

Wilderness Navigation

West Valley College
Park Management Program
Park Management 24
Spring 2017

John Carnes

Class Schedule

- Friday April 7, 6:00pm-9:15pm
- Saturday April 8, 8:00am - 5:40pm†
- Sunday April 9, 8:00am - 5:40pm

- Friday April 21, 6:00pm-10:15pm*
- Saturday April 22, 9:00am - 5:40pm *
- Sunday April 23, 8:00am - 5:40pm

This is the
handout
dude.



Class Web Page

- maptools.com/pkmg024
- userid = pkmg024 password = contour
 - Everything will be on the web page...
 - Class Schedule
 - Lecture Notes & Slides
 - In Class Exercises
 - Homework Assignments
 - Links to Online Resources
 - Instructor Contact Info

Stuff You Need

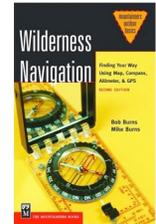
- Clothing & Footwear for “off sidewalk” travel around campus.
- Clipboard or notebook, pen or pencil
 - Flat surface for writing on in the field
- Calculator

More Stuff You Need

- Your Compass -- if you already own one.
 - Don't go buy one until after the class, we have loaners.
- Your GPS -- if you already own one.
 - Again we have loaners, so don't rush out and buy one
- Headlamp or flashlight for our next Friday night session.

Textbook and Homework Assignment

- Wilderness Navigation: Finding Your Way Using Map, Compass, Altimeter & Gps
 - Available from:
 - Campus Bookstore, Amazon, REI, Borders?
- Read the book
- Do all of the exercises in the book
- Due 2 weeks from tomorrow



Office Hours

- 30 minutes before and after class
- By email to john@maptools.com

Logistics

- Parking
 - You need to pay, they do write tickets 7 days a week.
- Lunch
 - Bring your own. Campus food service will be closed and there isn't much that's close.
 - Farmers Market on Saturday
 - Grocery store and fast food on Saratoga Ave, other side of Hwy 85.

This class is like drinking from a fire hose...

Some of it you will drink in...

some of it will get you wet...

some of it will pass you by.



Tips for Success in this Class

- Many skills to teach - little time
- Teach - Do - Use
- If you don't understand, don't wait to fix it.
- Don't learn alone.



This Weekend's Plan

- Friday Evening
 - How humans find their way
 - Six steps to being a better navigator
 - Map Types
 - Using a compass to orient yourself
 - Using UTM and USNG coordinates

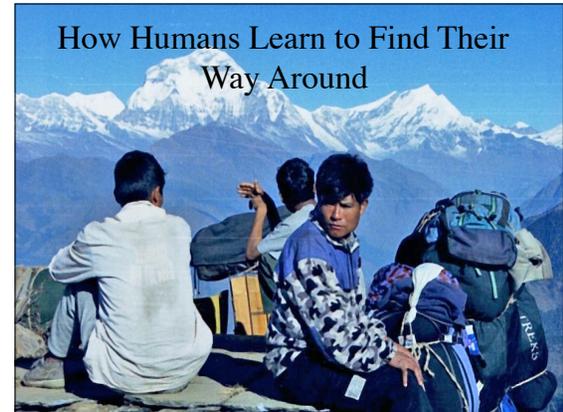
This Weekend's Plan

- Saturday
 - More on coordinates
 - First GPS Field Exercise
 - Maps without coordinate grids
 - Topographic Maps
 - Second GPS Exercise

This Weekend's Plan

- Sunday
 - Compasses
 - Using bearing and distance to navigate
 - North references
 - Plotting bearings
 - Location by intersecting bearings
 - Triangulation exercise

How Humans Learn to Find Their Way Around



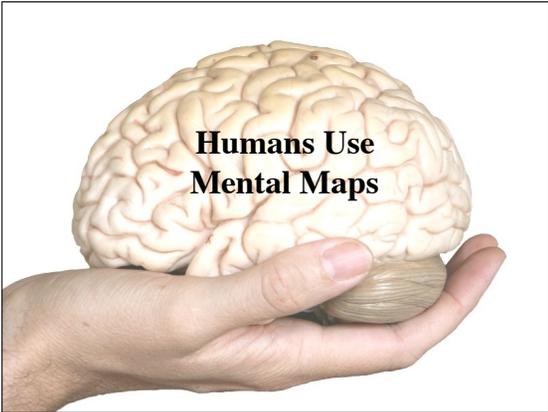
Geography Quiz

- Which city is further north: Seattle or Montreal?
- Which city is further west: Los Angeles or Reno?
- Imagine the map of North and South America. Which North American city lines up with the west coast of South America: Vancouver or Chicago?

- Seattle is farther north than Montreal
- Reno is farther west than Los Angeles.
- Chicago and not Vancouver, lines up with the west coast of South America.

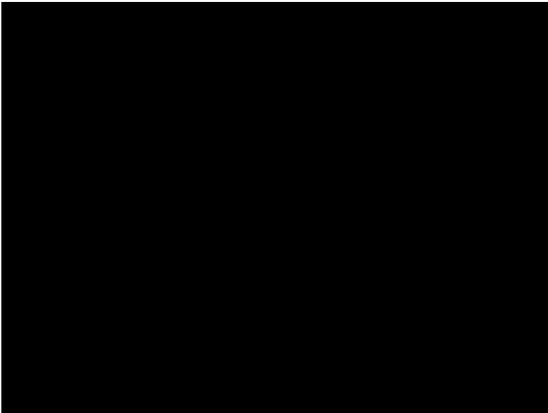
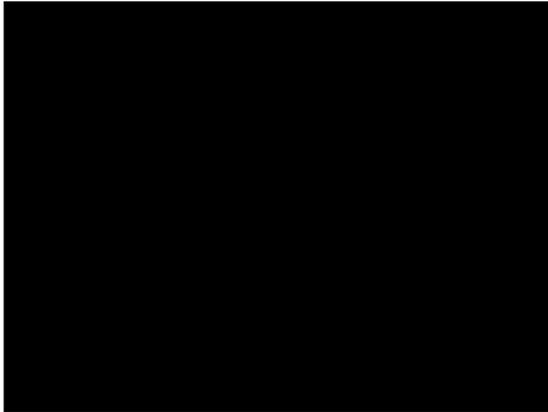
Native Guides Don't Need GPS Units





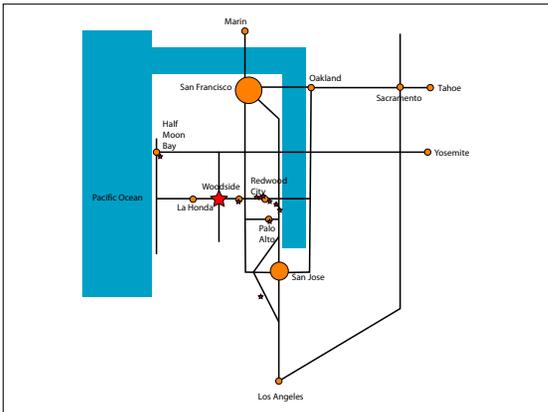
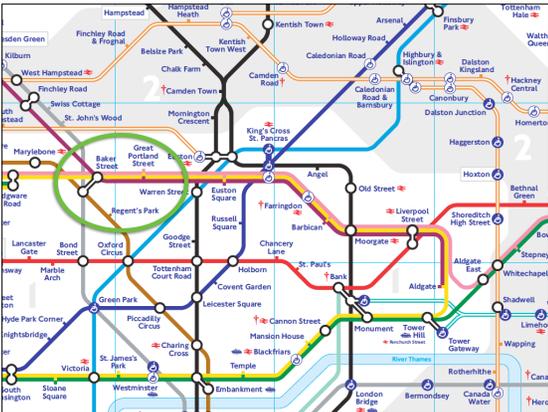
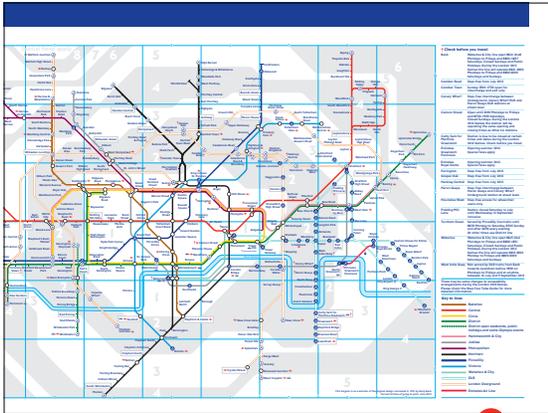
Another Exercise...

- Close your eyes.



Aris Venetikidis
2012 TEDx
Dublin

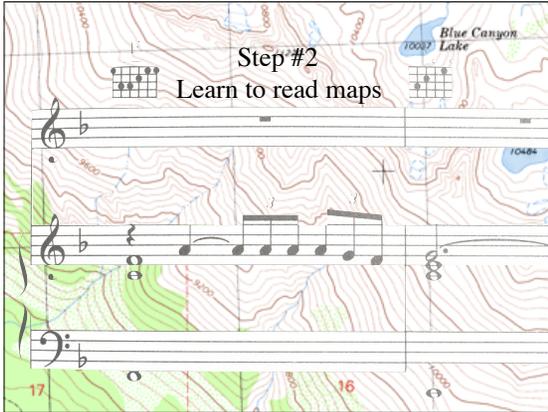
https://www.ted.com/talks/ariss_venetikidis_making_sense_of_maps
(16:28)



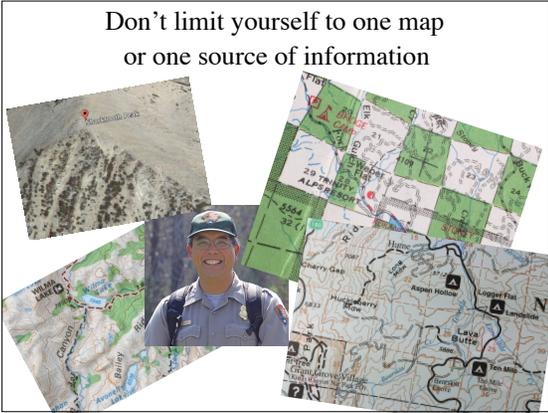
Six Steps to Becoming a Better Navigator



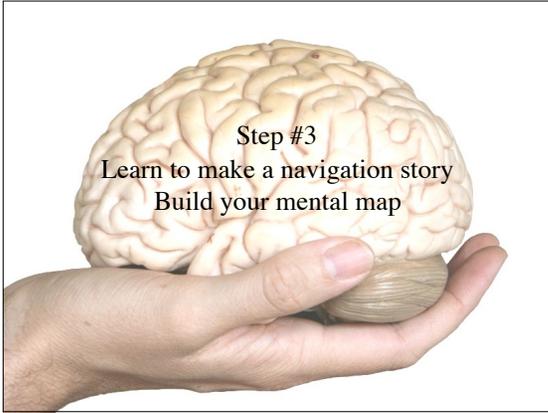
Step #1
Pay more attention to everyday navigation tasks.



Step #2
Learn to read maps



Don't limit yourself to one map or one source of information



Step #3
Learn to make a navigation story
Build your mental map



What's in the story?

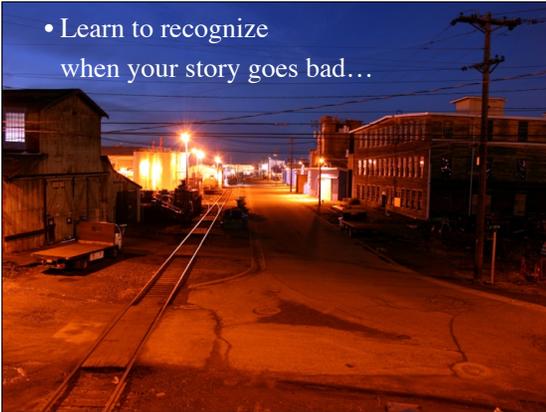
A sample story

- Leave the trail head climb a steep set of switchbacks for about an hour. Eagle Peak will be on the right.
- At the ridge top the trail will continue up the ridge. Slope is gentle and this should only take 15 to 20 minutes. Eagle Peak will be ahead of us.
- The trail will turn and descend down into Black Canyon. It's steep and will probably take an hour. Trail junction is in a bit of a saddle.
- Once at the bottom, cross the creek and follow the trail downstream until you reach Dog Leg Lake. Easy hiking for about 20 minutes.



Step #4
Learn to use your navigation story

- Learn to recognize when your story goes bad...



Adjust Your Story
Early and Often

Step #5
Build a toolkit of navigation
skills and techniques

Step #6
Practice, Practice, Practice

Common Situations
that will get you “lost”

- You should learn to lookout for some of these common situations that are likely to lead to navigation trouble...

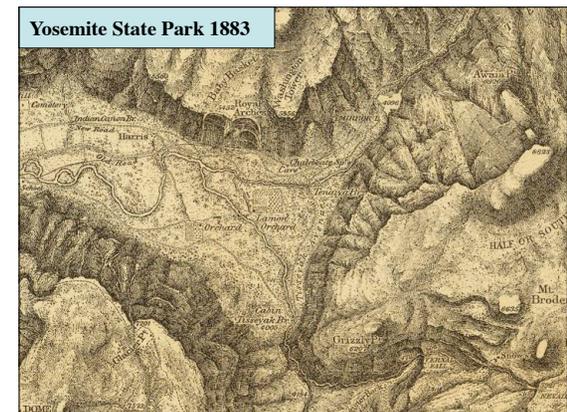
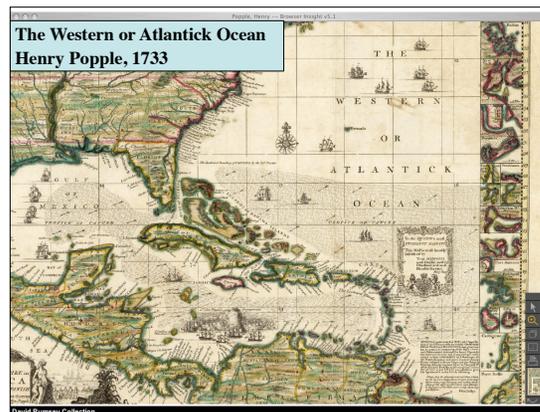
Let's take a break!

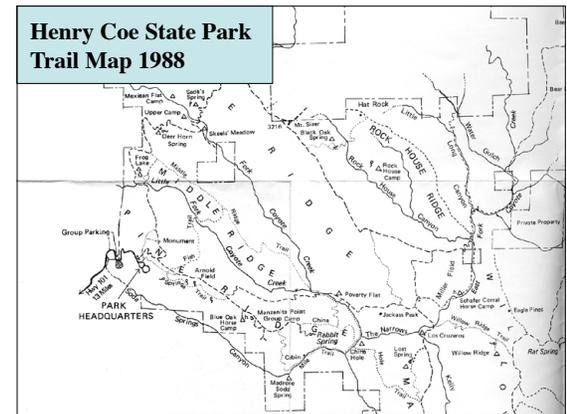
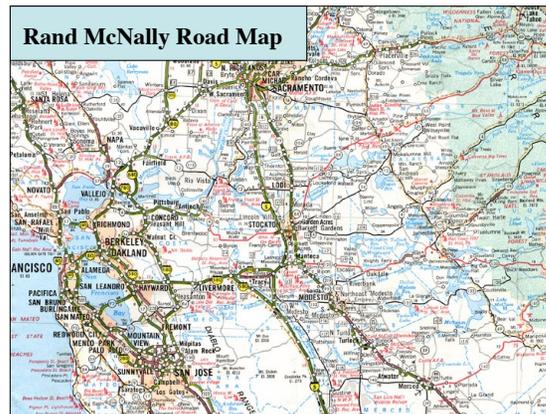
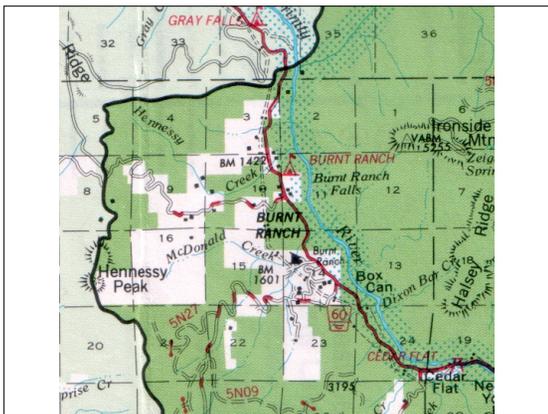
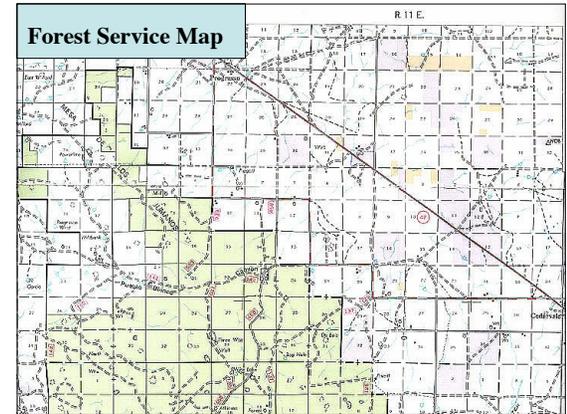
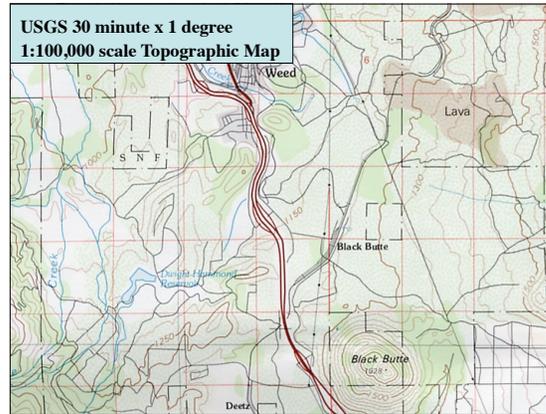
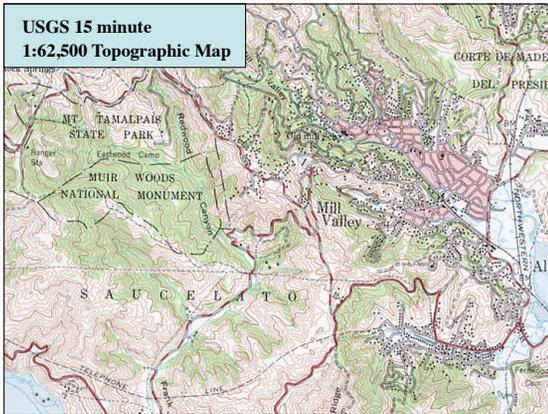
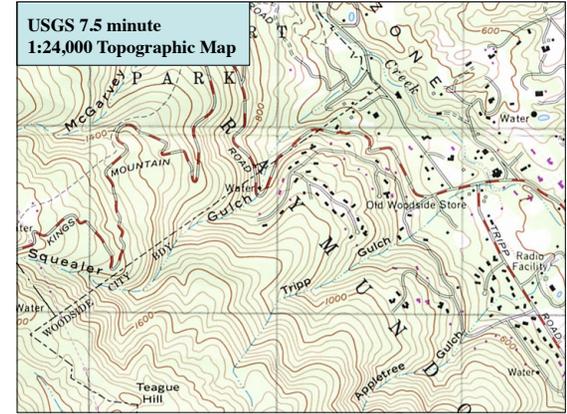
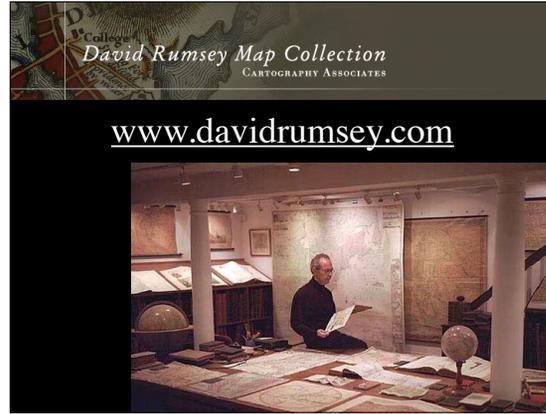
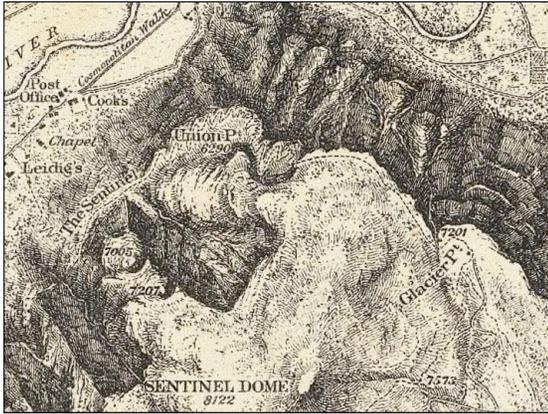
In about 10 minutes, we'll look at some of the many different types of maps you may encounter

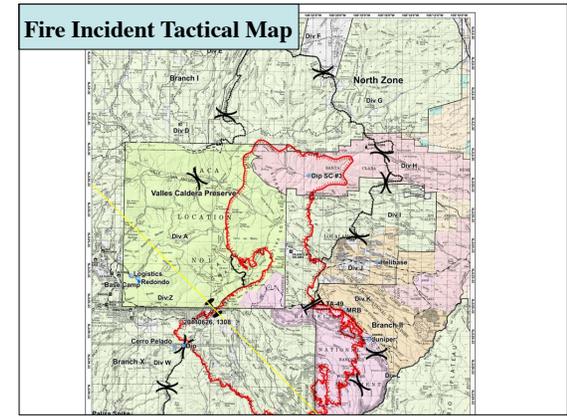
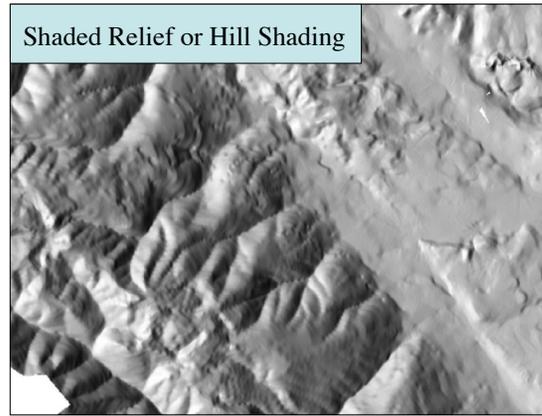
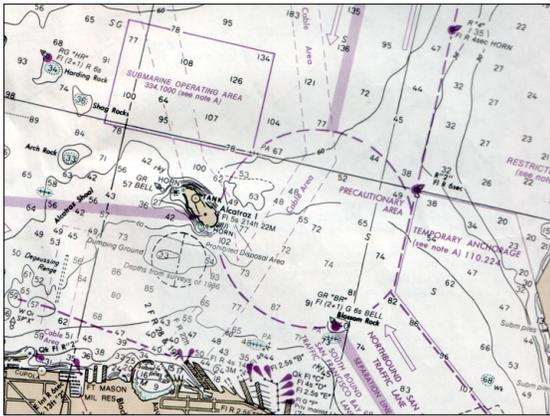
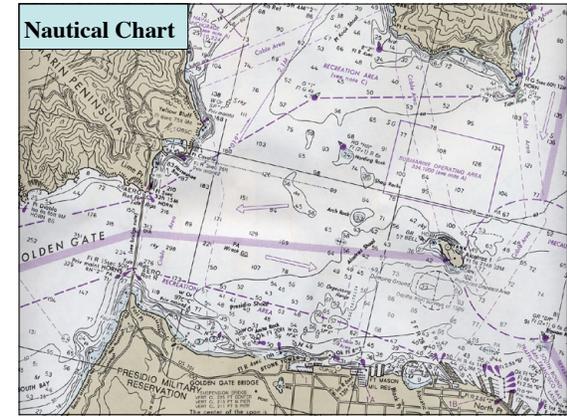
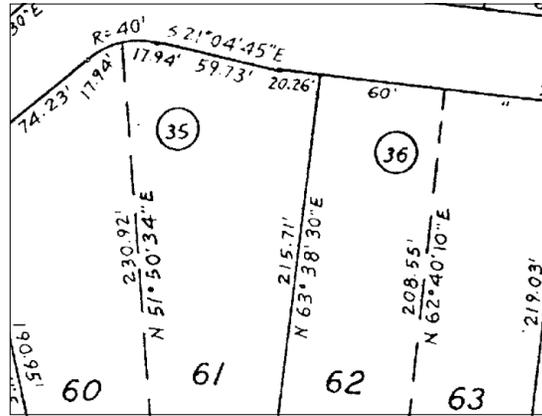
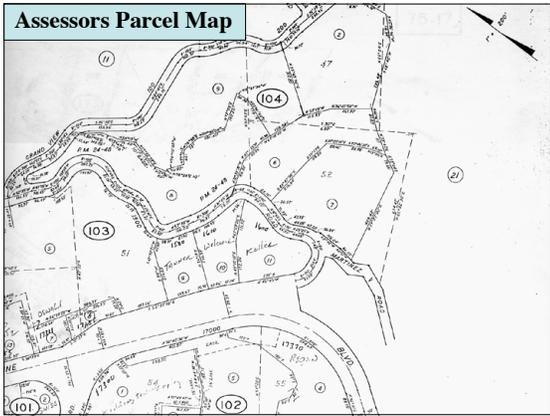
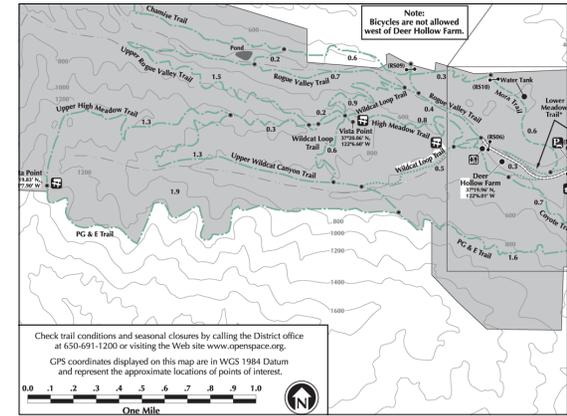
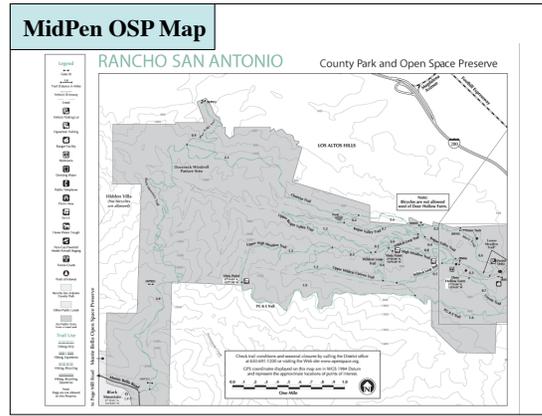
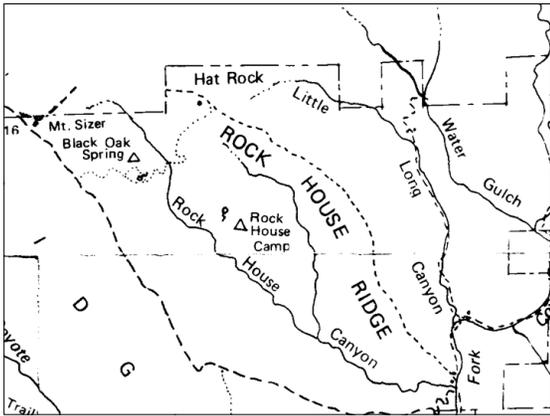


The many types of maps

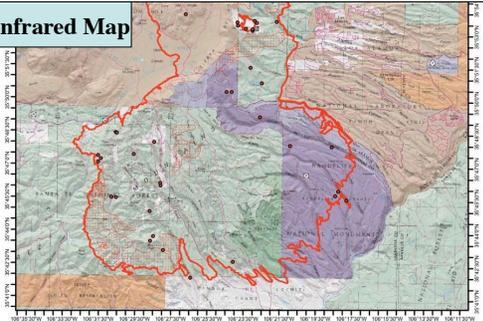
- Maps are published by many different organizations.
- Each organization has specific uses for the maps it produces.
- Different needs make for different maps.
- Let's look at some examples. For each one look at what themes the map shows and think about how it is likely used.







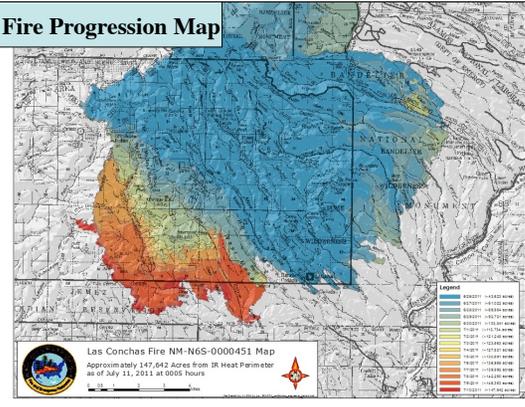
Fire Infrared Map



Las Conchas Fire
Infrared Map 07/09/2011
Imagery Date: 07/08/2011
Time: 22:43 MDT
Interpreted Total Acres: 142,250
IRN: Brian Banks

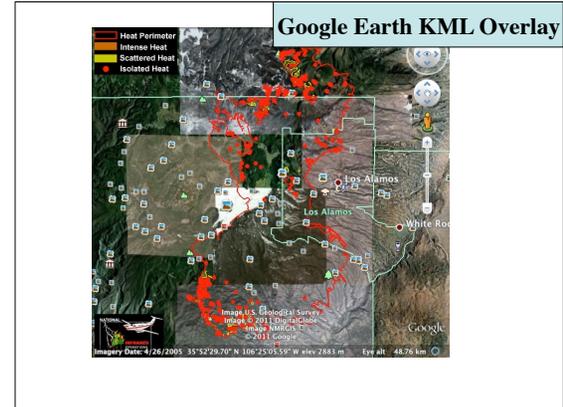
- Isolated Heat Sources
- Scattered Heat
- Intense Heat
- Heat Perimeter

Fire Progression Map

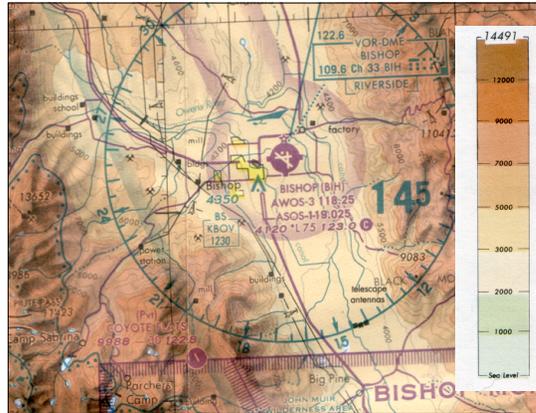
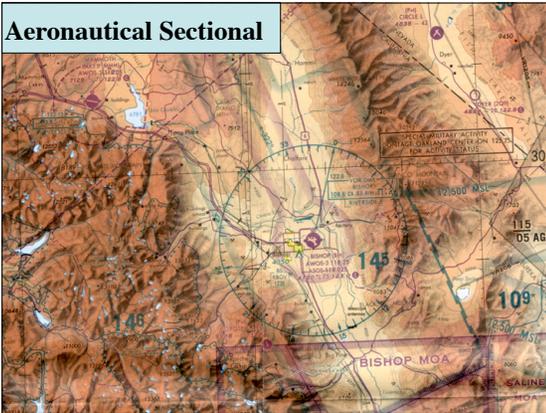


Las Conchas Fire NM-N65-000451 Map
Approximately 147,642 Acres from IR Heat Perimeter
as of July 11, 2011 at 0000 Hours

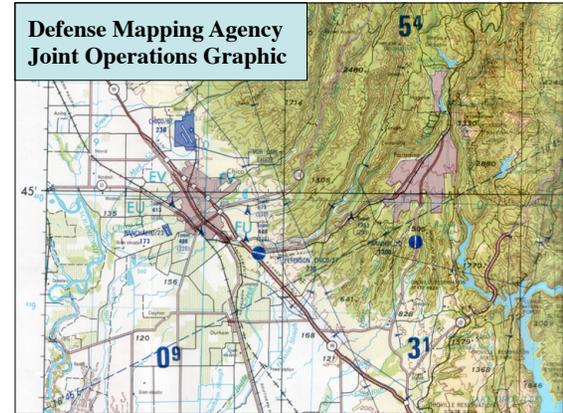
Google Earth KML Overlay



Aeronautical Sectional



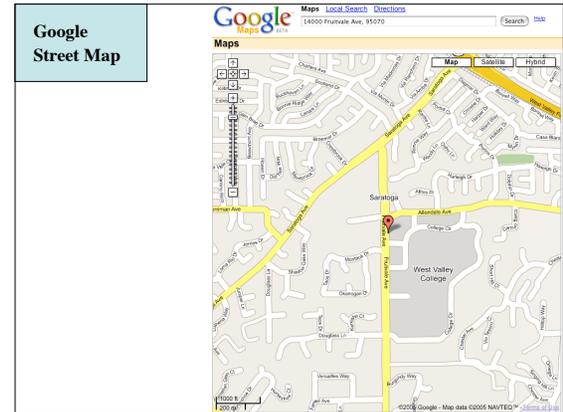
Defense Mapping Agency Joint Operations Graphic



USGS Orthophoto



Google Street Map



Google Satellite Image



Google Hybrid Street Map & Satellite Image



Map Scale

- It a ratio of distance on the map to distance on the ground
- 1:5000
 - Large Scale, Details are larger and more are shown
- 1:50,000
 - 10 times smaller scale
 - Smaller details, fewer details

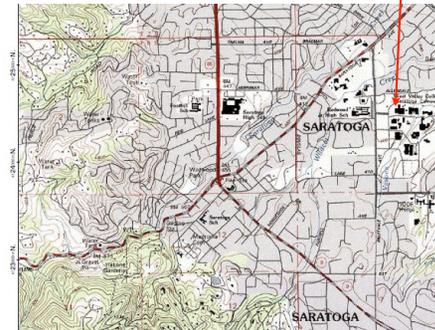
1:250,000



1:100,000



1:24,000

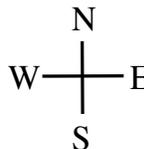


1:5490



Using a Compass to Orient Yourself

- The cardinal directions
North, South, East and West



“Zipper Pull” Compass



Handheld Compass

75¢



10¢



Beware of... Iron, Steel, Electricity, and Magnets

N

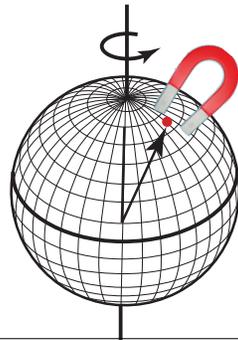
See if you can find items that influence your compass.



Check things like...

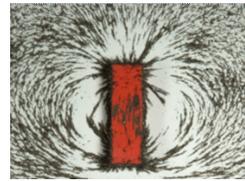
- Your glasses
- Your watch
- Your pen/pencil
- Your clipboard
- Anything that is likely to be within a foot or so of your compass when you are taking a bearing.

What is North?



Magnetic North

Where your compass points



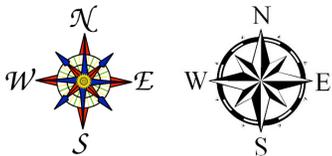
True North

The earth's axis of rotation

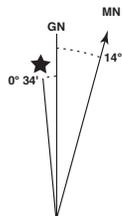


The most common “up”
or “top of the page”
direction on maps.

North Arrows

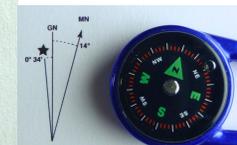


North Reference Diagram



Put the compass on the map near the North Arrow.

Rotate the entire map, along with the compass, until the compass is aligned with the magnetic north direction shown on the map.



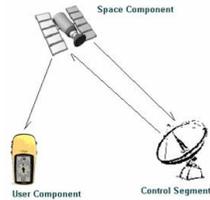


Where am I?

Using a GPS receiver
to determine your location.



Global Positioning System



Geographic Coordinates

Geographic Coordinate Systems

- Latitude / Longitude
- Universal Transverse Mercator (UTM)
- Others
 - State Plane
 - Military Grid Reference System
 - British Grid
 - Maidenhead
 - and many, many more.

Communicating Geographic Coordinates

- You need to understand the most common coordinate formats.
- Units and symbols help. Don't just give sequences of numbers.
- Map datum matters if you need better than 2 football field accuracy.
- You can easily convert between formats with your GPS receiver.

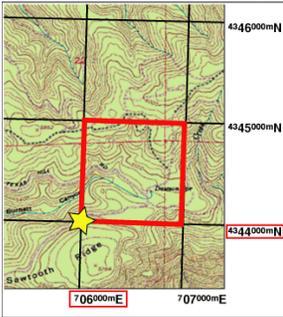
UTM

Universal Transverse Mercator Coordinates



- This 1km square is located at

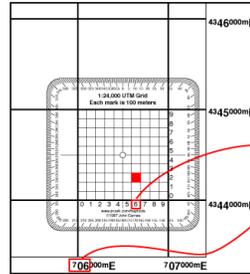
706km E 4344km N
- Usually we need to be a bit more precise about a location!



Using UTM is Easy

- Take a look at the “UTM Practice Map” handout.
- Can you quickly determine what map feature is at:

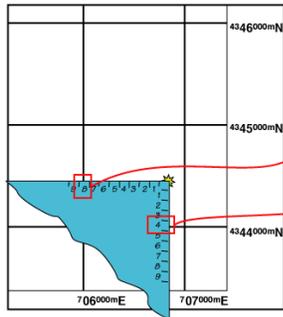
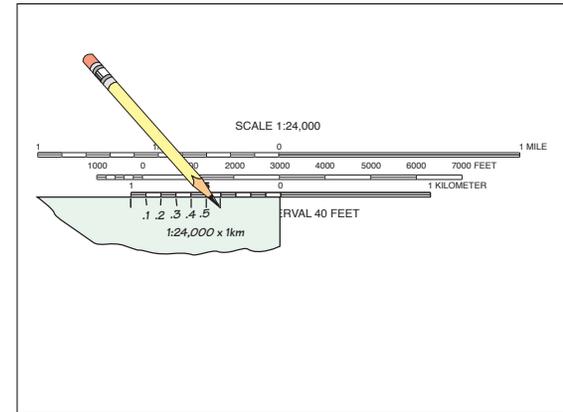
755.2 km E 4255.4 km N



A simple UTM Grid tool will quickly locate a 100m square.

This 100m square is located at:

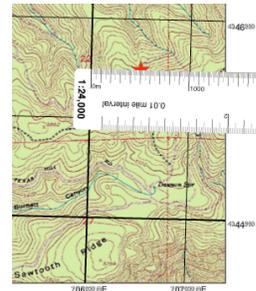
706.6km E 4344.2km N



The ***** is located at:

706.8km E 4344.4km N

Using a distance scale, marked in meters, to measure UTM coordinates



There are many ways to write the same position...

P
r
e
c
i
s
i
o
n

I
L
V

| Kilometers | Meters |
|--------------------------|----------------------|
| 755km E 4255km N | 755000m E 4255000m N |
| 755.2km E 4255.4km N | 755200m E 4255400m N |
| 755.23km E 4255.48km N | 755230m E 4255480m N |
| 755.234km E 4255.483km N | 755234m E 4255483m N |

755.200km
755 200m

UTM Display on a GPS Receiver

The UTM Zone → **10 S 0706835
4344275**

East-West coordinate in meters
The “Easting”

North-South coordinate in meters
The “Northing”

Reporting your position in UTM kilometers

Zone

1,000 km
100 km
10 km
1 km
100 m
10 m
1 m

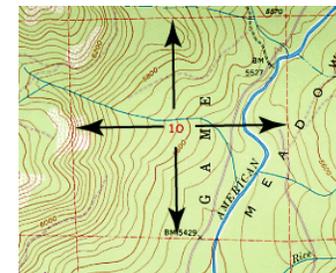
**10 S 0559.741 km E
4282.213 km N**

Drop Zone
Drop Leading Zeros
Insert Decimal Points
Insert Units

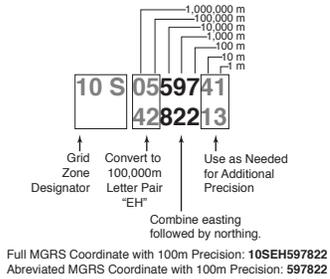
Include digits to the right of the decimal point to achieve desired precision.

559.74km E 4282.21km N

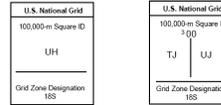
This is a Township & Range Section, NOT a UTM Grid



U.S. National Grid (USNG) Coordinates



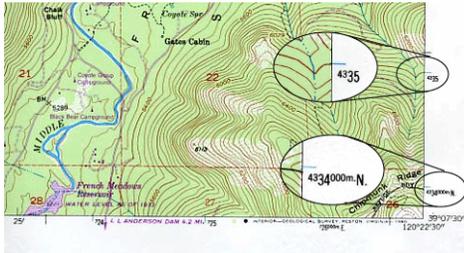
Printed Grid Reference Box



U.S. National Grid could make many location signs "GPS Compatible"



UTM Coordinate Markings on USGS Topographic Maps



Make a mark between digits from the grid within the grid

| USGS 1:24,000 1000m grid | Campus Air Photo 1:5490 100m grid |
|--------------------------------|---|
| 755230m E 4255480m N | 587460m E 4124620m N |
| 755.23km E 4255.48km N | 587.46km E 4124.62km N |

Plotting and Reading UTM Classroom Exercise

