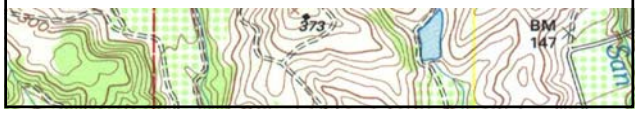
Geography 12: Maps and Spatial Reasoning

Lecture 8: Cartometry: Position and distance

Professor Keith Clarke



The map as a model

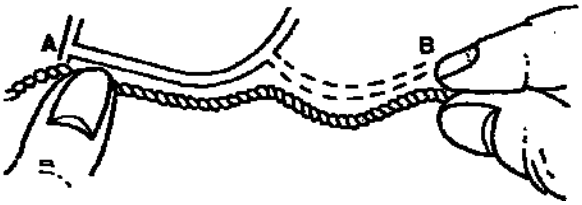
If the map model is geometrically faithful to the real world and accurate, then the map can serve as a model of the real world

We can make measurements, navigation decisions, and analyze or interpret the landscape from maps, and assume the same conclusions apply to the real world.

Vs.

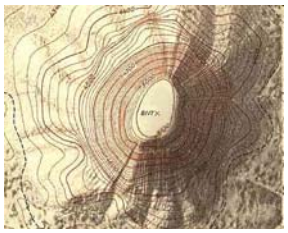
Cartometry

- Making measurements from maps
- Measurements link to reality through map scale



What can we measure?

- The “Feature” model of maps
- The world contains:
  - Point features
  - Line features
  - Area features
- So the map contains:
  - Point symbols
  - Line symbols
  - Area symbols
  - Labels



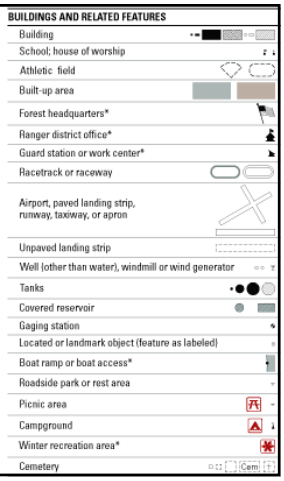
Nowhere, OK
550800mE 3890837mN 14S

Points, Lines, Areas, Text

The map legend

- In the feature model, the legend is the key or index that allows us to interpret symbols as features
- So common, the ESRI map fonts are included in Word Processors

The USGS topographic map symbols POINT features e.g. Buildings

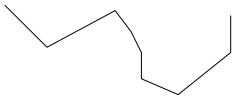


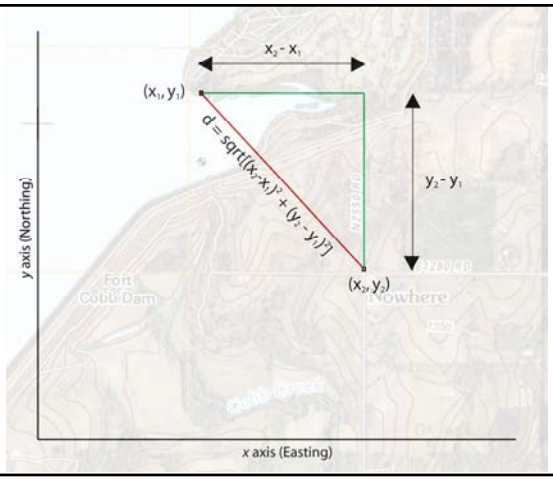
Point Features

Human features
Cadastral features
Mines and caves
Projections and grids

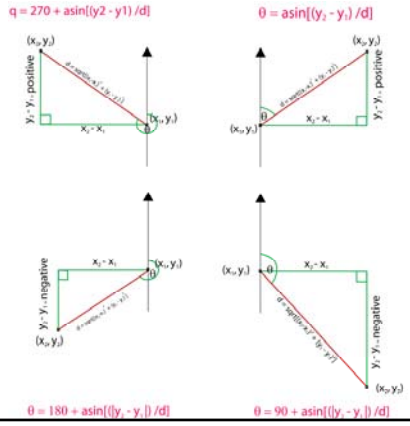
Measures for points

- Position (coordinates) ⊠
- Two positions (distance, bearing) ⊠-⊠ ⚫
- Sequence of coordinates (line length, number of points, distance(s), bearing(s))
- Set of points (list of coordinates, measures of central tendency, measures of variation)





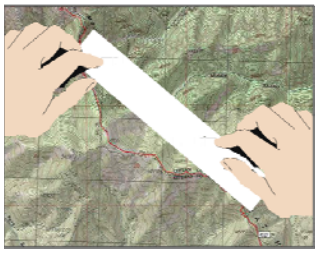
Also, bearings from basic trig



This implies….

- Given two coordinate pairs:

1. Can calculate distance between them
2. Can compute the bearing between them

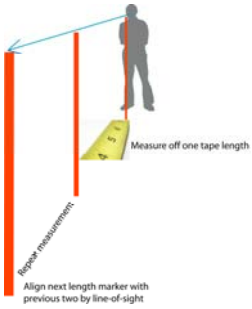


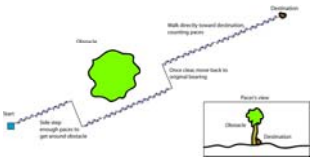
Distance

Measuring distance on the earth

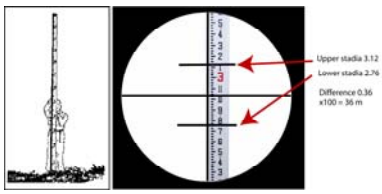
Number of minutes to cover 1 MILE	HIGHWAY	OPEN FIELD	OPEN WOODS	MOUNTAIN & FOREST
WALK	15	25	30	40
RUN	10	13	16	22

Longer distances

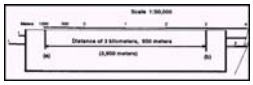




Even longer distances

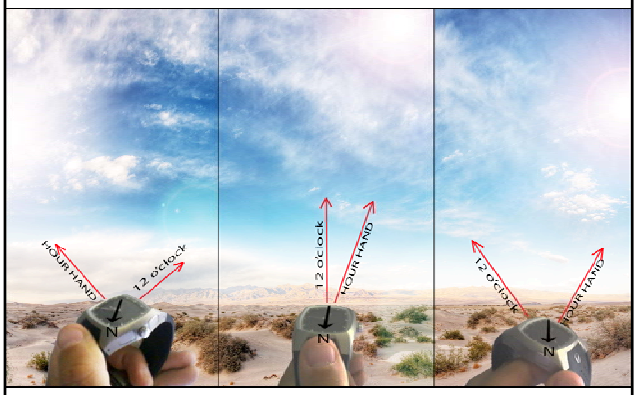


Measuring on the map

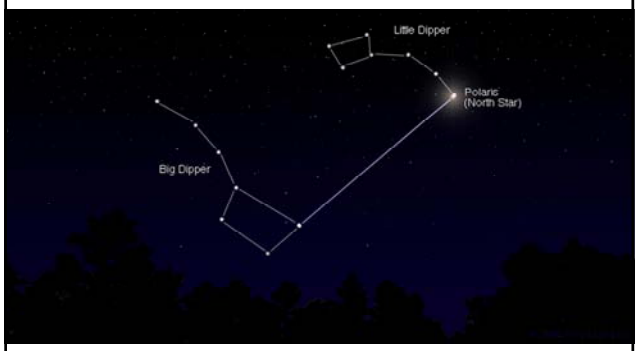


Direction

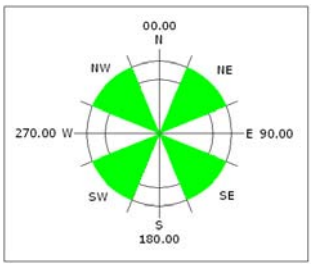
Can also measure direction in the real world!



North using Polaris



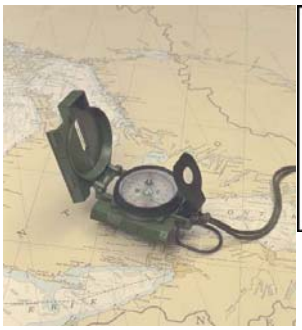
Bearings & the compass

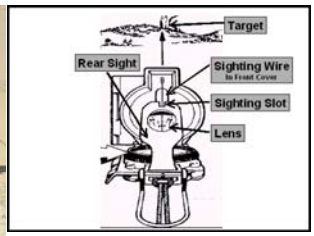


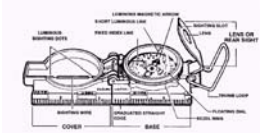
Typical compasses

Mirror compass

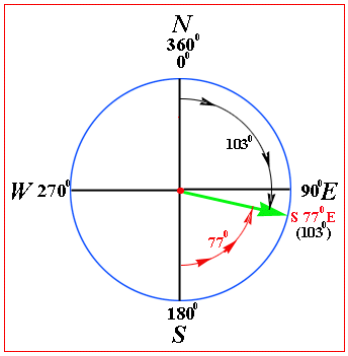
The military compass



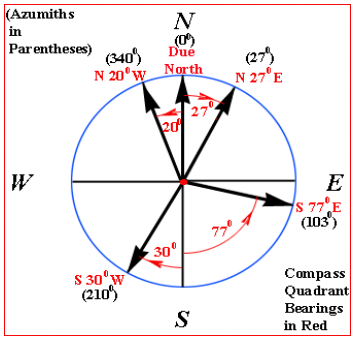




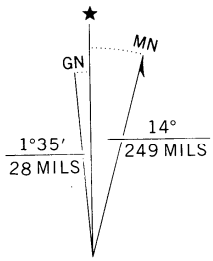
Azimuths and quadrats: S77ºE



Equivalents



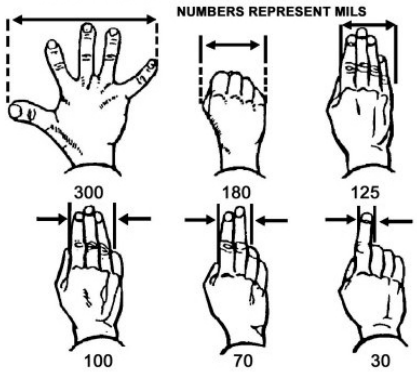
Magnetic north is not true north



UTM GRID AND 1988 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

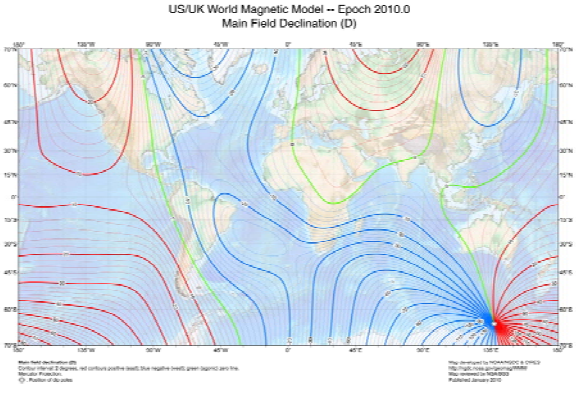
Distance estimation from bearings

Known object size-> Distance. E.g. 1m object is 1 mil at 1km

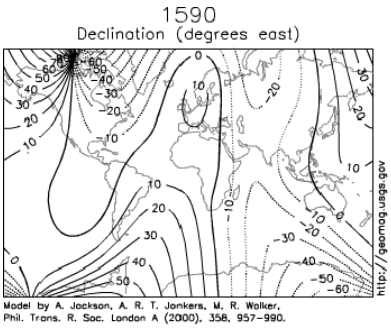


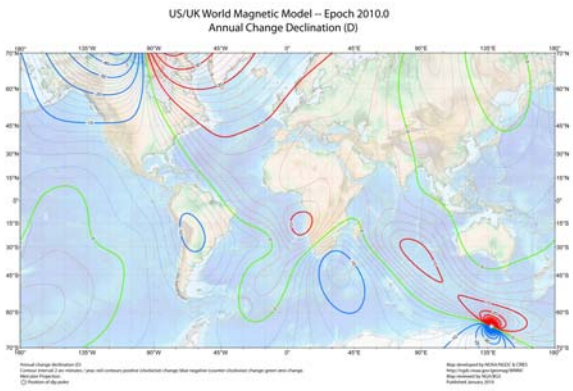
Declination

Globally



Declination changes over time





NOAA declination updates

Summary

- The map model and cartometry
- Features have dimension: Point, Line, Area (and text)
- Dealt with point symbols on topo maps
- Can measure distance and direction from map, earth or by using coordinates
- Grid, true and magnetic north differ