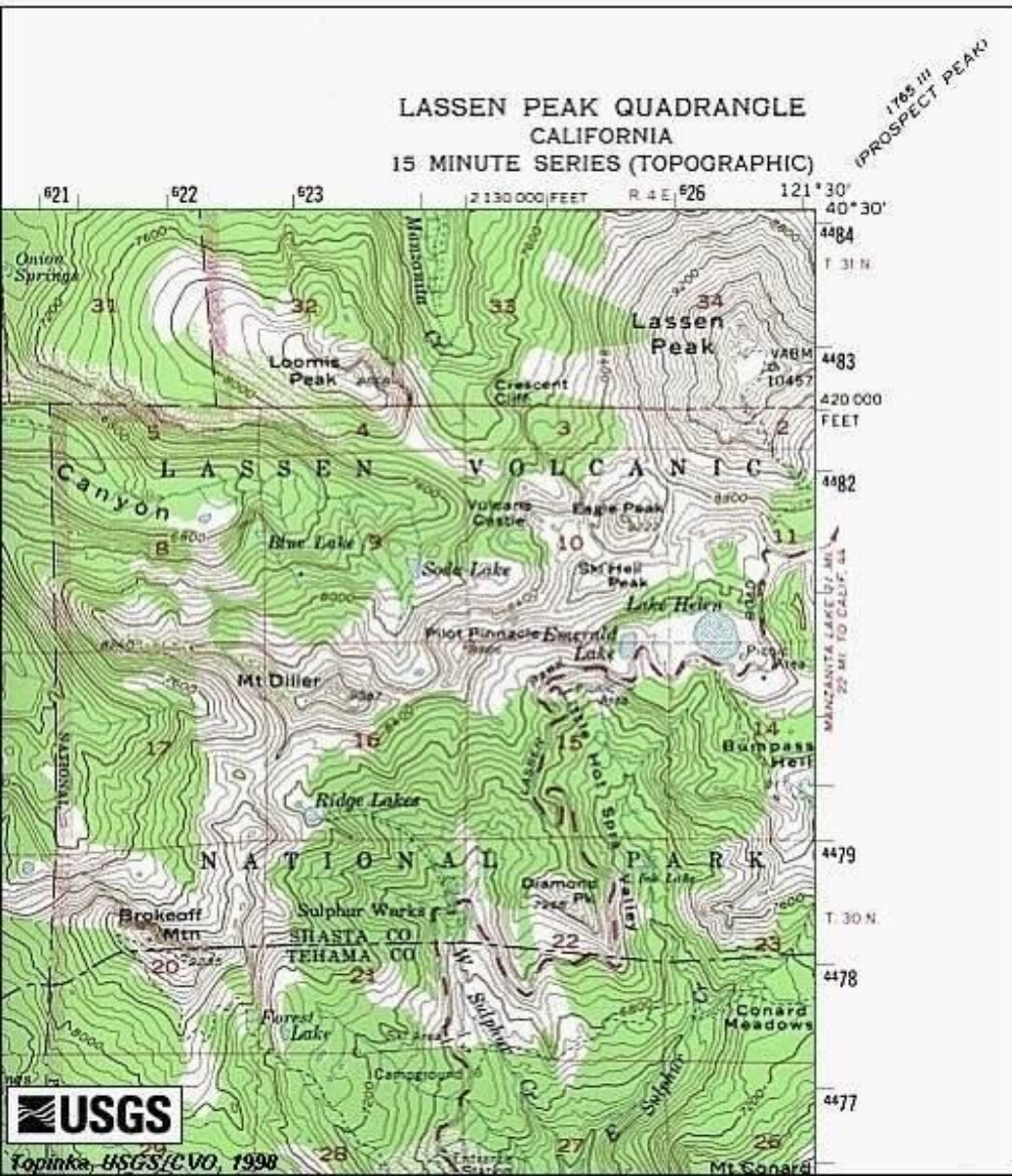


Topographic Map

THE TOPOGRAPHIC MAP



Without ever having been to a particular place, and without talking to someone who has been there, you can already know quite a lot about it with a map. A map is a graphic representation of the earth's surface drawn to scale, as seen from above. It uses colors, lines, symbols, and labels to represent features found on the ground.

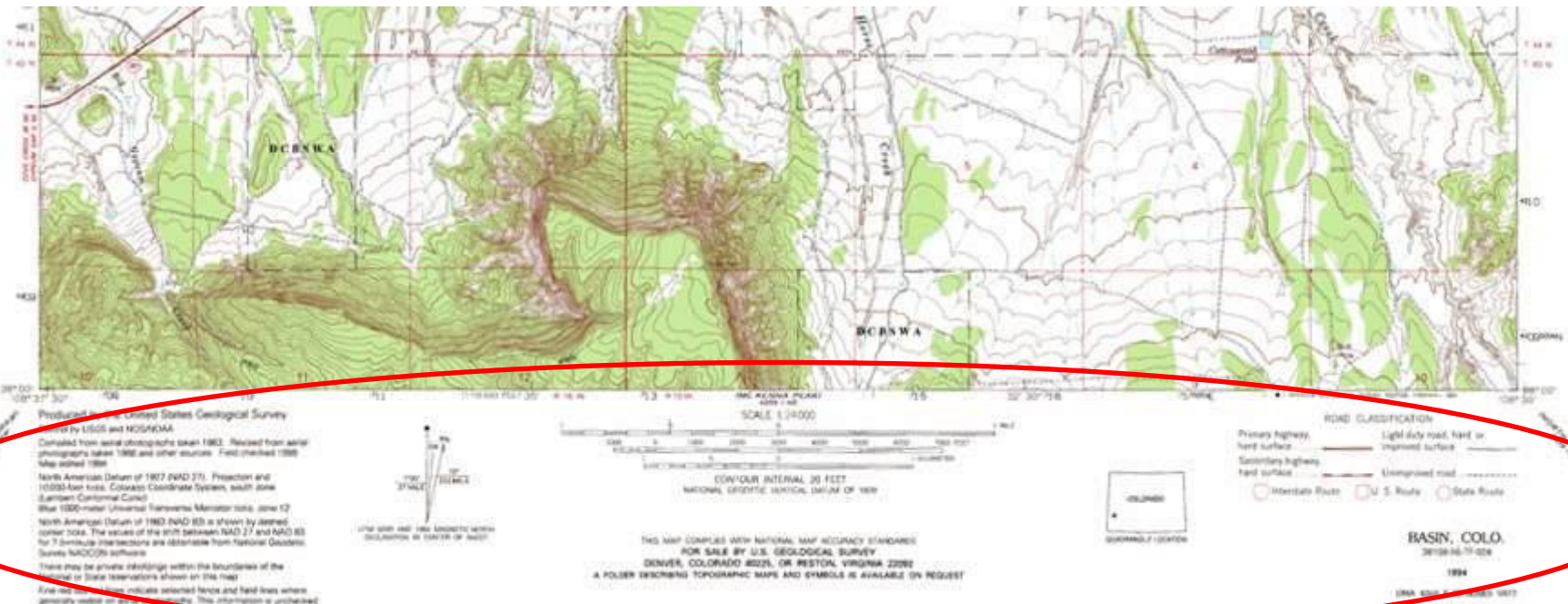
However, the finest maps available are worthless unless the map user knows how to read them.

TOPOGRAPHIC MAP DESCRIPTION

- Reading a map is a language composed of lines, colors, and symbols.
- Five basic colors are used for Topographic Maps.
 - **Brown (Contour Lines)**
 - **Black (Man Made Features, Roads, Trails)**
 - **Blue (Water Features)**
 - **Green (Vegetation)**
 - **Red (Highway and Land Grids)**
 - Two minor colors
 - **Pink (Built up area, civilization)**
 - **Purple (Updated Map Information)**
- Symbols are used to represent the natural and man-made features of the earth.
- Lines show relief and elevation; it indicates variations in terrain features and heights of natural features.
- Every map has Margin Information about the map.
- Maps come in three scale sizes; SMALL, MEDIUM, and LARGE. Which affects the amount of area covered and detail that will be shown.
- A map is read for four basic kinds of information.
 - Direction
 - Distance
 - Position
 - Identification
- Maps must be taken care of and properly folded for field use.

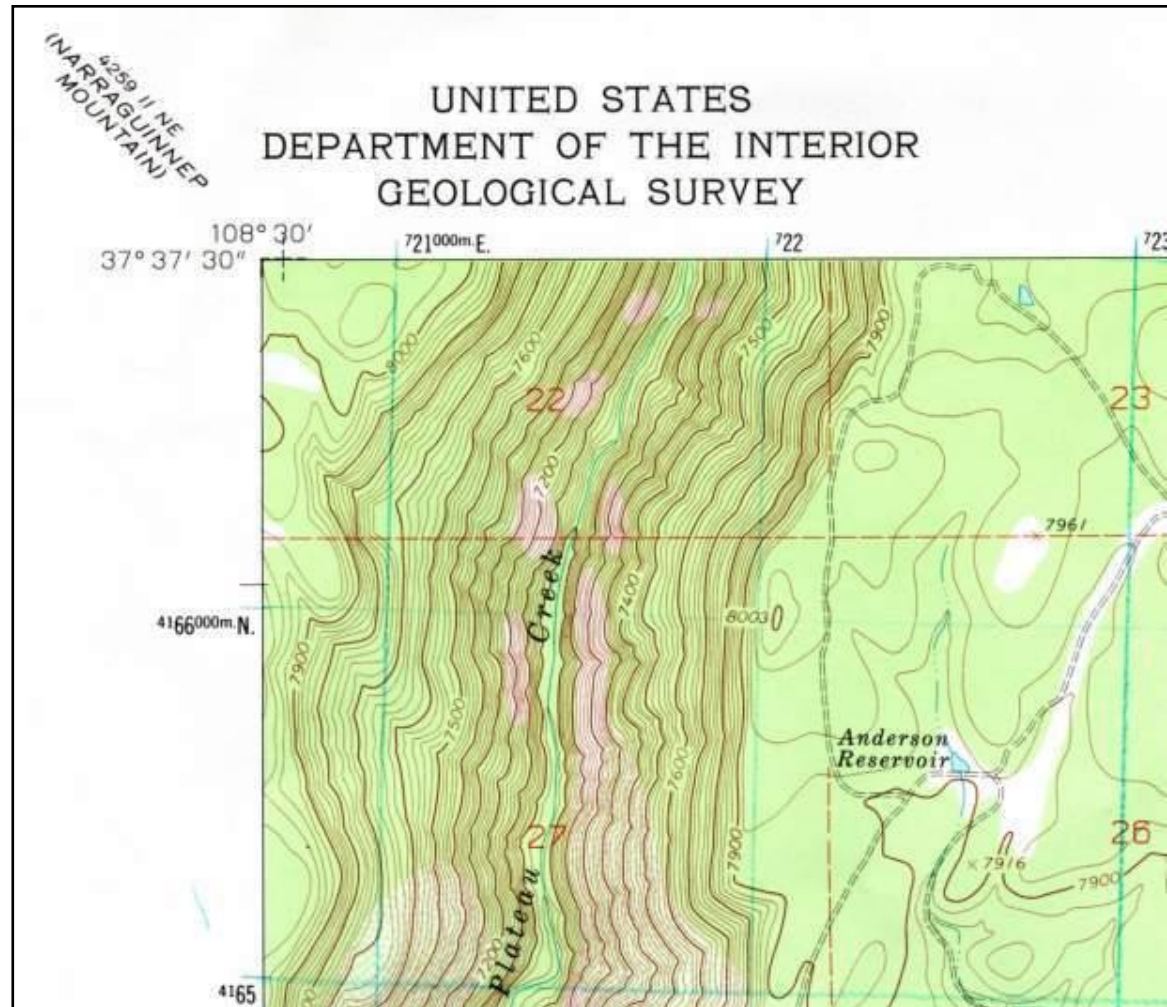
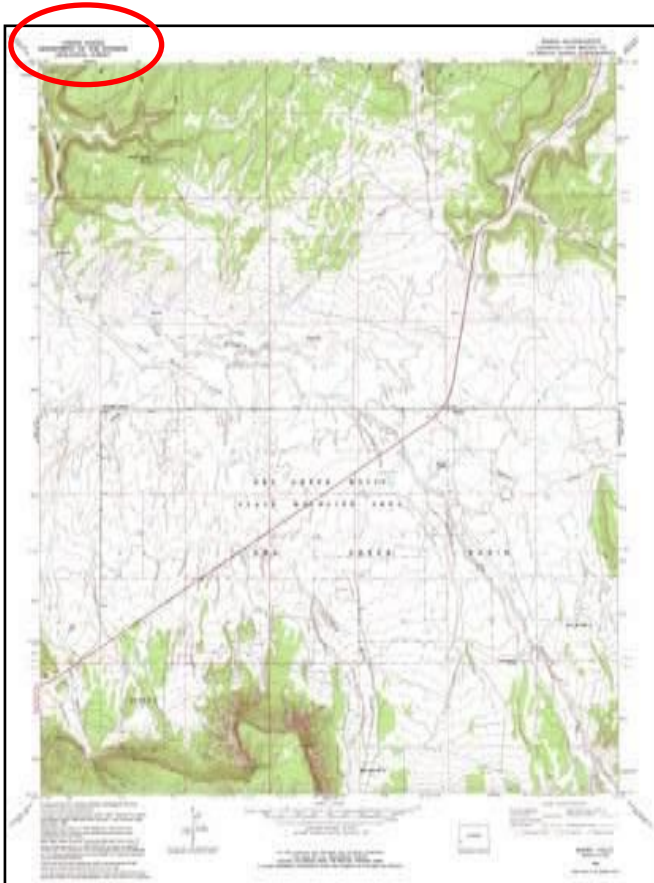
Map Margin Information

- A map could be compared to any piece of equipment, in that before it is placed into operation the user must read the instructions.
- It is important that you know how to read these instructions.
- The most logical place to begin is the marginal information and symbols, where useful information is about the map is located and explained.
- All maps are not the same, so it becomes necessary every time a different map is used to examine the marginal information carefully.



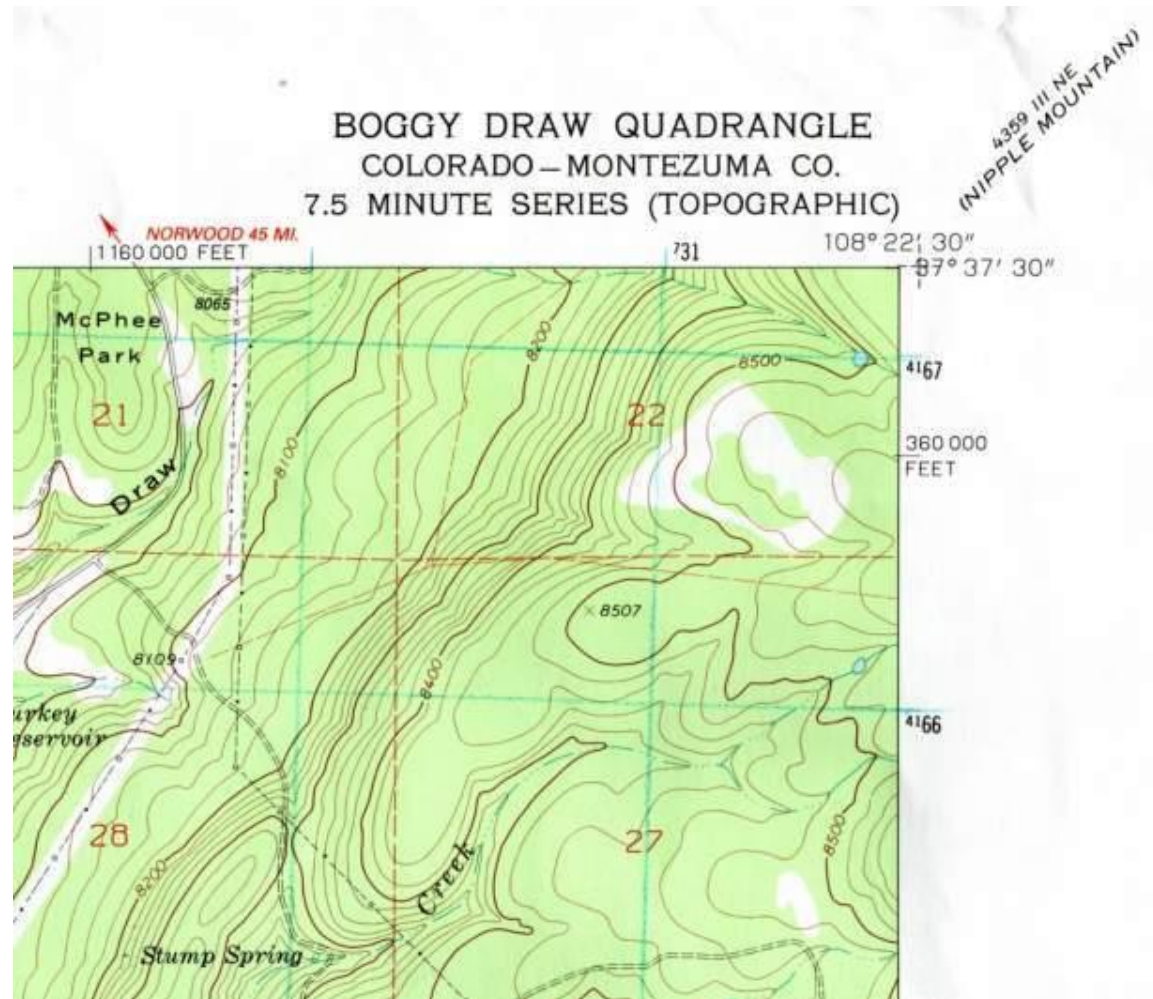
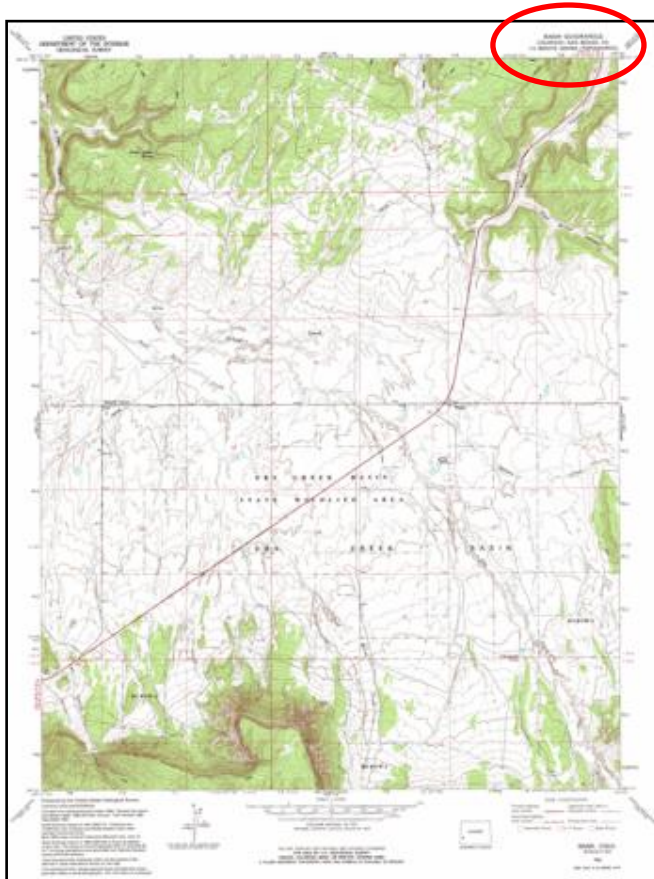
Map Margin Information

The top left corner of all USGS topographic maps carries the imprint of the authority responsible for the mapping .



Map Margin Information

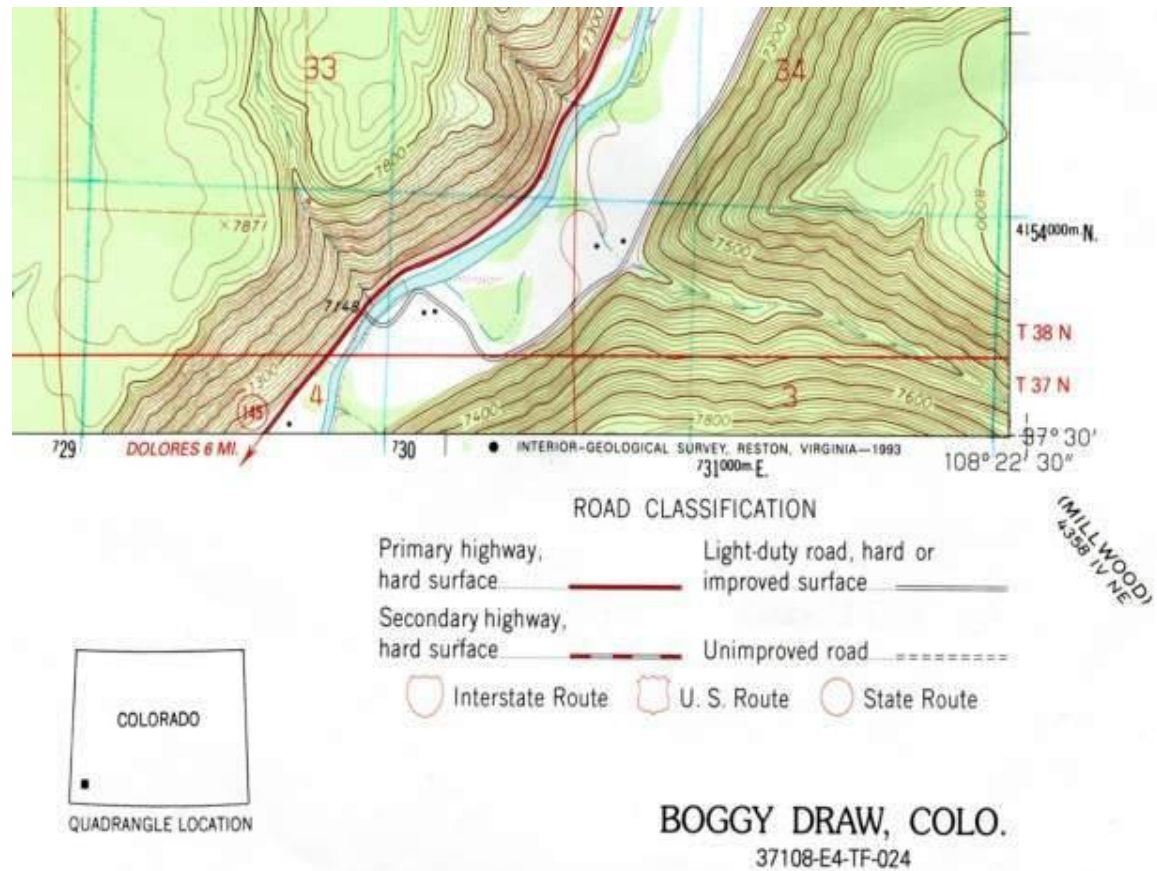
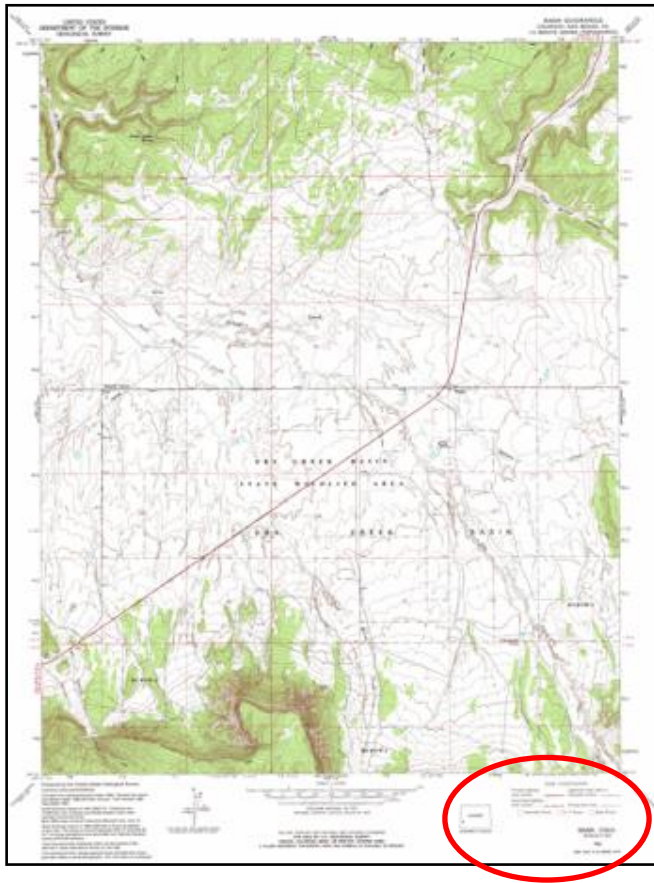
In the upper right corner is the complete quadrangle name. The state is also given, as may be the county. Also included is the area covered and the type of map.



Map Margin Information

In the bottom right corner of the map is a

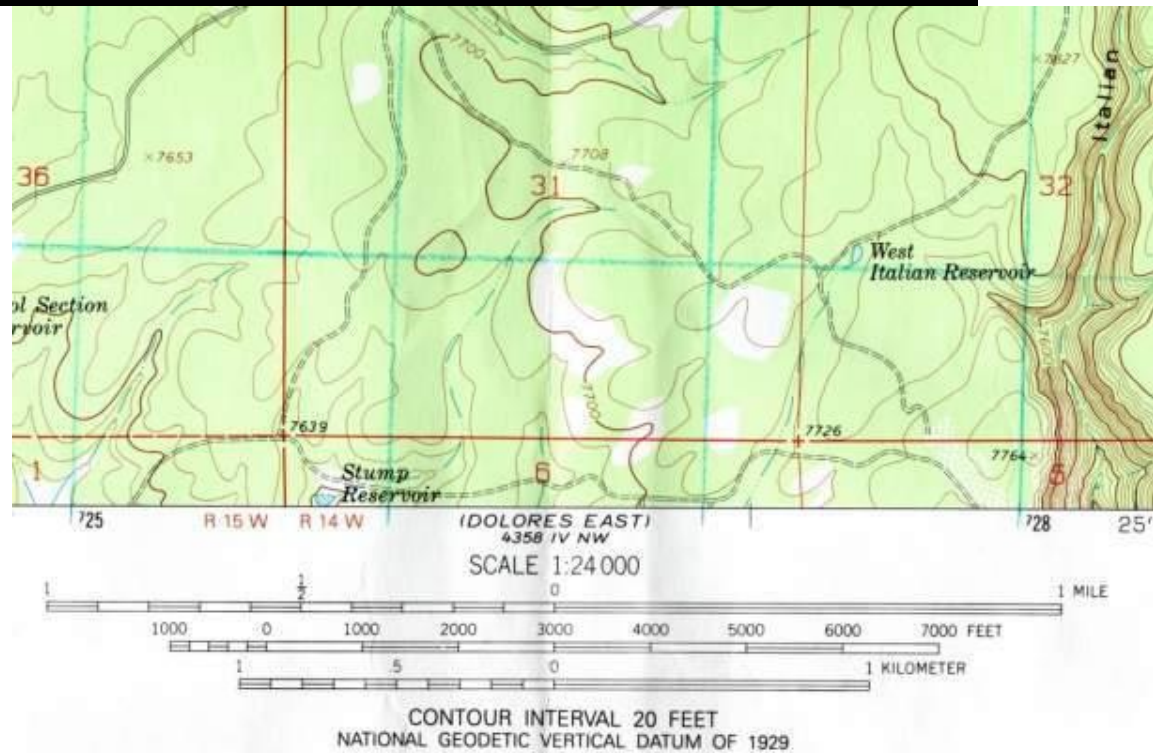
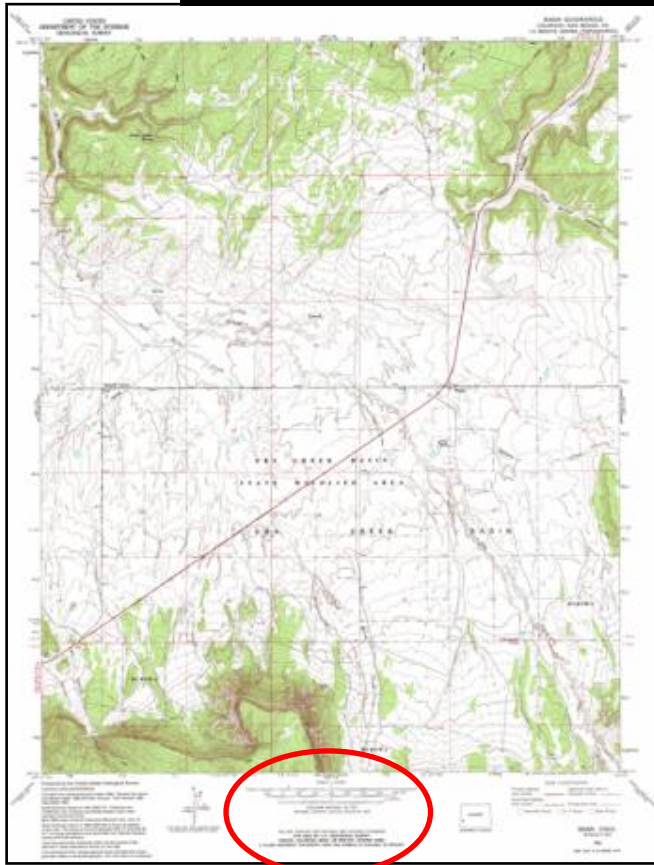
- key to roads on the map.
- Map name and state.
- date of the map - one of the most significant pieces of information available.
- quadrangle location shown as a black square superimposed on a state map.



Map Margin Information

At bottom center is the

- map scale ratio – size of area covered and terrain detail.
- Distance bar scales show several alternative units for the measurement of distance.
- the contour interval. The contours are the brown lines.



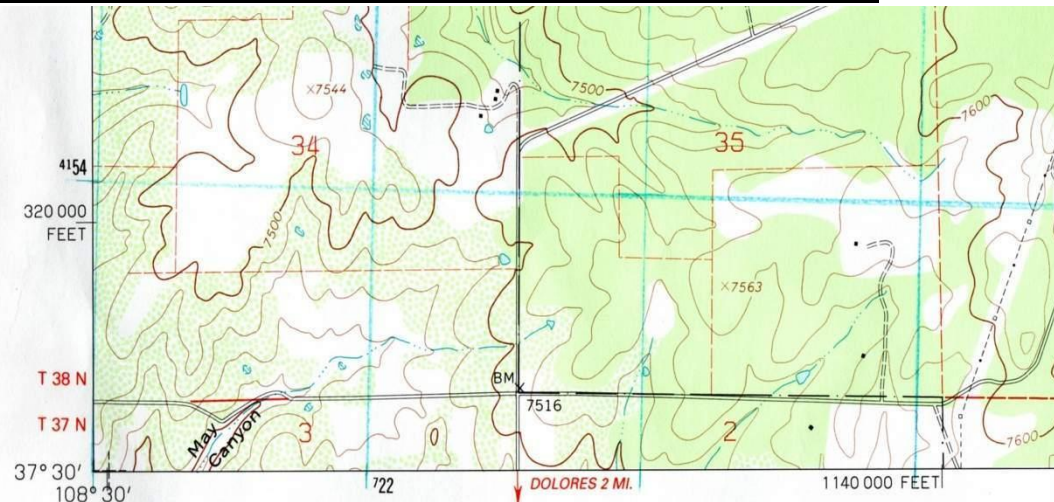
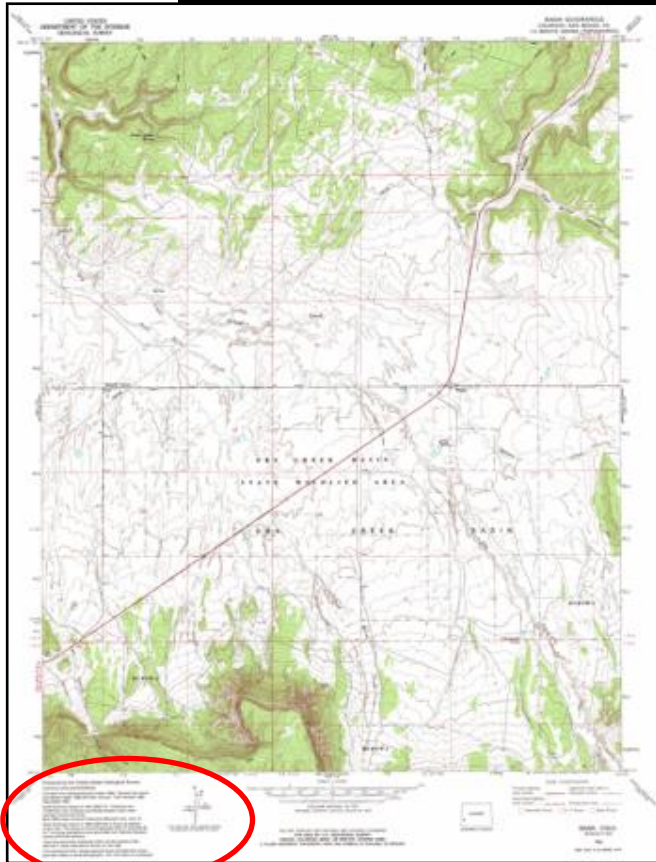
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY
DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

Map Margin Information

In the lower left corner is the credit legend, a complex of information. And the following

- the magnetic declination.

- The star indicates true north: the direction of the North (rotational) Pole
- "MN" indicates the direction of the North Magnetic Pole
- "GN" (Grid North), the Universal Transverse Mercator (UTM) grid.



(DOLORES WEST)
#238 / NE

Produced by the United States Geological Survey
Revised in cooperation with the U.S. Forest Service
Control by USGS, NOS/NOAA, and U.S. Forest Service

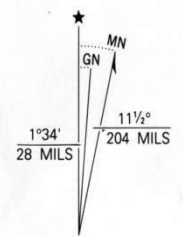
Compiled from aerial photographs taken 1964. Revised from aerial photographs taken 1988. Field checked 1990. Map edited 1993

North American Datum of 1927 (NAD 27). Projection and 10000-foot grid ticks: Colorado Coordinate System, south zone (Lambert Conformal Conic). 1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

The difference between NAD 27 and North American Datum of 1983 (NAD 83) for 7.5 minute intersections is given in USGS Bulletin 1875. The NAD 83 is shown by dashed corner ticks

There may be private inholdings within the boundaries of the National or State reservations shown on this map

Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked

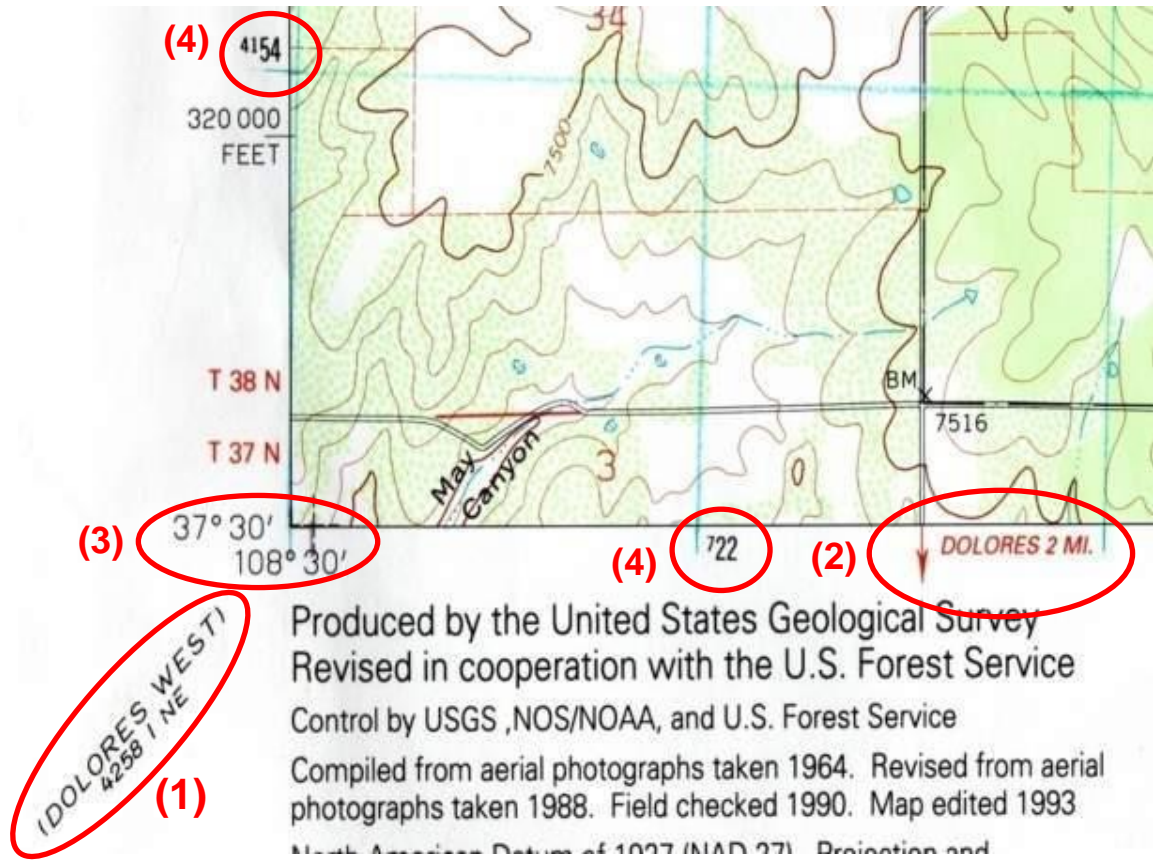
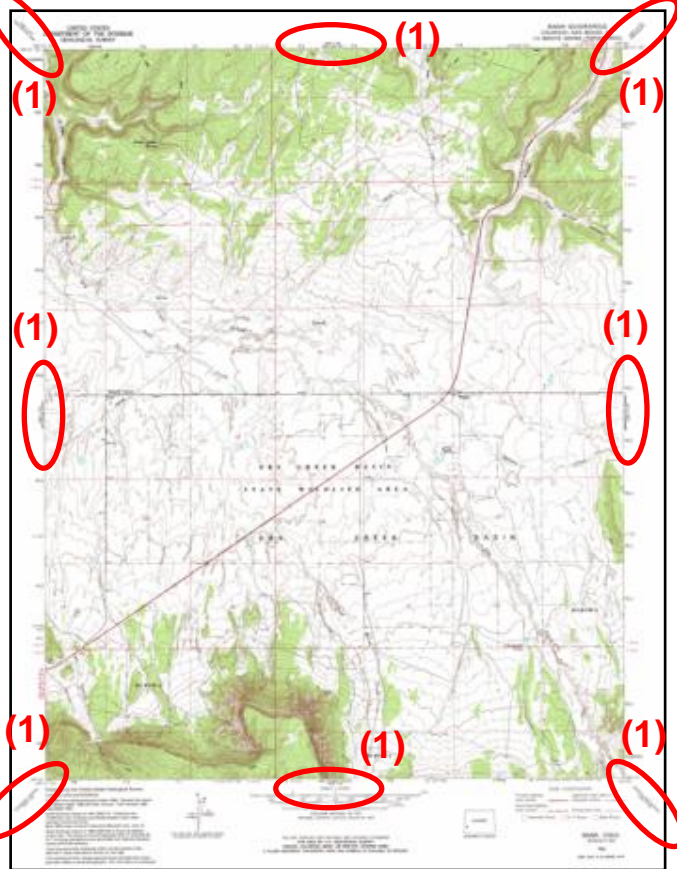


UTM GRID AND 1993 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Map Margin Information

Additional information is distributed around the entire map margin. (only “need to know” items are circled)

- (1) names for adjoining quadrangle maps (in black). Adjacent to corners and centers of the map sides.
- (2) In red are the distances by road to the nearest towns.
- (3) The spherical grid, latitude and longitude, complete coordinates are given at each corner of the map.
- (4) the UTM (in black lettering with blue tics) and the UTM grid is in kilometers.

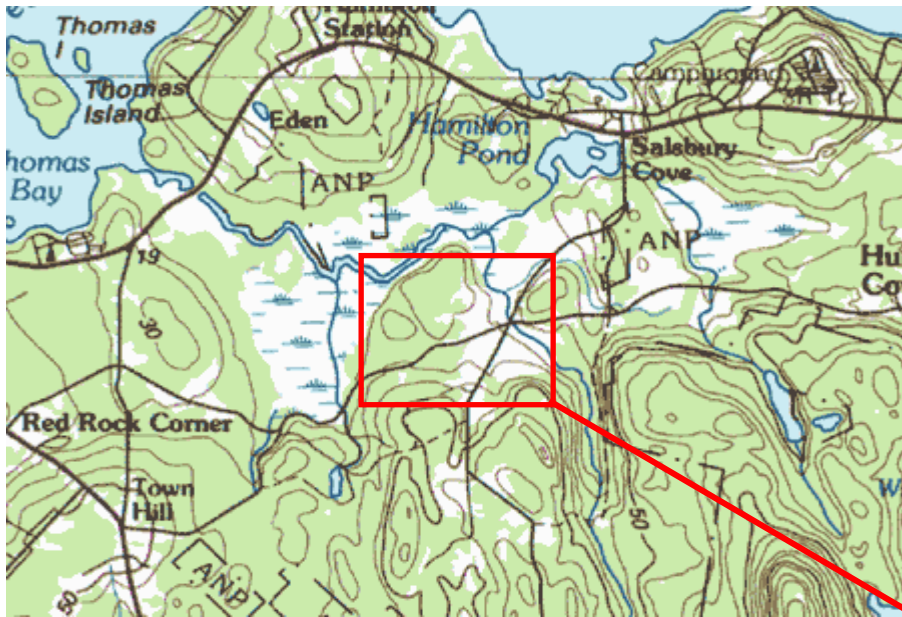


Produced by the United States Geological Survey
Revised in cooperation with the U.S. Forest Service
Control by USGS, NOS/NOAA, and U.S. Forest Service
Compiled from aerial photographs taken 1964. Revised from aerial
photographs taken 1988. Field checked 1990. Map edited 1993
North American Datum of 1983 (NAD 83) Projection and

Map Scale

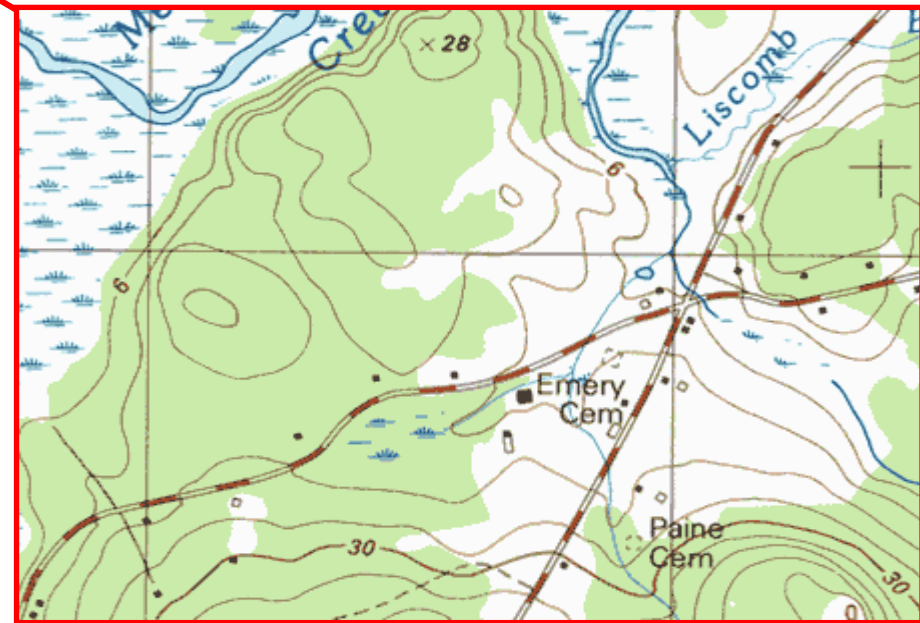
Map Scale

- Map scale is the relationship between distance on a map and the corresponding distance on the ground. Scale is expressed as a ratio, such as 1:24,000, and shown graphically by bar scales marked in feet and miles, or in meters and kilometers. Maps with a small scale for example, 7.5-minute maps, are often called large-scale maps because they show more detail (by covering less area) than a large bar-scale (30- x 60-minute) map.
- You must know the scale to determine ground distances between objects or locations on the map, the size of the area covered, and how the scale may affect the amount of detail being shown.
- The terms “*small scale*,” “*medium scale*,” and “*large scale*” may be confusing when read in conjunction with the number.
- However, if the number is viewed as a fraction, it quickly becomes apparent that 1:600,000 of something is smaller than 1:75,000 of the same thing. Therefore, the larger the number after 1:, the smaller the scale of the map.
- (1) **Small**. Maps with scales of 1:1,000,000 and smaller are used for general planning and for strategic studies. The standard small-scale map is **1:1,000,000 (1 inch = 16 miles)**. This map covers a very large land area at the expense of less detail.
- (2) **Medium**. Maps with scales larger than 1:1,000,000 but smaller than 1:75,000 are used for operational planning. They contain a moderate amount of detail, but terrain analysis is best done with the large-scale maps. The standard medium-scale map is **1:250,000 (1 inch = 4 miles)**. Medium-scale maps of 1:100,000 are also frequently encountered.
- (3) **Large**. Maps with scales of 1:75,000 and larger are used for tactical, administrative, and logistical planning. These are the maps that you as a Soldier or junior leader are most likely to encounter. The standard large-scale map is 1:50,000; however, many areas have been mapped at a scale of **1:25,000 (1 inch = 2,000 feet)**. Lots of detail is shown on this type of map.

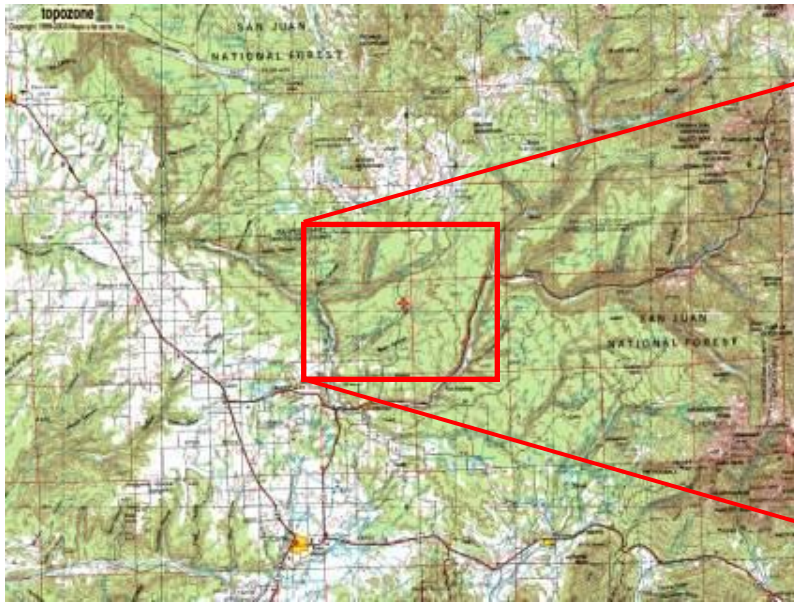


Medium-scale topo map (1:150,000)
SOME DETAIL

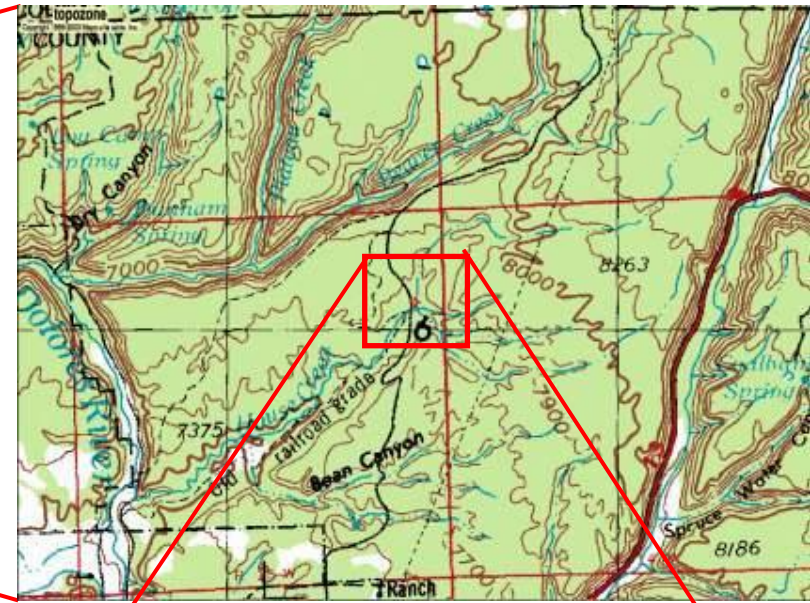
Map Scale



Large-scale topo map (1:24,000)
LOTS OF DETAIL



Small-scale map (1:100,000,000)
VERY LITTLE DETAIL



Medium-scale map (1:250,000)
MORE DETAIL

Map Scale



Large-scale map (1:24,000)
LOTS OF DETAIL

Map Symbols

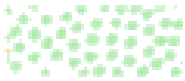
Map Symbols

VEGETATION

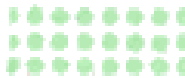
Woods



Shrub



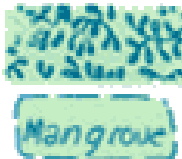
Orchard



Vineyard



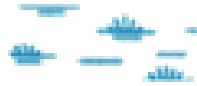
Mangrove



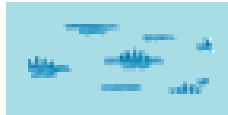
SUBMERGED AREAS AND BOGS

Map Symbols

Marsh or swamp



Submerge marsh or swamp



Wood marsh or swamp



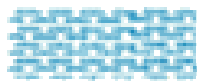
Submerge wood marsh or swamp



Rice field



Land subject to inundation



RIVERS, LAKES, AND CANALS

Map Symbols

Intermittent stream 

Perennial lake or pond 


Perennial stream 

Intermittent lake or pond 

Intermittent river 


Dry lake 

Perennial river 

Well or spring 



Small falls; small rapids 

Dam 

Large falls; large rapids 


Canal 


MAN-MADE FEATURES and HIGHWAY & LAND GRIDS

Map Symbols

Built-up Areas 

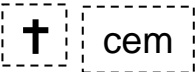
Buildings 


School 

Church 

Airports 

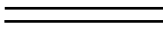
Landing Strip 

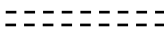
Cemetery 

Mine 

Gravel Pit 

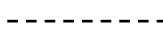
Highway 

Road 

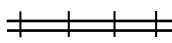
Dirt Road 

Bridge 

Foot Bridge 

Trail 

Power Lines 

Railroad 



Land Grids

12	13	14
15	16	17
18	19	20

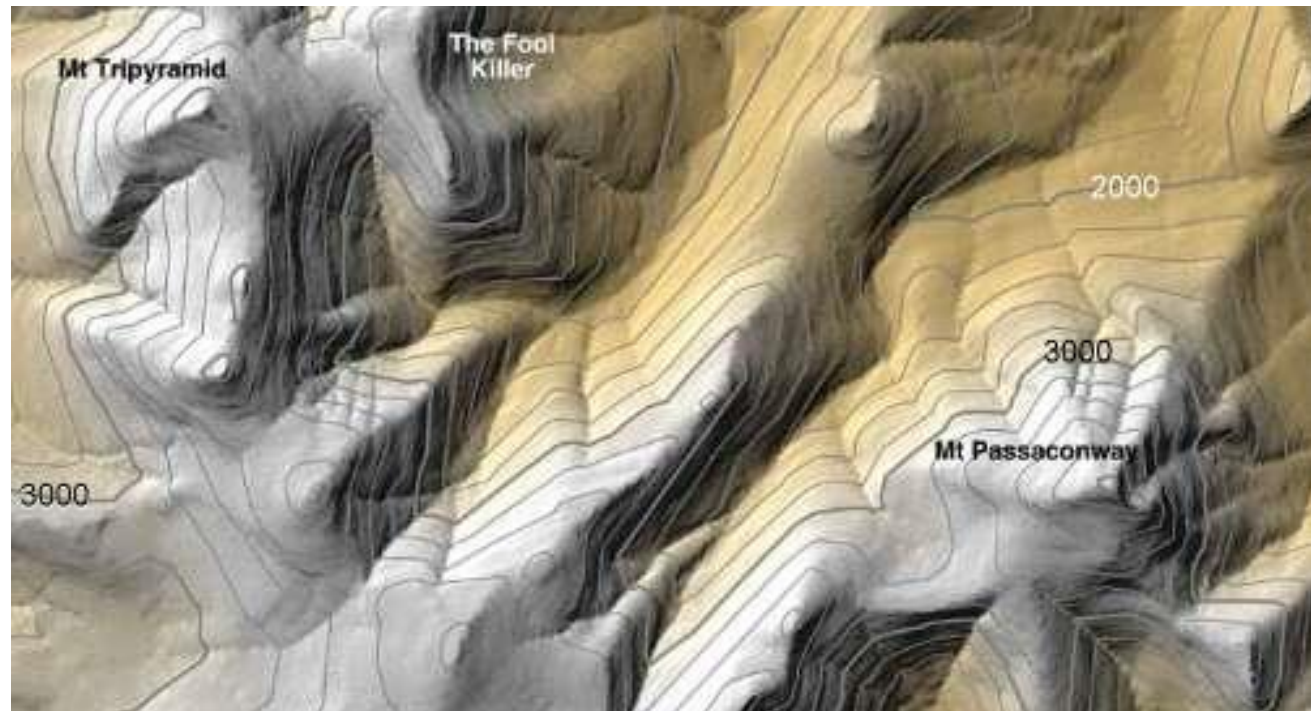
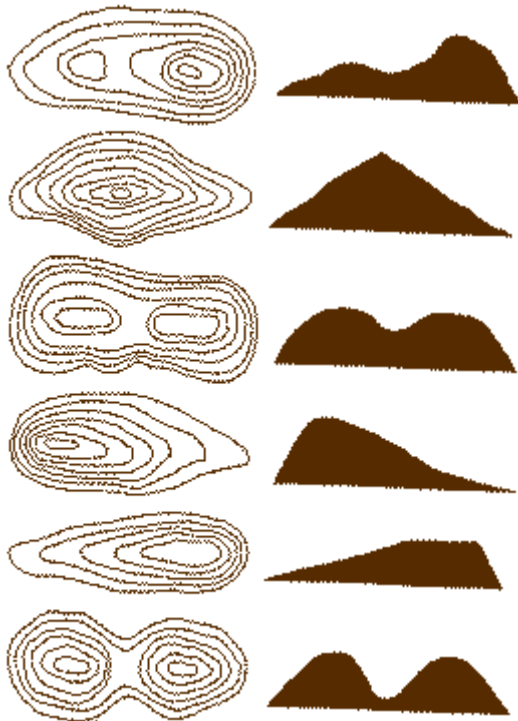
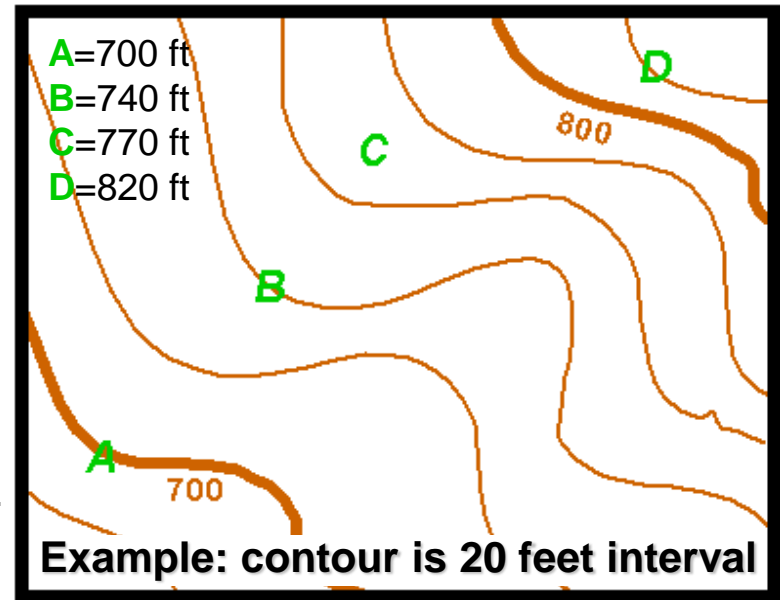
Contour Lines

CONTOUR LINES

Contour Interval ~ The contour interval is the distance between each contour line. The contour interval is found along the bottom edge, center of the map.

Intermediate Contour ~ a brown line on a topographic map and represents a line of equal elevation.

Index Contour ~ a bolder/wider brown line that has the elevation value marked at various intervals as a part of the line.



CONTOUR LINES

- There is a dimension to establishing position which does depend on map reading skills.
- This is the vertical dimension. On a map it is referred to as “relief”.
 - Knowledge of the relief of an area is extremely important to a wilderness navigator.
- The most graphic technique ever devised to show relief information is the contour line.
 - If you were to walk a contour line you would never go down hill and never up hill, and eventually you would arrive back where you started.



Terrain Relief Features

Terrain Relief Features

Five Major

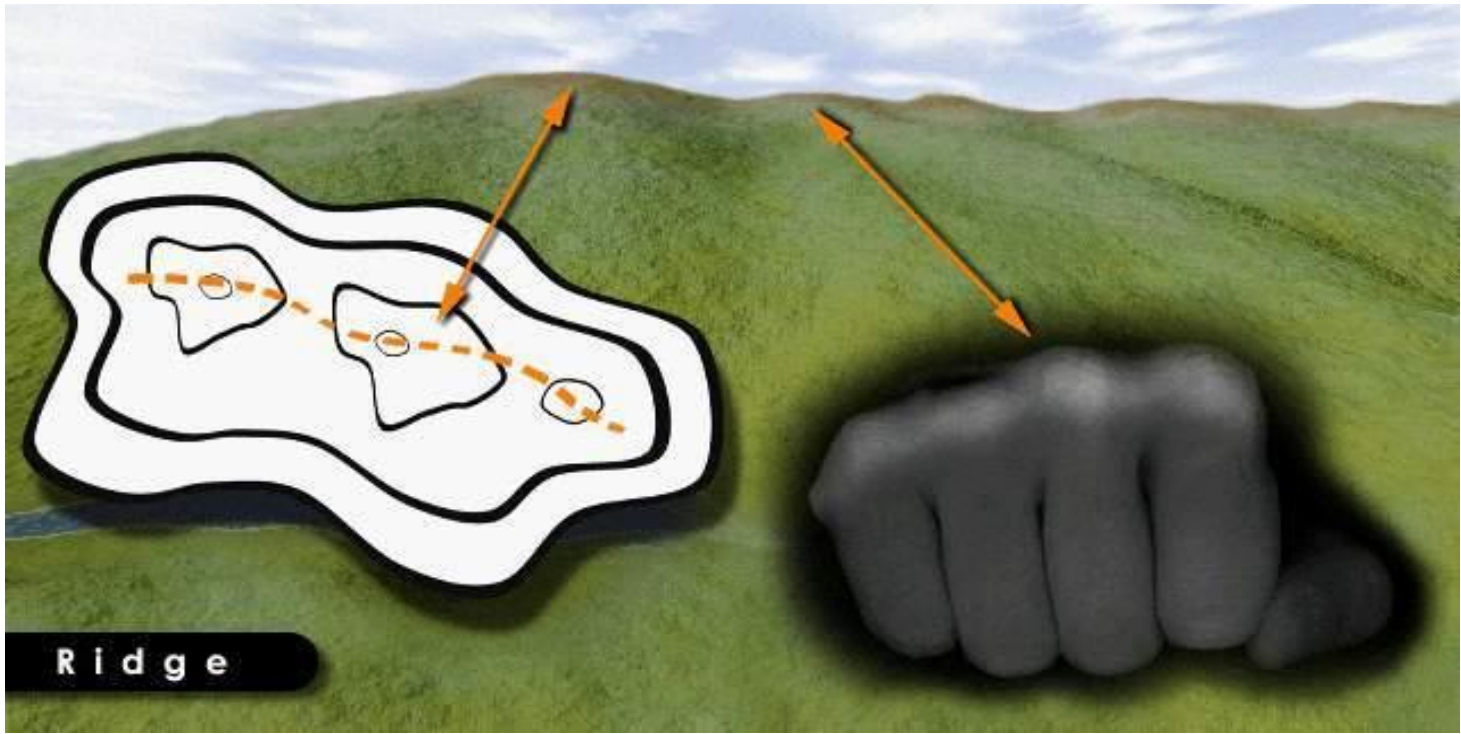
- Ridge
- Hill
- Saddle
- Valley
- Depression

Three Minor

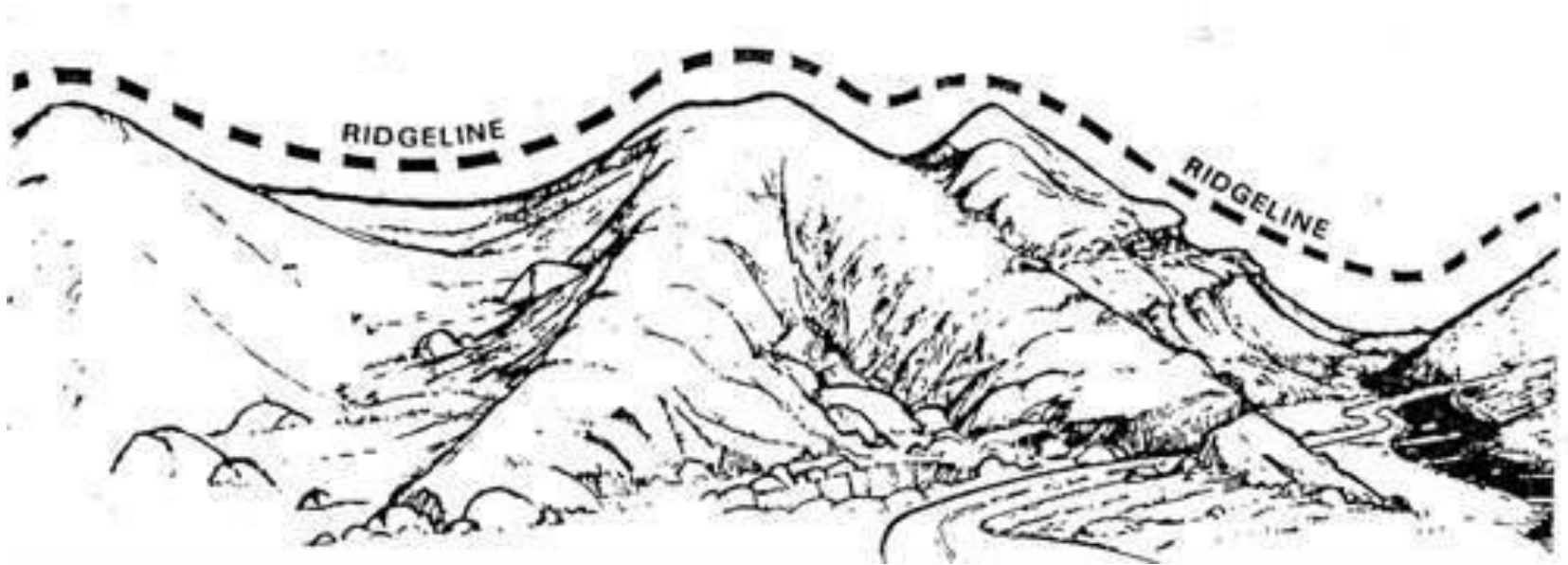
- Spur
- Draw
- Cliff

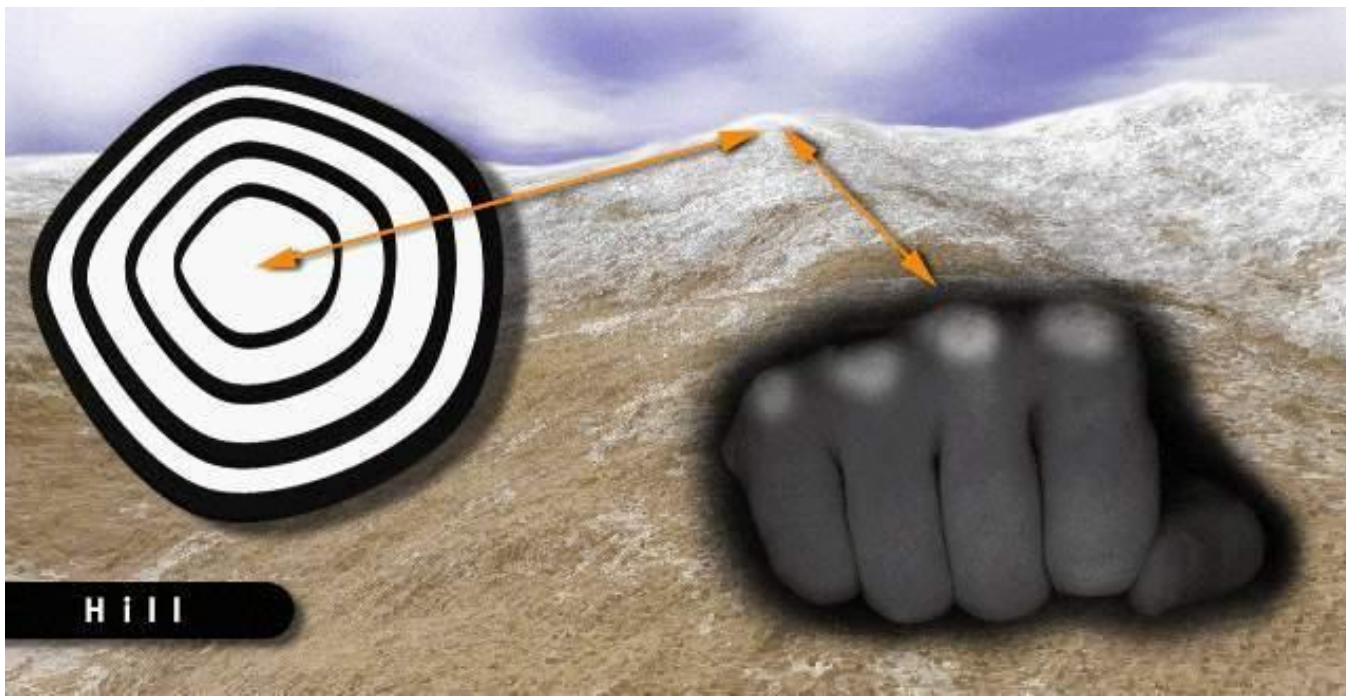
Two Supplemental

- Cut
- Fill

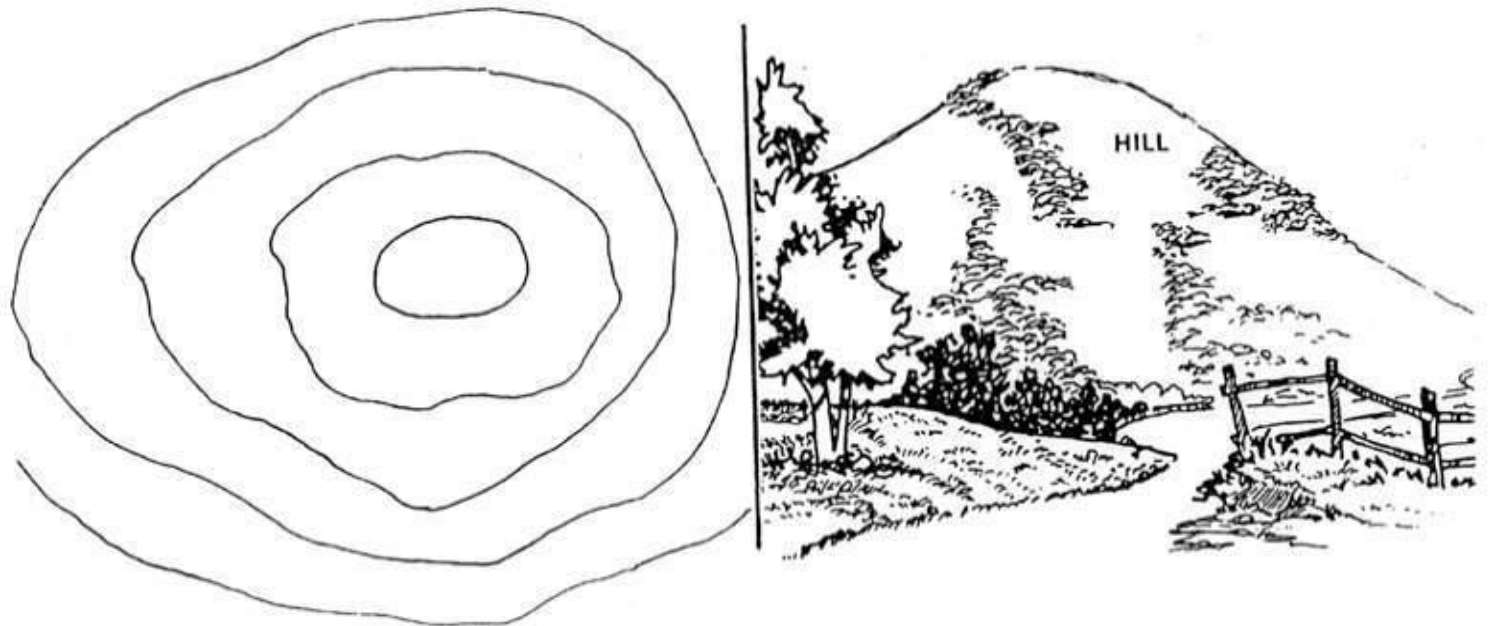


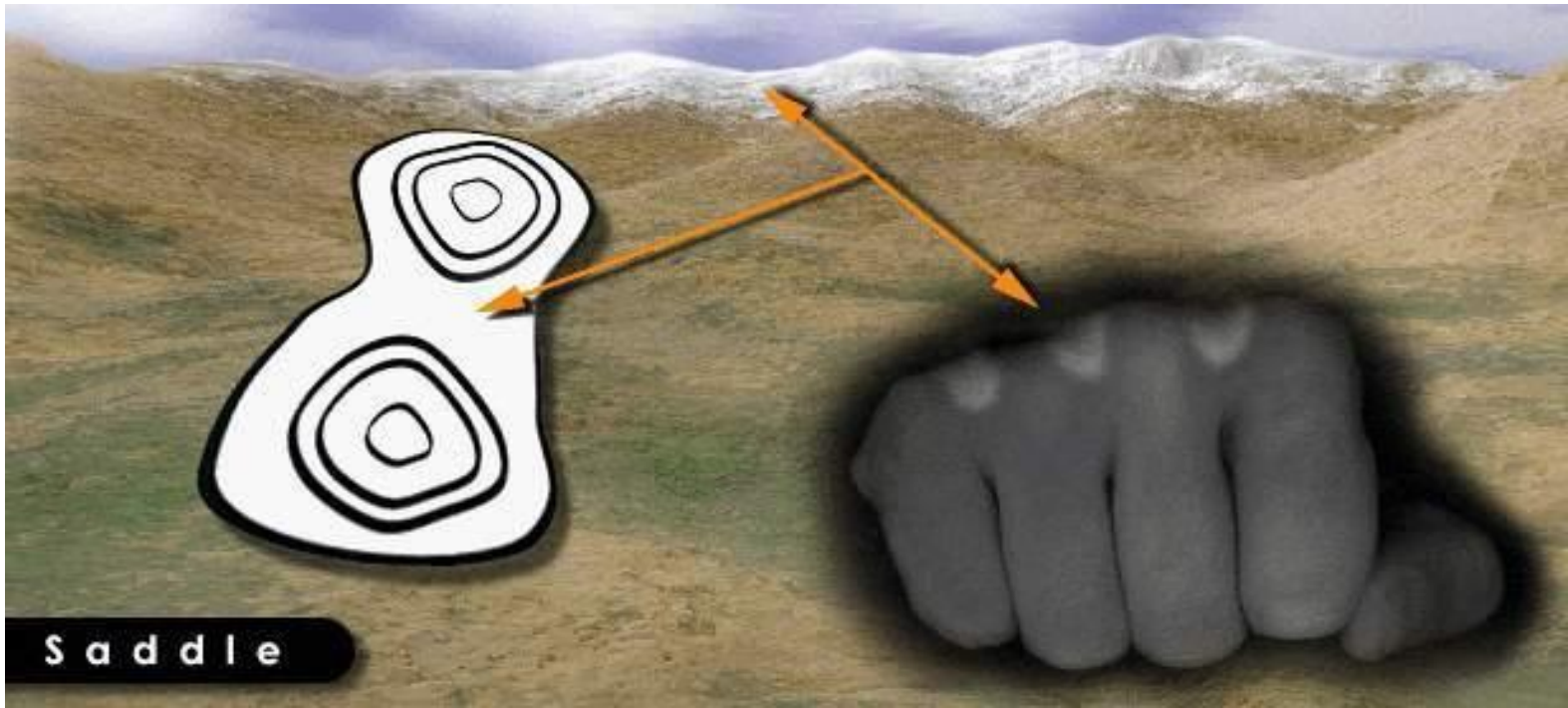
RIDGE



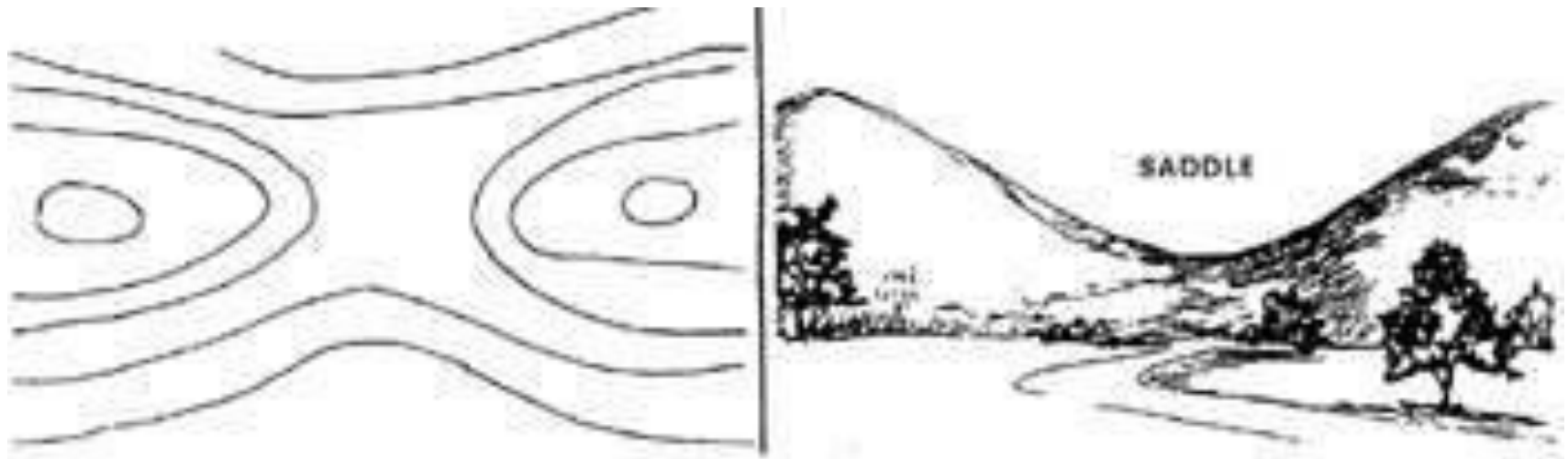


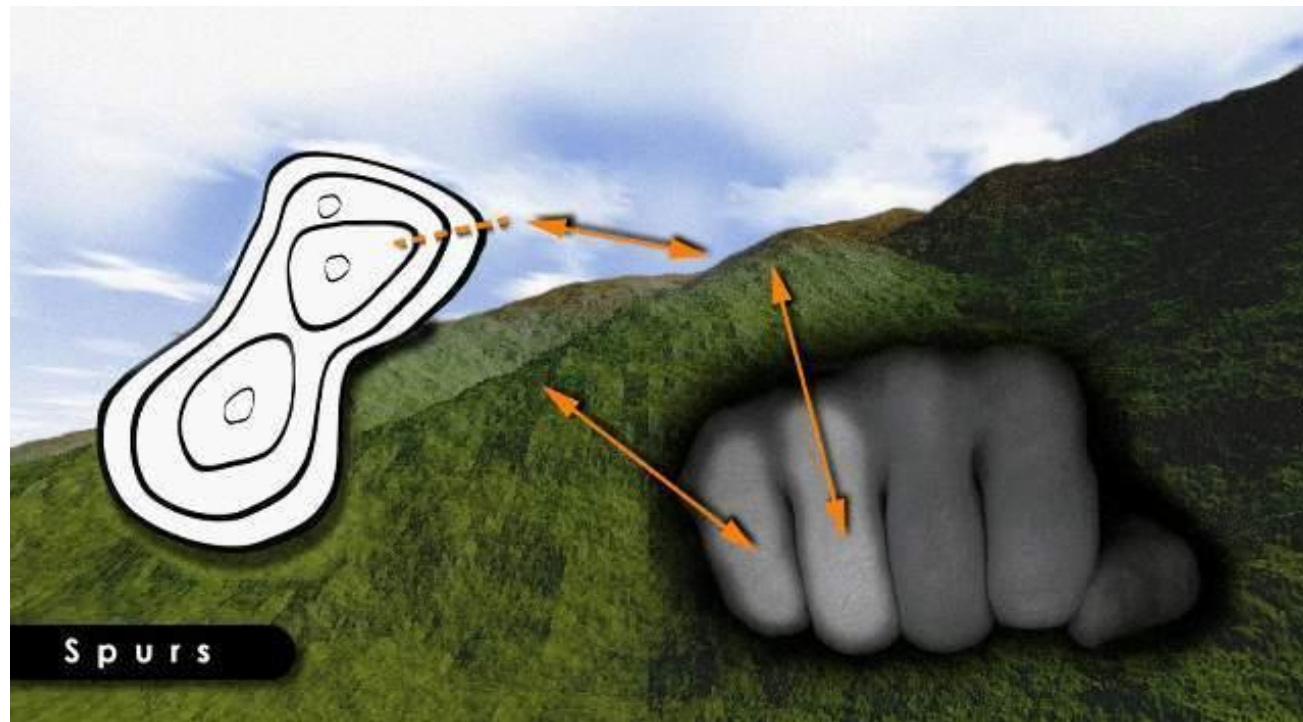
HILL



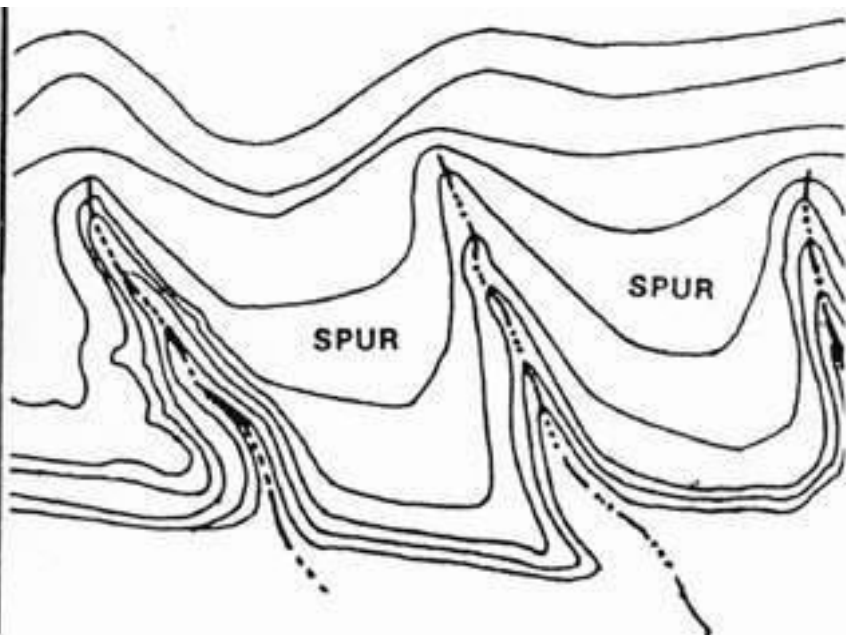


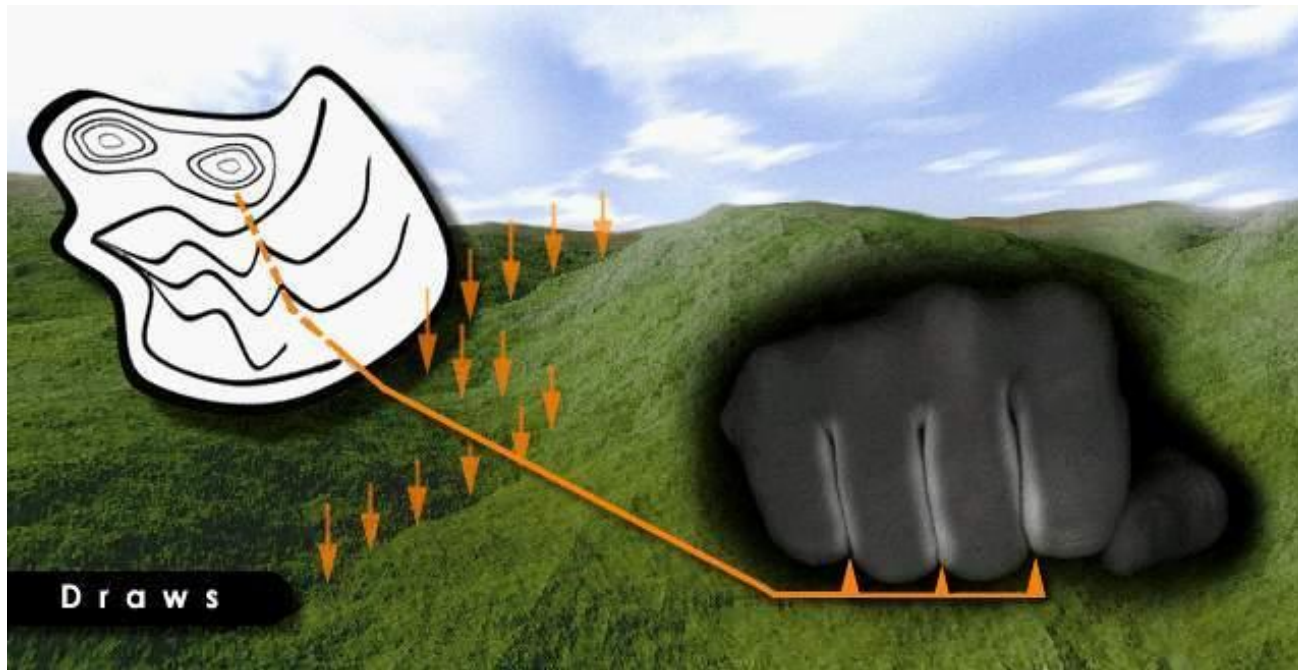
S
A
D
D
L
E



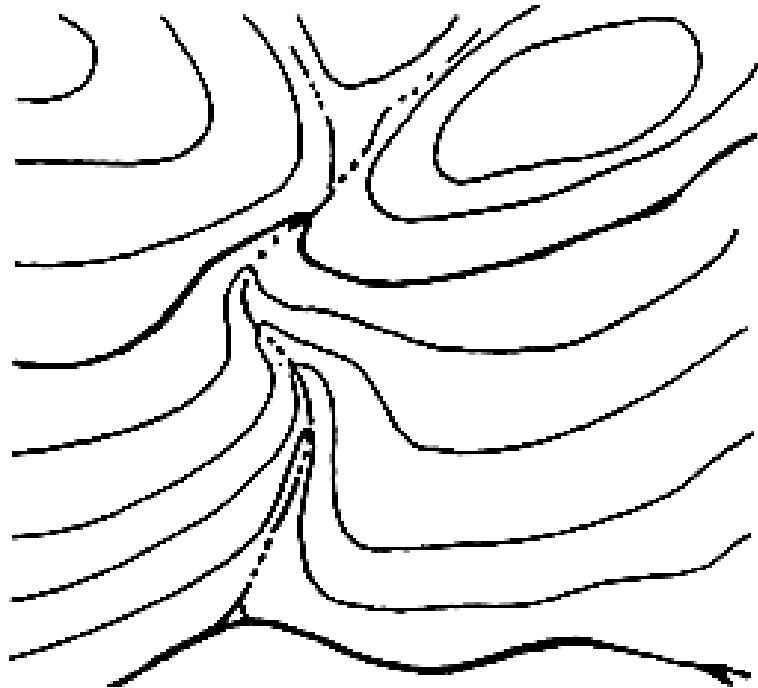


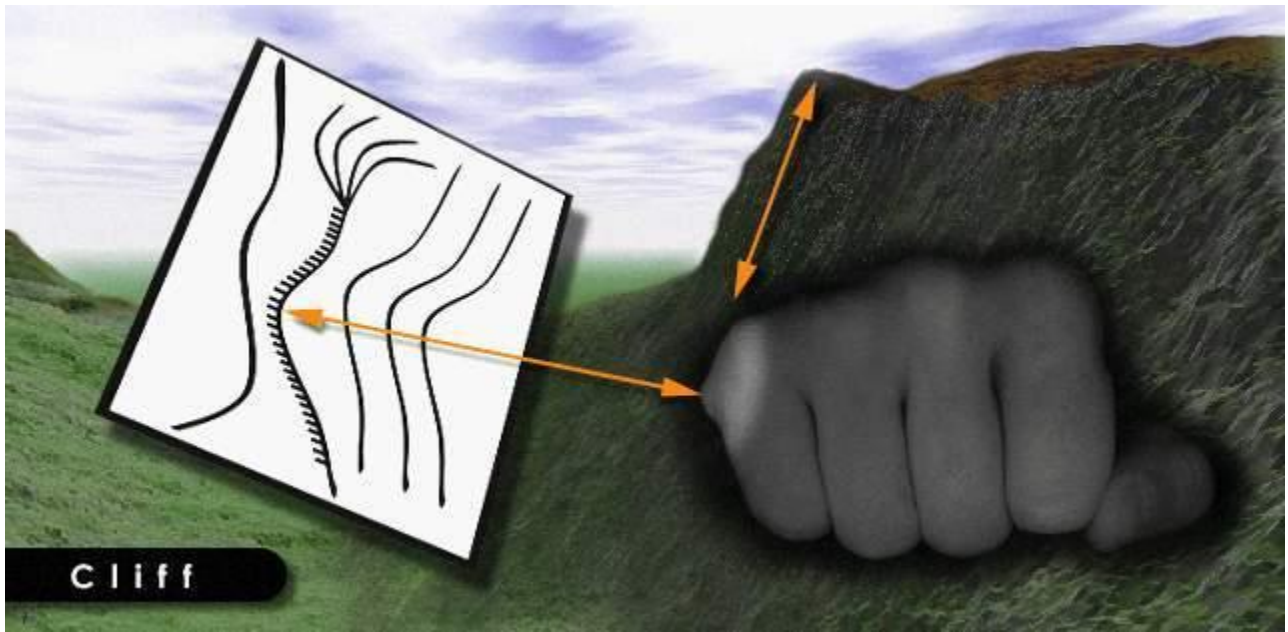
SPURS



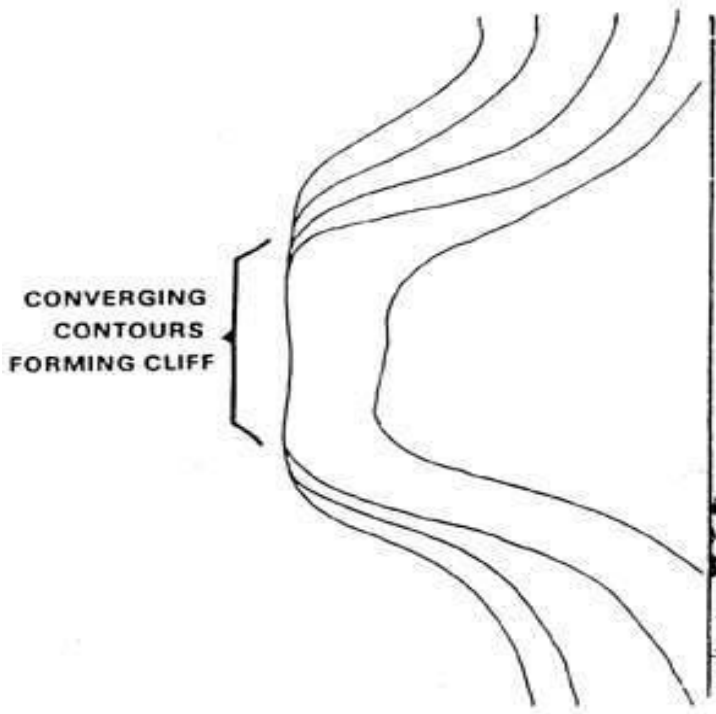


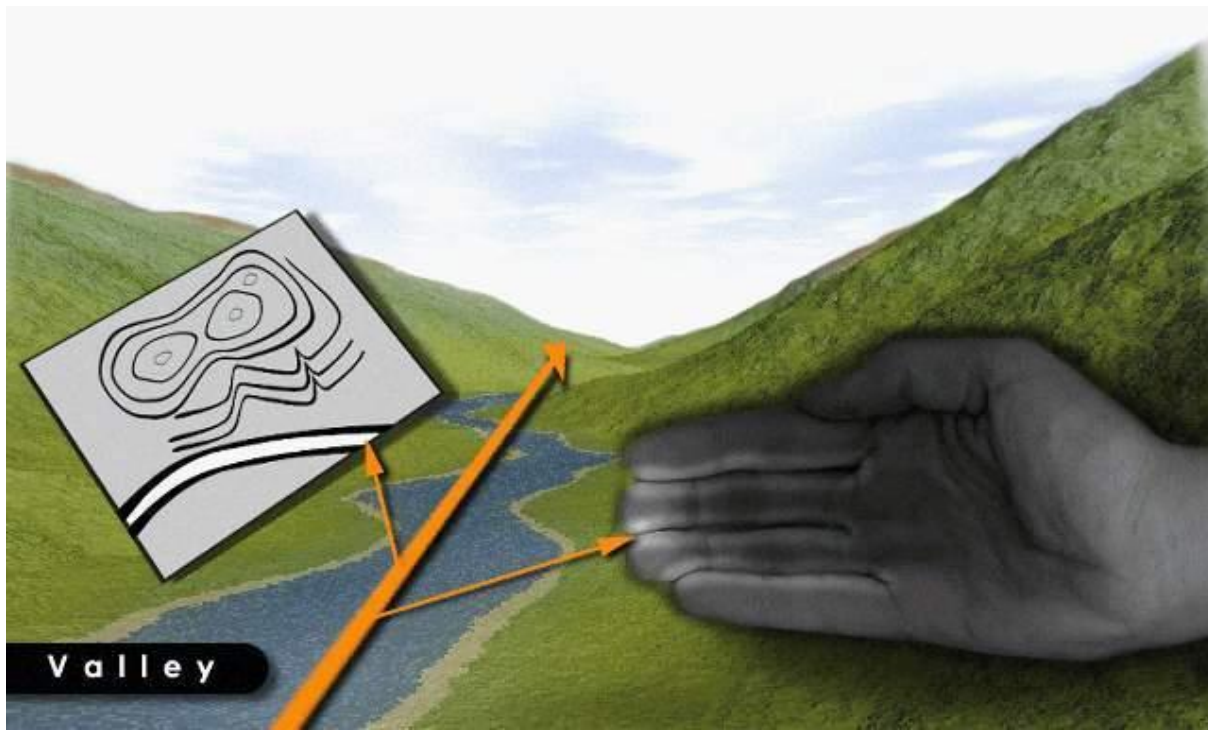
DRAWS



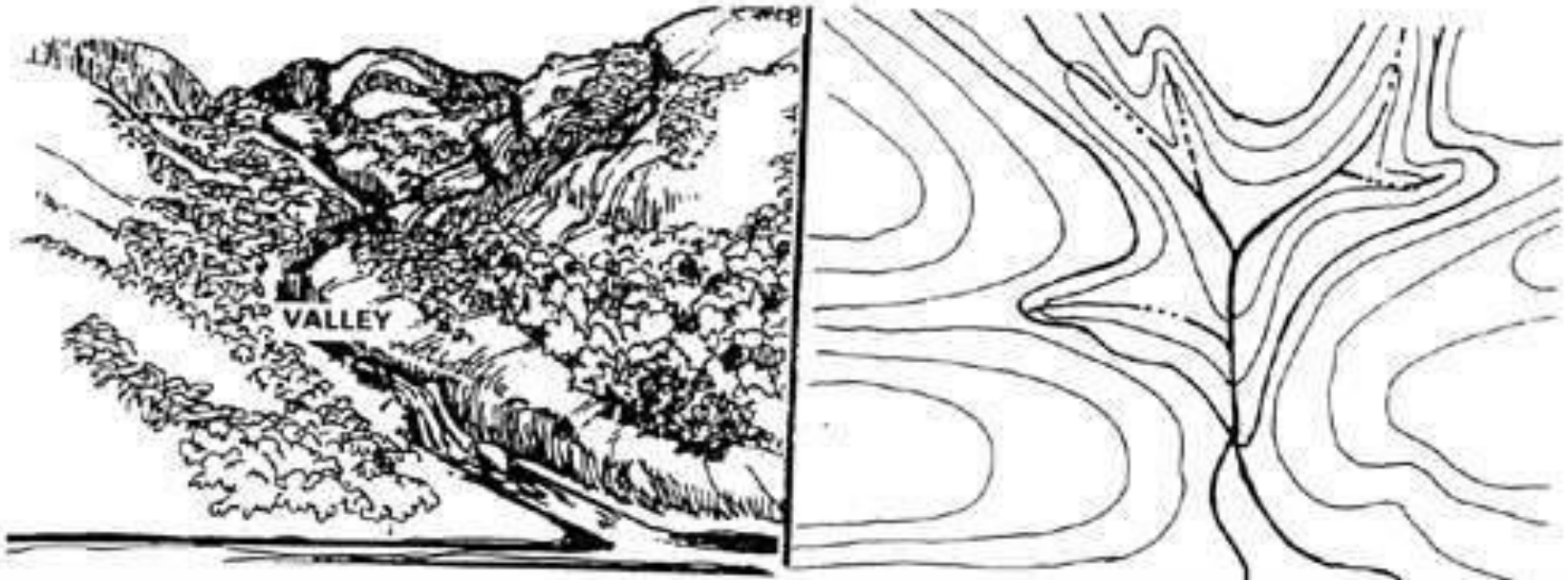


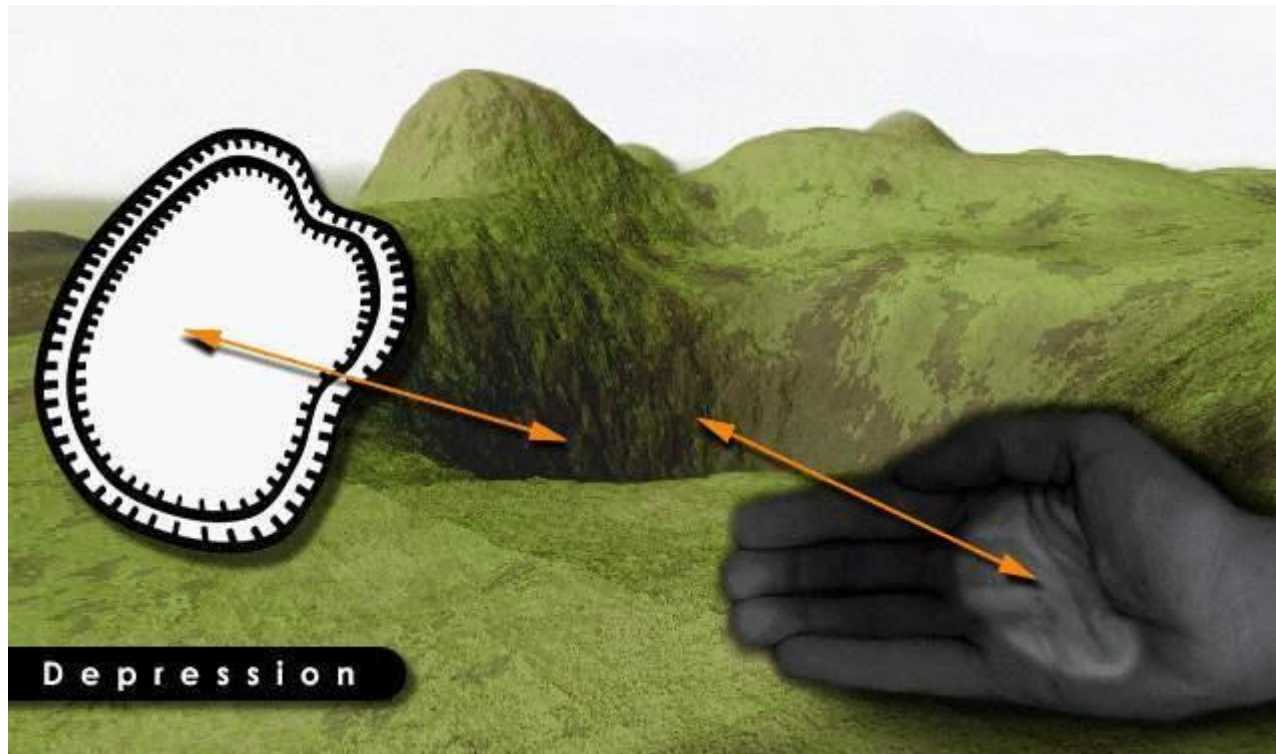
CLIFF



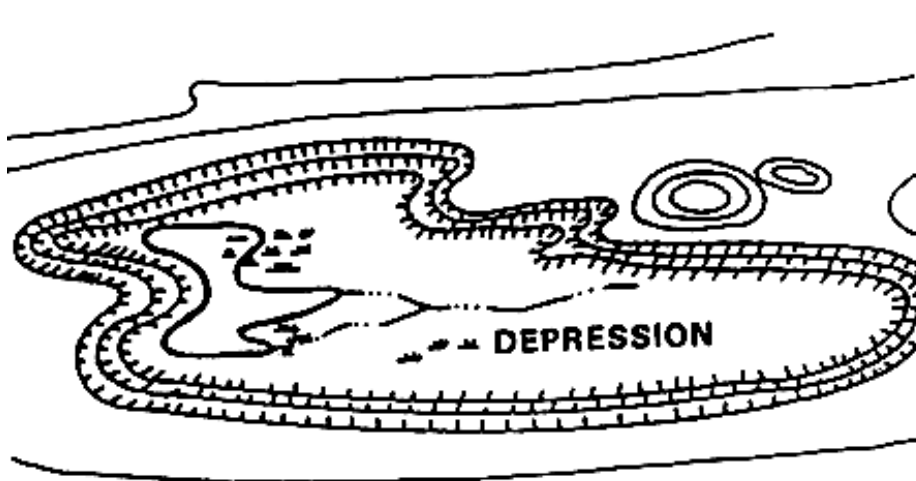


VALLEY

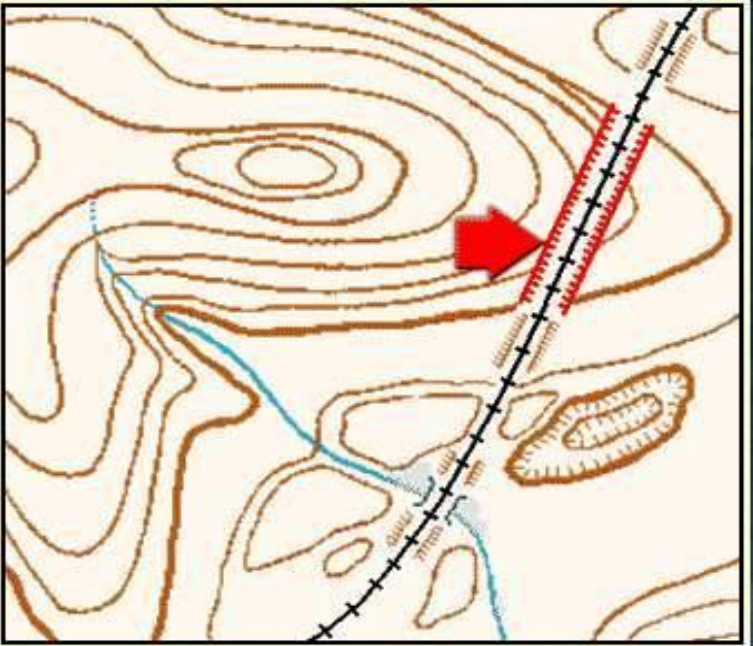
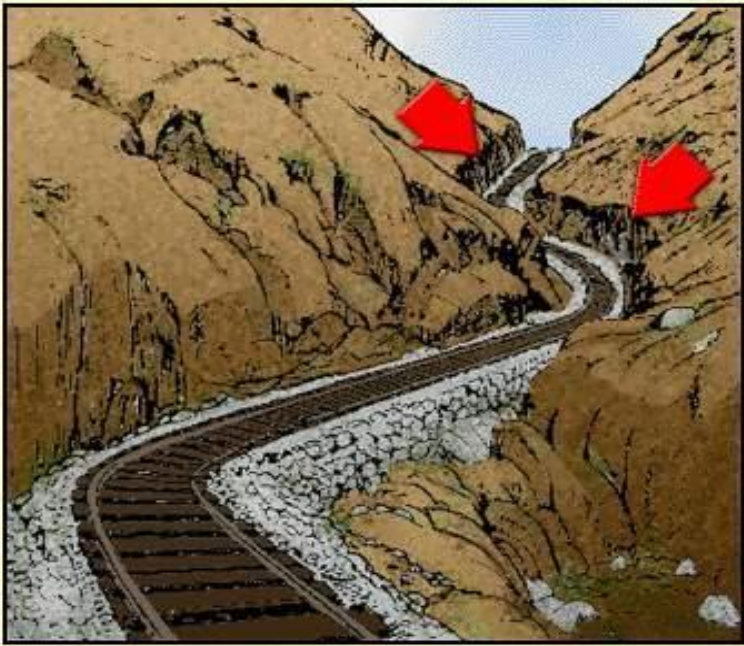




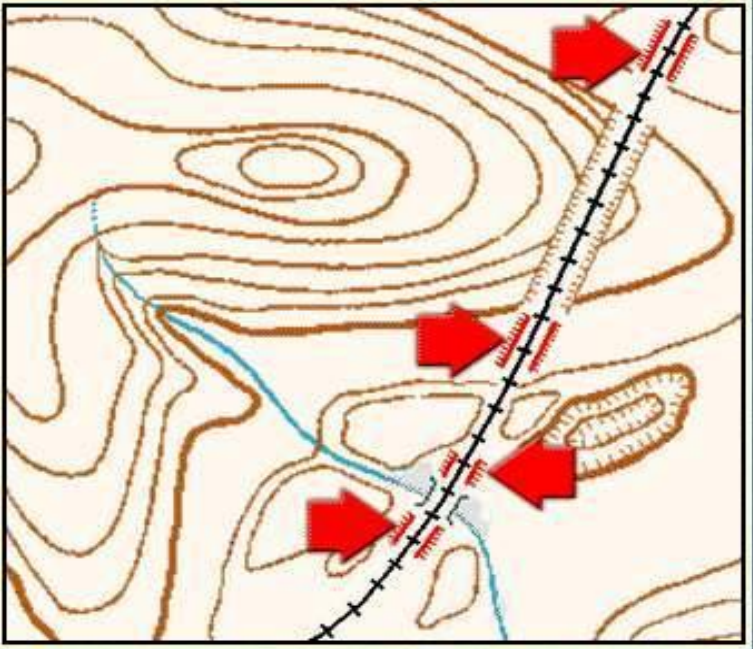
DEPRESSION



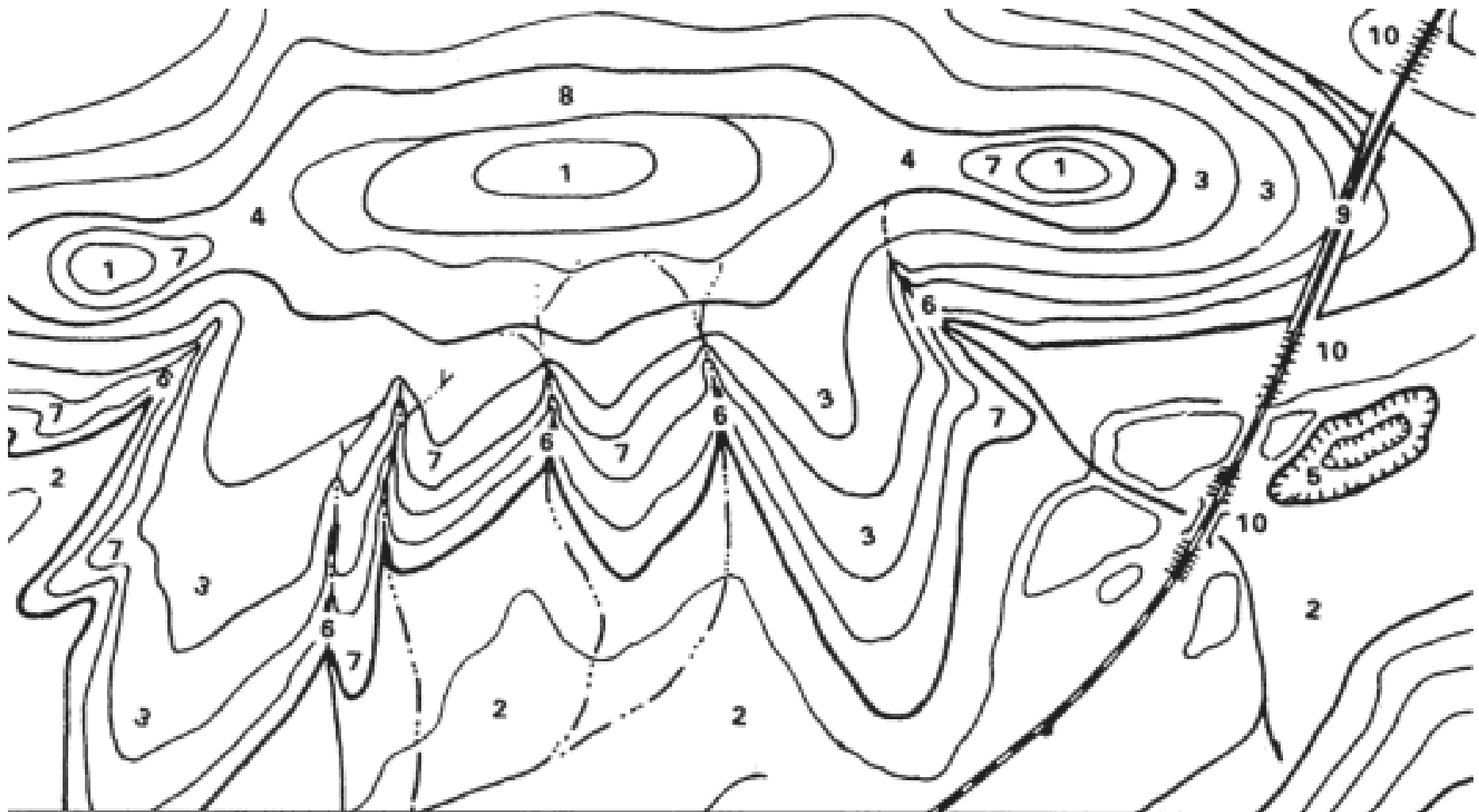
CUT



FILL



Terrain Features



1. HILL

3. RIDGE

5. DEPRESSION

7. SPUR

9. CUT

2. VALLEY

4. SADDLE

6. DRAW

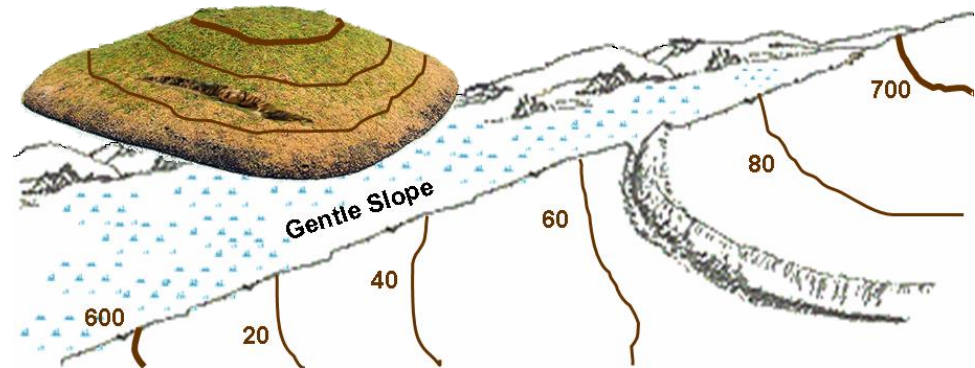
8. CLIFF

10. FILL

Map Information Identification

Map Information - Identification

- The identification of significant features, both natural and man-made, is partly a matter of knowing the language of maps.
 - One category of map language is lines. In addition to showing contour relief, lines are used to portray roads, trails, railroads, power lines, and drainage features.
 - Another category of map language is composed of various picture symbols.
 - A third part of map language is color.
- If part of identification is in knowing the language of maps, the rest is a problem of interpretation. What is the relationship among certain lines, symbols, and colors?
- Reading contour lines is literally reading between the lines. **Contour lines represent the shape of the terrain only at specified intervals.** The user must be aware that what lies between may be quite different. There could be rugged terrain, vertical bluffs, or deep ravines that might not be shown.



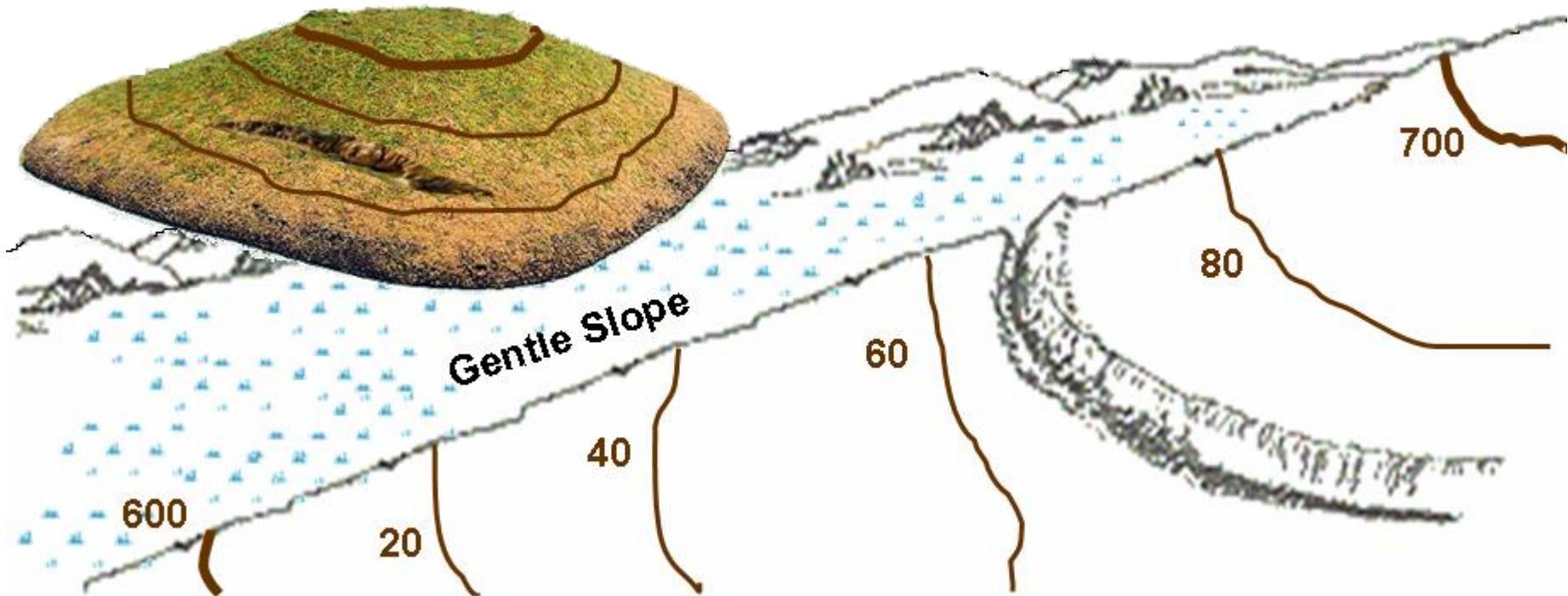
- A river may be drawn some what straight on a map, but the terrain's actual river meanders, with many curves, turns, and with wide and narrow banks.
- What a topographic map shows is as accurate as possible, BUT can give you a false sense of what you might mentally think what is ahead of you and what actually is shown on an aerial photo map and actual land features. (see next slides)



CONTOUR LINES

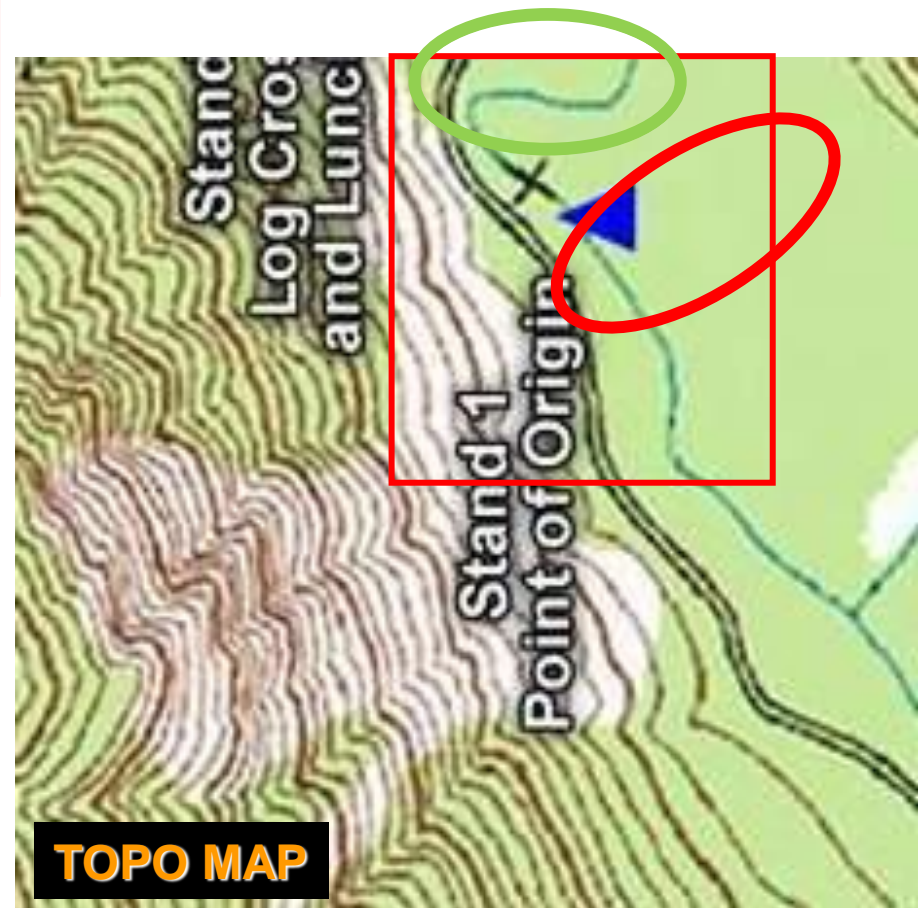
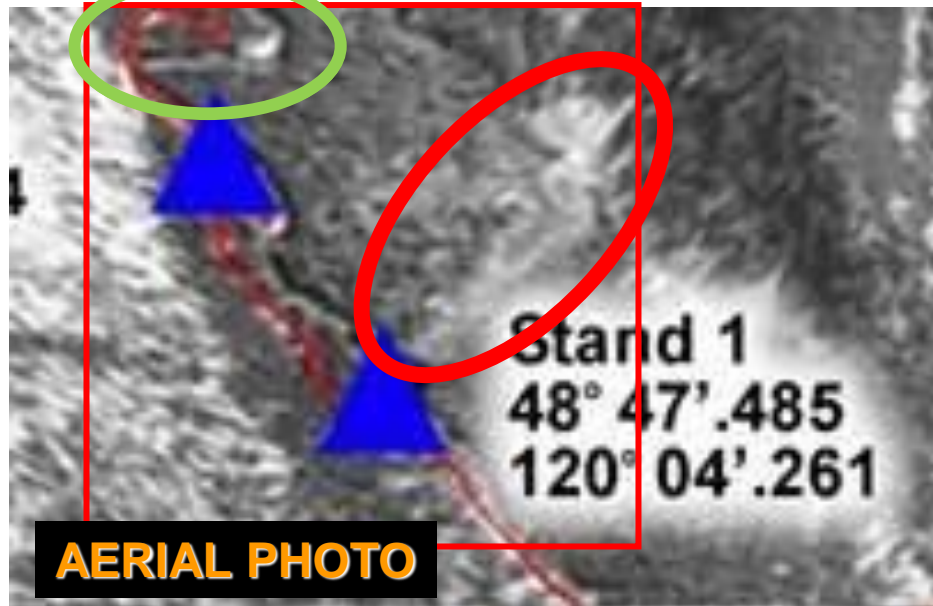
Contour Lines on a map
Do not show everything.

Scan the Landscape,
read between the lines.



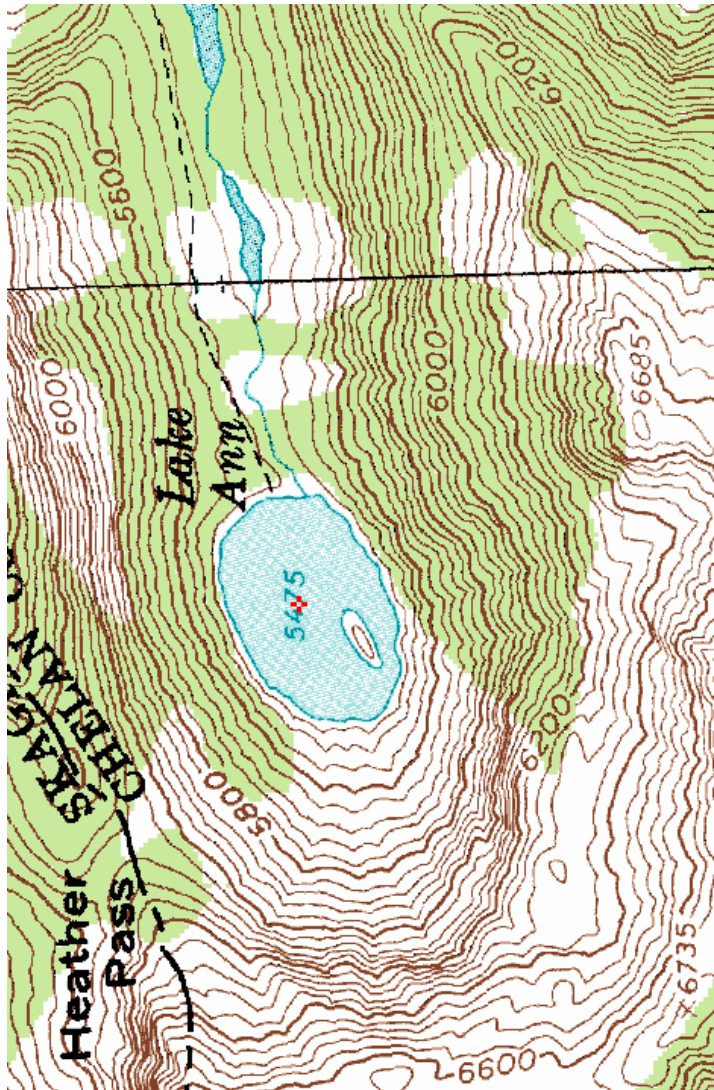


What a Topo map,
Aerial photo map,
And actual Land features show

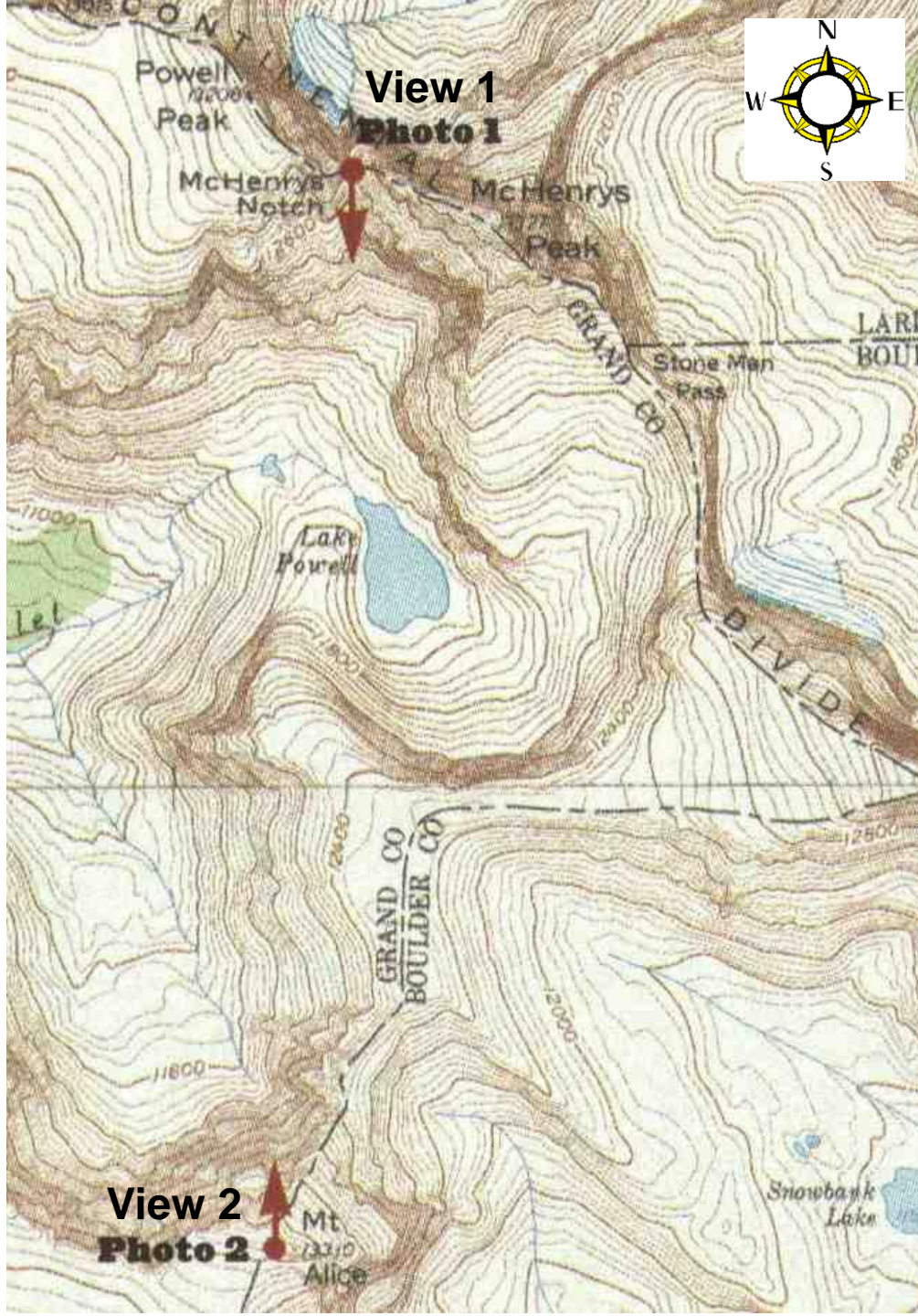




What a Topo map
and actual Land features show



What a Topo map
and actual Land features show



What a Topo map
and actual Land features show

Compare the next five slides
with this map, to get viewpoint
perspective of what you see on
this map and what you see on
the landscape in front of you

● **Mt. Alice**

BOULDER CO.

GRAND CO.

● **Lake Powell**

● **tarn**

**View 1:
Looking South**



McHenry's Notch

McHenry's Peak

Powell Peak

Stone Man Pass

BOULDER CO.
GRAND CO.

**View 2:
Looking North**



What a Topo map and actual Land features show

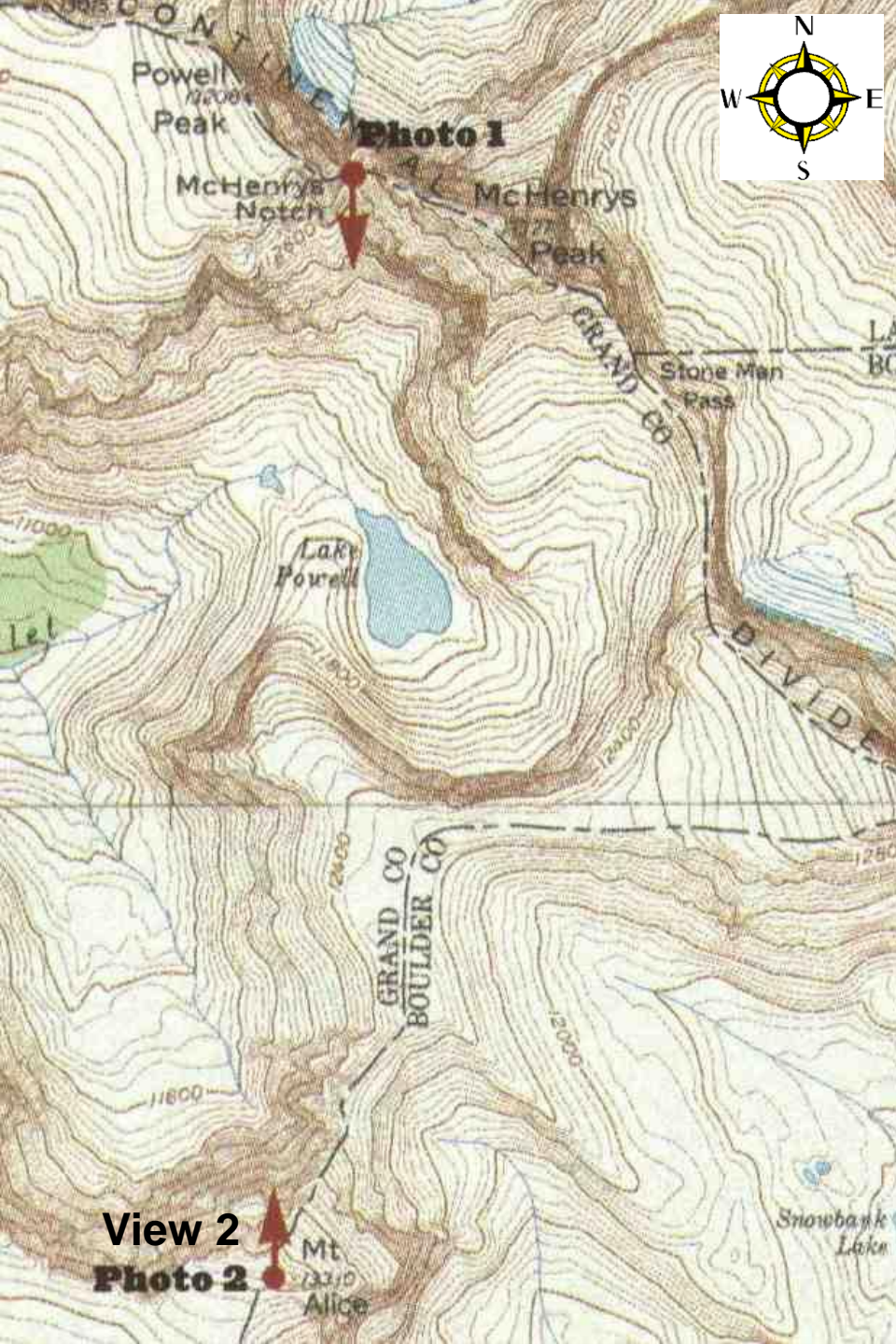
Note: here the map is turned upside down so you can get a better perspective

View 1



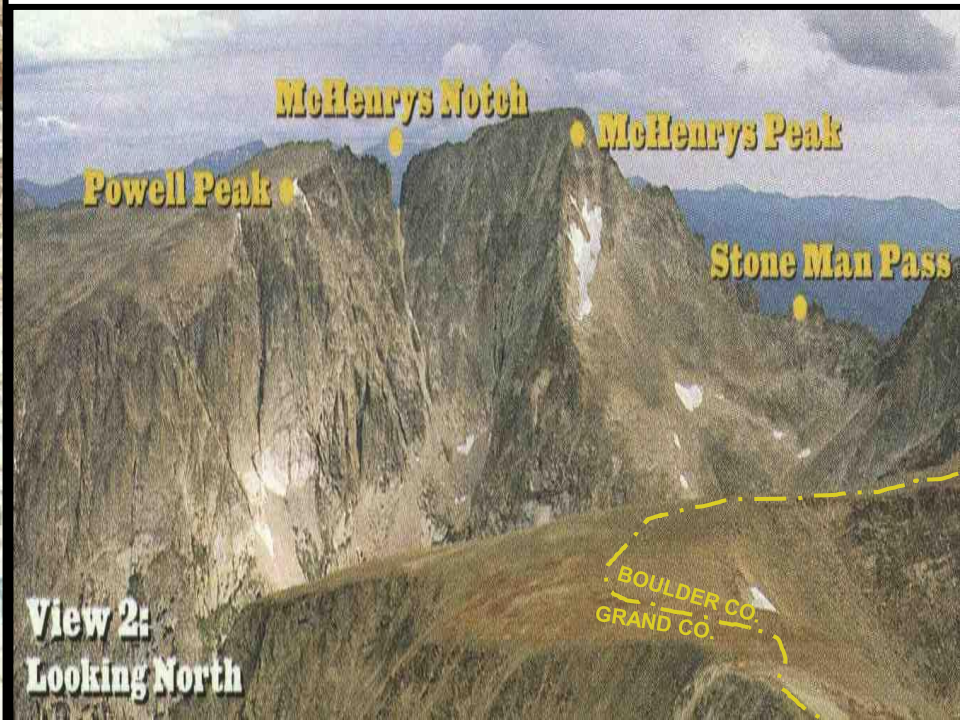
View 1:
Looking South

tarn



What a Topo map
and actual Land features show

View 2



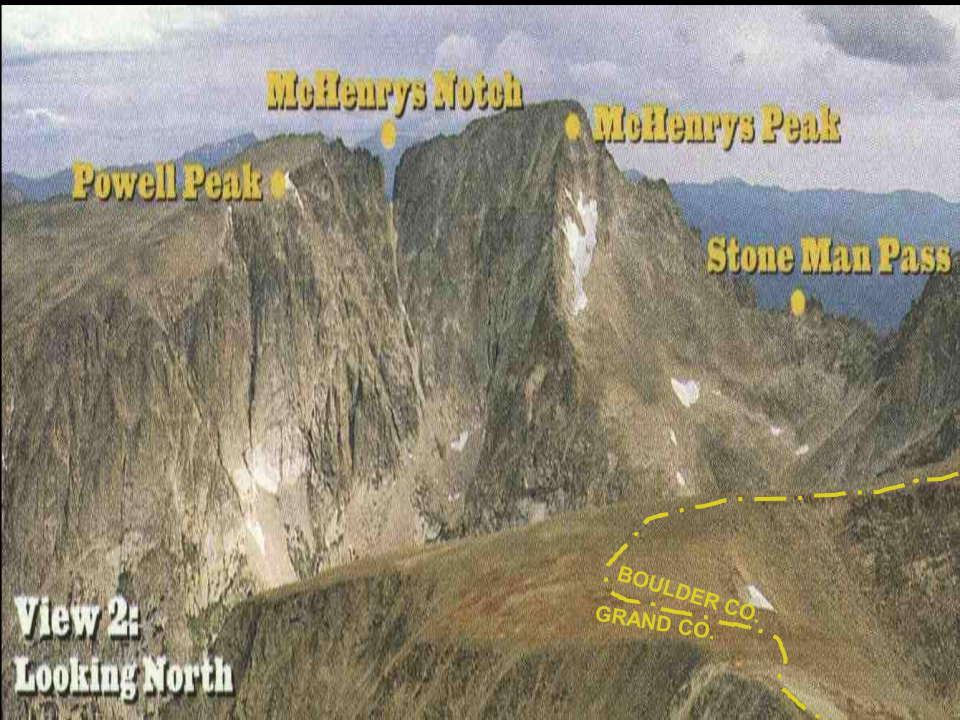
View 2

Photo 2

View 2:
Looking North



**View 1:
Looking South**



**View 2:
Looking North**

Map Folding

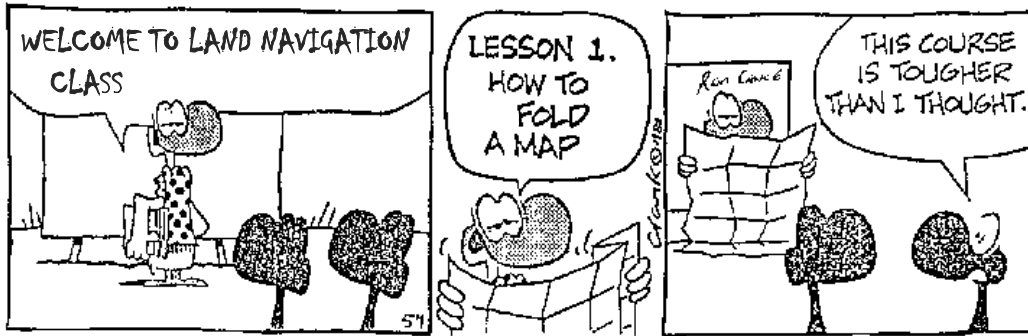
Map Folding and Map Care

- Maps should be correctly folded.
 - Maps should be folded to make them small enough to be carried and still be available for use without having to unfold them entirely.
 - After a map has been folded it should be placed in a folder for protection. This will prevent the corners and edges of the map from wearing out and tearing easily when opened.
- It is hard to navigate accurately with a dirty, grimy, wet or damaged map. Take care of your map and it will take care of you.
 - Most maps are printed on paper and require protection from water, mud, weather, and tearing.
 - Whenever possible, a map should be carried in a waterproof packet to prolong its life.
 - Waterproofing maps.

All members of the group should know the map's location at all times.



- Marking a map.
 - If it is necessary to mark a map, use light lines so that they may be erased without smearing or smudging. If the margins of the map must be trimmed note any marginal information which may be needed, such as grid data or magnetic declination data, on the back of the map.
- Special care should be taken of a map that is being used in any situation, especially in a small group; the mission may depend on that map.



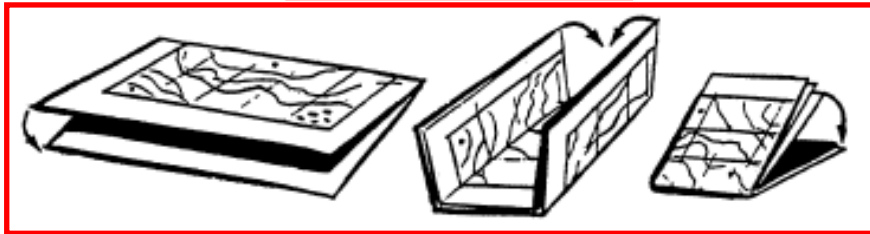
Map Folding

Technique # 3

After a map has been folded, it should be pasted in a folder for protection. Apply adhesive to the back of the segments corresponding to A, F, L, and Q

NOTE: It is suggested that before attempting to cut and fold a map in the manner illustrated below (Technique #3), make a practice cut and fold with a piece of paper.

Technique # 1



Technique # 2

