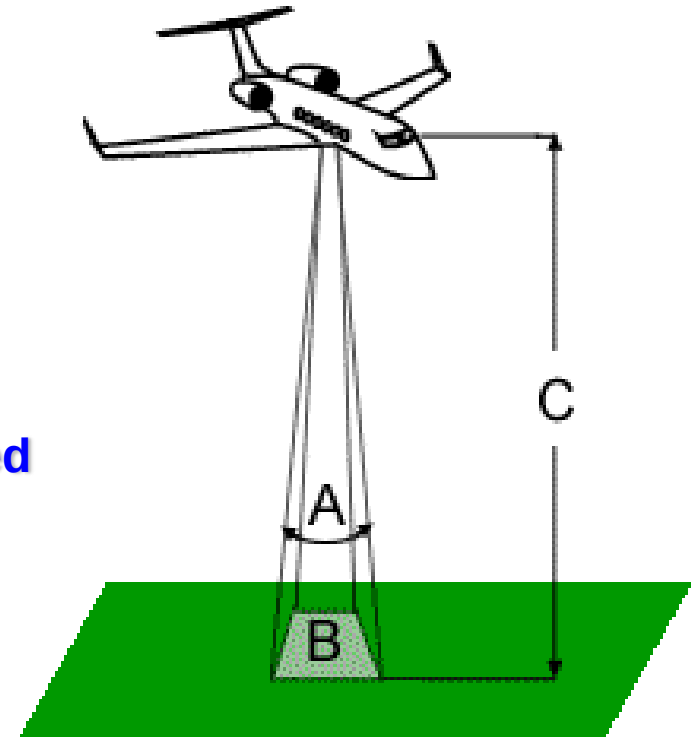
Geographic Position

BASICS OF RS

RS: DEFINITION OF REMOTE SENSING

The science (and art) of…

- **acquiring information about an object,**
- **without entering in contact with it,**
- **by sensing and recording reflected or emitted energy and**
- **processing,**
- **analyzing, and**
- **applying that information.**



BASICS OF RS

HISTORY OF REMOTE SENSING

1609 – Invention of the telescope

1859 – First Aerial Photographer (Nadar)

1862 – US Army Baloon Corp

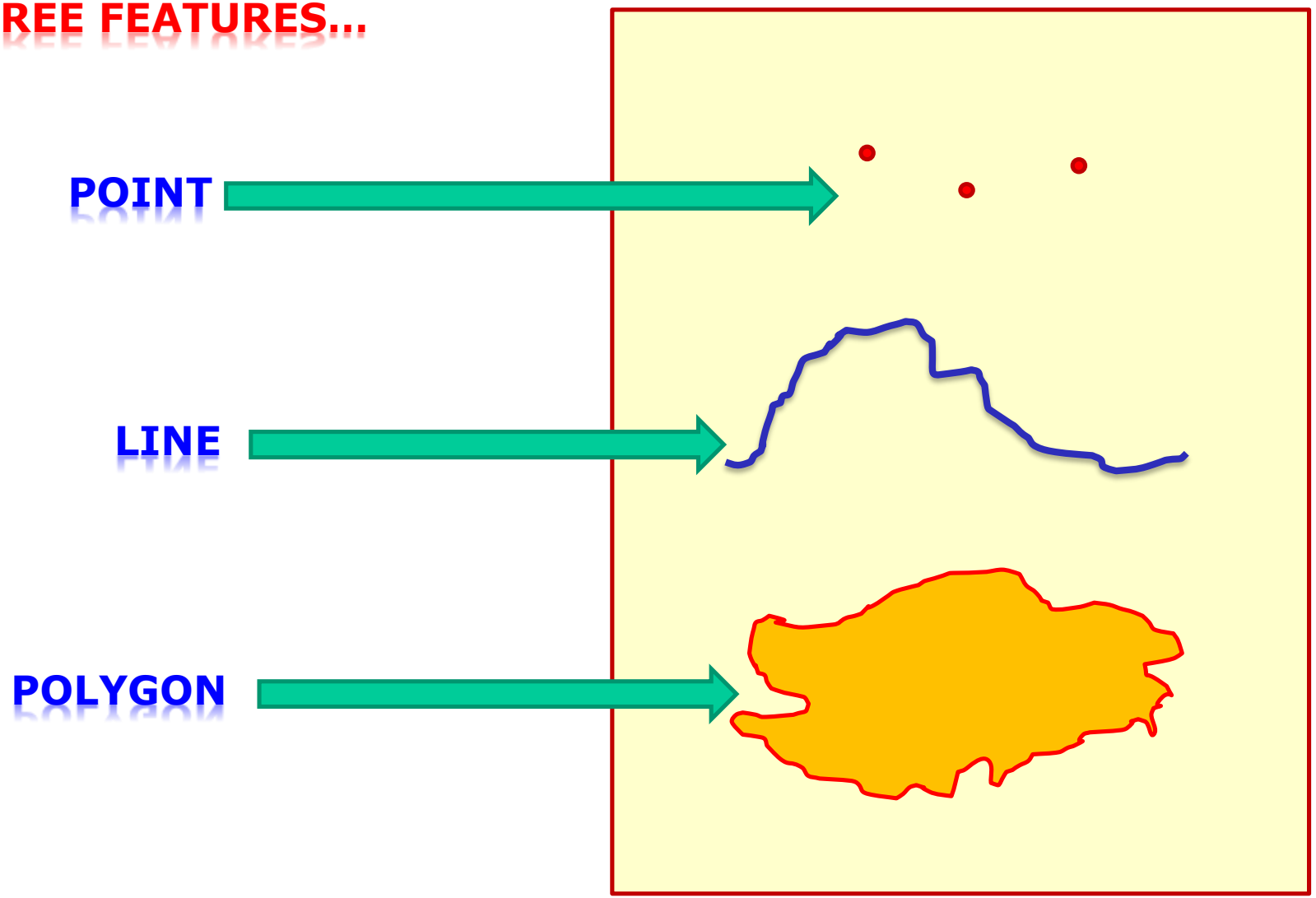
1890 – Kite photography, Pegion Camera, etc

1908 – First photos from an Airplane

1947 – Space

POINT LINE AND POLYGON

THREE FEATURES...



ATTRIBUTE DATA TYPES

POINT…

Specific Location
Cyclone Shelter: Spatial Data

What will be the Attribute Data?

Attribute Data:
Area in Acre
Village
Union
Upazila
District
Country
Capacity
Year of establishment
Number of room
Building type
Number of tubewell
Number of toilet
And many more……

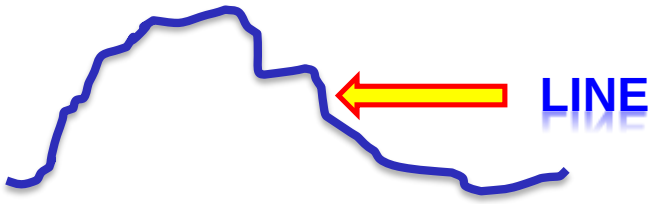
ATTRIBUTE DATA TYPES

LINE…

Road

Spatial Data: Geographic location (Latitude and Longitude or X,Y values)

What will be the Attribute Data?



Attribute Data:

- Road type
- Length
- Width
- Surface quality
- Soil type
- Height
- Existence of Tunnel forestry
- Presence of unauthorized structure
- Year of Establishment
- Year of repair/maintenance
- Disaster affected
- Number of Bridges

ATTRIBUTE DATA TYPES

POLYGON…

Union

Spatial Data: Administrative Boundary (Latitude and Longitude or X,Y values, Starting and ending points are the same)

What will be the Attribute Data?

POLYGON

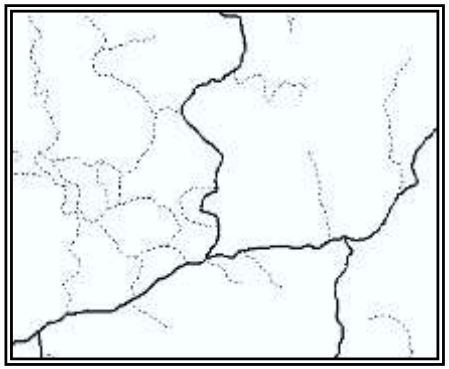
Attribute Data:

Name
Population
Population Density
Number of village
Number of ward
Number of school
Number of cyclone shelter
Number of tubewell
Length of protection embankment
Total Area in acre
Water body in acre
Forest area in acre, etc.

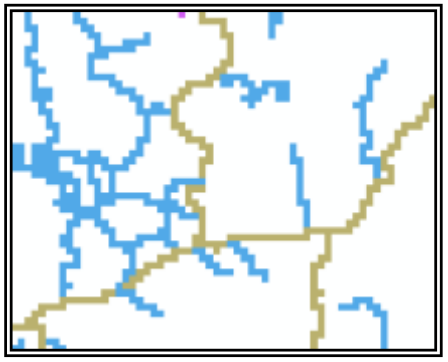
REPRESENTING GEOGRAPHIC FEATURES

HOW DO WE DESCRIBE GEOGRAPHICAL FEATURES?

HOW DO WE REPRESENT THESE DIGITALLY IN A GIS?



Vector Data Model



Raster Data Model

Raster and Vector are two methods of representing geographic data in GIS

GLOBAL POSITIONING SYSTEM

GPS…

The Global Positioning System (GPS) is a satellite-based navigation system.

GPS was originally intended for military applications, but in the 1980s, the government made the system available for civilian use.

It is a constellation of 24 Earth orbiting satellites that can provide continuous 3D positioning 24 hours a day through-out the world.

GPS developed by US Dept of Defence at a cost of >$12 Billion.

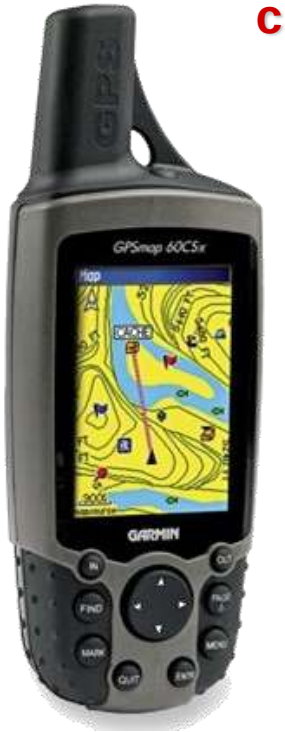
GLOBAL POSITIONING SYSTEM

GPS…

GPS is the only system today able to show you your exact position on Earth anytime, in any weather, anywhere.

The three parts of GPS are…

a. **Satellite;**
b. **Receiver;**
c. **Software**



The accuracy of data & information depends on the quality or the error levels of the device.

IMPORTANCE OF GIS: CHANGING SCENARIO

- Quantification has changed the subject dramatically;
- Shift from description to spatial management;
- GIS help ask questions (why, how, where, who) instead of giving overview of a territory;
- Implementation to development;
- Planning perspective: manual to digital;
- Perception to Accuracy;
- Data to Information;
- GIS gives hi-tech feel to GEO data.

IMPORTANCE OF GIS: WHY IT IS A MODERN TOOL?

- **A map with a database behind it;**
- **Environmental issues are one of the major concern in contemporary world;**
- **GIS is an important tool for understanding and managing the environment because,**
  - **Map environmental (physical and human) characteristics;**
  - **Measure environmental factors;**
  - **Monitor changes in environmental factors over time and space;**
  - **Model alternatives of actions and processes operating in the environment.**

BASICS OF RS

REMOTE SENSING: ADVANTAGES

- Provides a regional view (large areas);
- Remote sensors 'see' over a broader portion of the spectrum than the human eye;
- Provides geo-referenced, digital, data;
- Some remote sensors operate in all seasons, at night, & in bad weather.

REMOTE SENSING: CONSTRAINTS

- Expensive and requires specialized training;
- Humans always involved in different stage of handling data thus the process may produce error.
- Obstacle such as fog, cloud may produce error while investigating an object.
- Provides primary information that needs accurate interpretation.
- May require ground truthing.