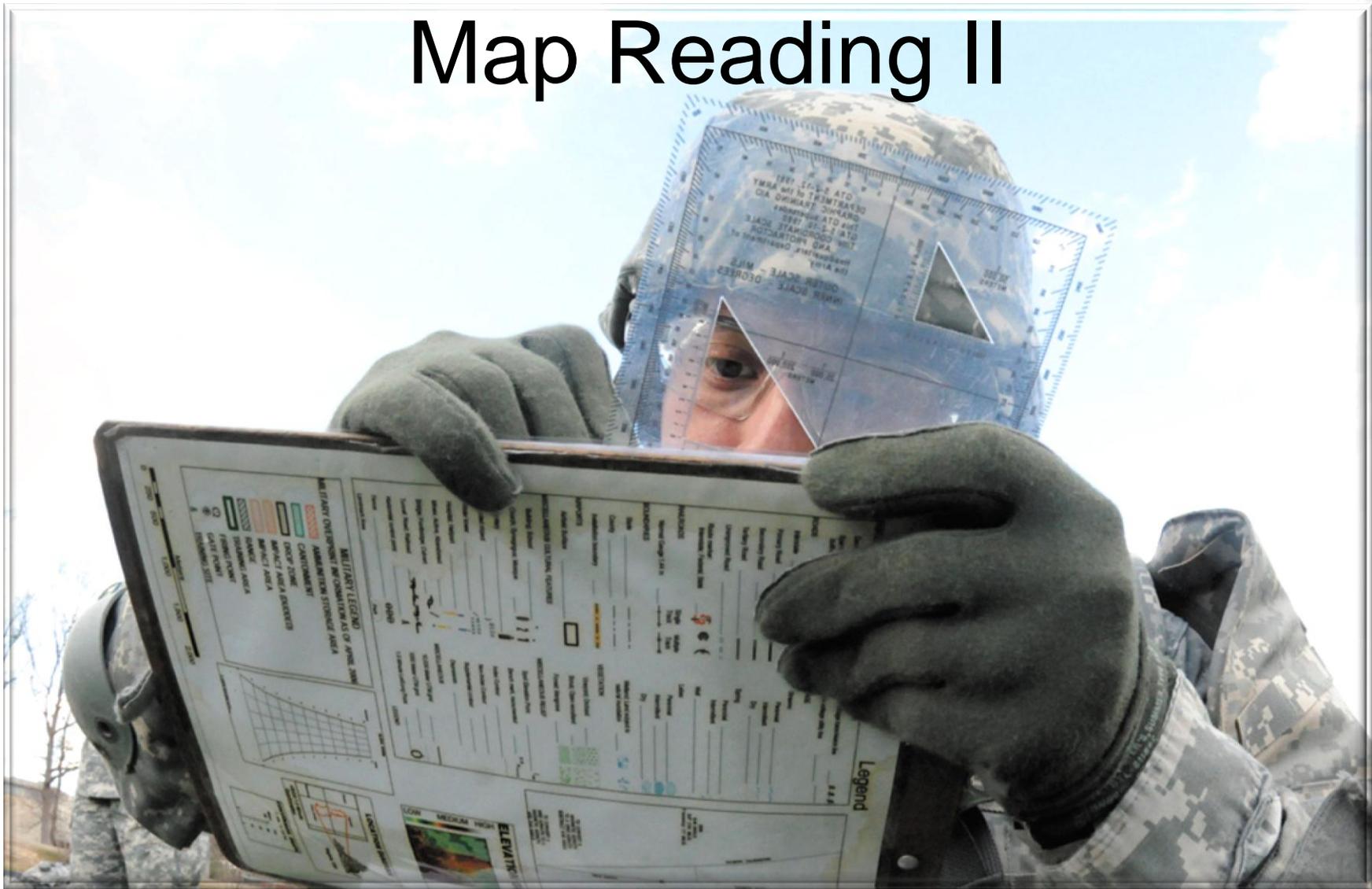




# Map Reading II





# Objectives

- ❑ Apply map reading skills using aspects taken from marginal information on a military map
- ❑ Interpret different terrain features based on a map's changing topographic contour intervals
- ❑ Differentiate symbols, colors, and surrounding natural or man-made objects on a military map
- ❑ Determine hilltop elevation based on index, intermediate, and supplementary contour lines
- ❑ Plot four and six-digit grid coordinates



## Marginal Information

□ Sheet Name

Tenino

□ Sheet Number

SHEET 1477 IV SERIES V791 EDITION 7-DMA

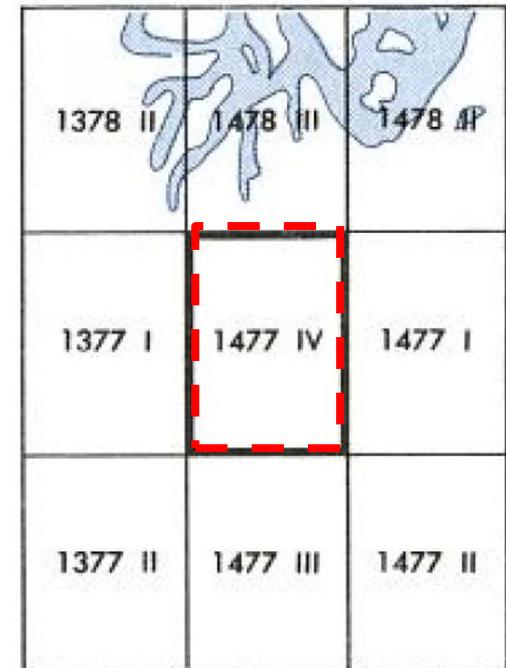
□ Adjoining Sheets

### ADJOINING SHEETS

Prepared and published by the Defense Mapping Agency

LEGEND  
MAP INFORMATION AS OF 1975  
ON THIS MAP, A LANE IS GENERALLY CONSIDERED AS BEING A MINIMUM OF 2.5 METERS (8 FEET) IN WIDTH

<b>ROADS</b>	Buildings or structures
Divided highway with median strip	Church/School
Primary all weather, hard surface, two or more lanes wide	Watermill
Secondary all weather, hard surface, two or more lanes wide	Windmill, wind pump
Light duty, all weather, hard or improved surface	Mine, vertical shaft
Fair or dry weather, unimproved surface	Mine, horizontal shaft
Trail	Open pit mine or quarry, inactive
Route markers: Interstate, Federal, State	Open pit mine or quarry, active
<b>RAILROADS</b> (Standard gauge: 1.44m-4'8 1/2")	Horizontal control station
Single track	Bench mark, monumented
Multiple track	Bench mark, non-monumented
Multiple track, non-operating	Spot elevations in meters. Checked, Unchecked
Railroad station. Position known, Position unknown	Woodland
Car line	Vineyard, Orchard
<b>BOUNDARIES</b>	Intermittent lake
National	Intermittent stream; Dam
State, territory	Marsh or swamp
County, parish, municipio	Rapids; Falls
Civil township, precinct, town, barrio	Large rapids; Large falls
Incorporated city, village, town, hamlet	
Reservation: National, state, Military	
Power transmission line	



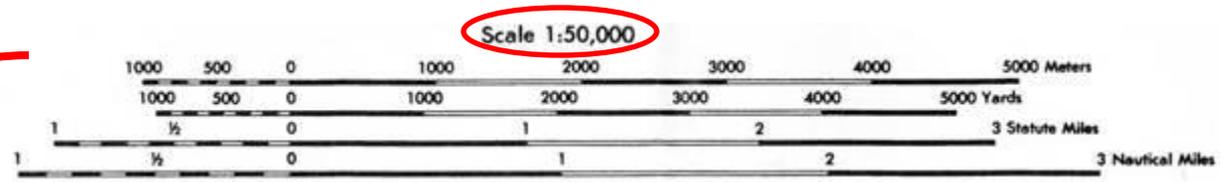
SHEET 1477 IV SERIES V791 EDITION 7-DMA TENINO



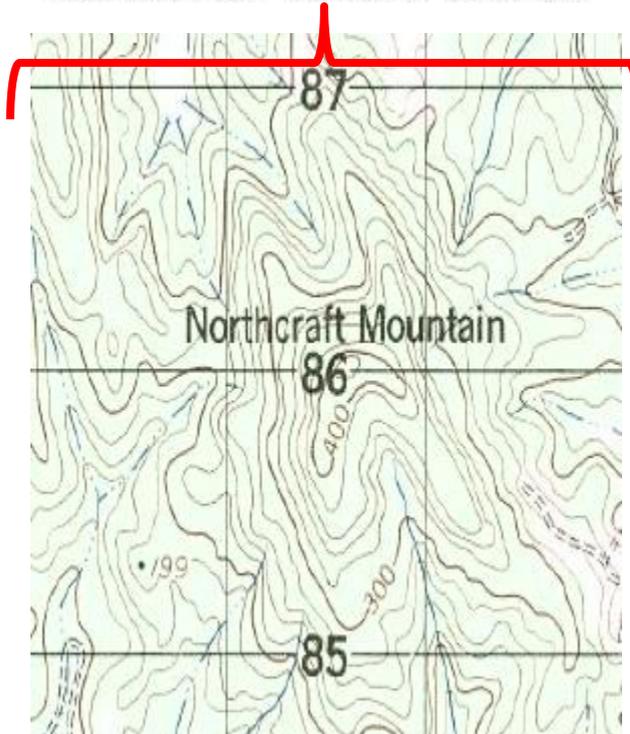
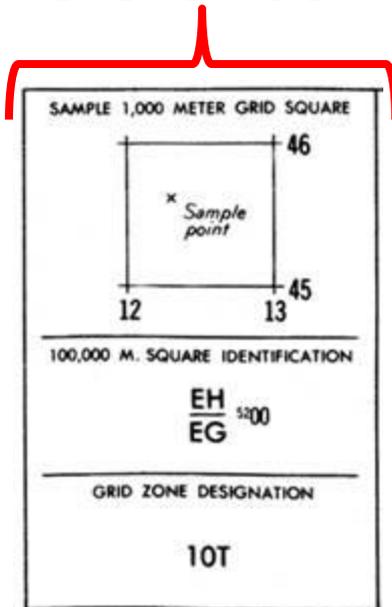


# Marginal Information

- Scale
- Bar Scales
- Contour Interval Notes
- Grid Reference Box



CONTOUR INTERVAL 20 METERS  
SUPPLEMENTARY CONTOURS 10 METERS





# Marginal Information

- Unit Imprint →
- Legend



Prepared and published by the Defense Mapping Agency

### LEGEND

MAP INFORMATION AS OF 1975

ON THIS MAP, A LANE IS GENERALLY CONSIDERED AS BEING A MINIMUM OF 2.5 METERS (8 FEET) IN WIDTH

#### ROADS

Divided highway with median strip	
Primary all weather, hard surface, two or more lanes wide	
Secondary all weather, hard surface, two or more lanes wide	
Light duty, all weather, hard or improved surface	
Fair or dry weather, unimproved surface	
Trail	
Route markers: Interstate; Federal; State	

#### RAILROADS (Standard gauge: 1.44m.- 4'8 1/2")

Single track	
Multiple track	
Multiple track, non-operating	
Railroad station: Position known; Position unknown	
Car line	

#### BOUNDARIES

National	
State, territory	
County, parish, municipio	
Civil township, precinct, town, barrio	
Incorporated city, village, town, hamlet	
Reservation: National, state; Military	
Power transmission line	

Buildings or structures	
Church; School	
Watermill	
Windmill, wind pump	
Mine, vertical shaft	
Mine, horizontal shaft	
Open pit mine or quarry, inactive	
Open pit mine or quarry, active	
Horizontal control station	
Bench mark, monumented	
Bench mark, non-monumented	
Spot elevations in meters: Checked; Unchecked	
Woodland	
Vineyard; Orchard	
Intermittent lake	
Intermittent stream; Dam	
Marsh or swamp	
Rapids; Falls	
Large rapids; Large falls	



# Topographic Symbols



CHURCH



SCHOOL



TANKS

BENCH MARKS:

BM X231 MONUMENTED

X231 NON - MONUMENTED



MINE OR QUARRY INACTIVE



BUILDING OR STRUCTURES

·227 SPOT ELEVATION IN METERS



TRAIL



SINGLE TRACK  
RR



BUILDING



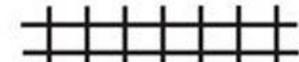
WINDMILL



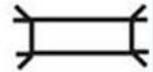
MINE  
OR QUARRY  
ACTIVE



PROMINENT FENCE



DOUBLE TRACK  
RR



CEMETARY

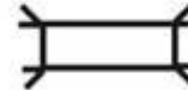
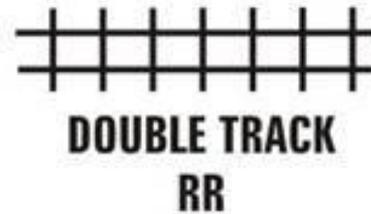
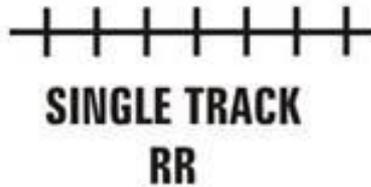


# Military Map Colors

- **Black:** Indicates cultural (man-made) features, such as buildings and roads, surveyed spot elevations, and all labels.
- **Red-Brown:** The colors red and brown are combined to identify cultural features, all relief features, non-surveyed spot elevations, and elevation, such as contour lines on red-light readable maps.
- **Blue:** Identifies hydrograph or water features such as lakes, swamps, rivers, and drainage.
- **Green:** Identifies vegetation with military significance, such as woods, orchards, and vineyards.
- **Brown:** Identifies all relief features and elevation, such as contours on older edition maps, and cultivated land on non red-light readable maps.
- **Red:** Classifies cultural features, such as populated areas, main roads, and boundaries, on older maps.
- **Other:** Occasionally other colors may be used to show special information. These are indicated in the marginal information as a rule.



# Black - Topographic Symbols



**CEMETARY**





# Red-Brown - Topographic Symbols



**HEAVY DUTY  
DIVIDED HIGHWAY**

**HARD SURFACE**



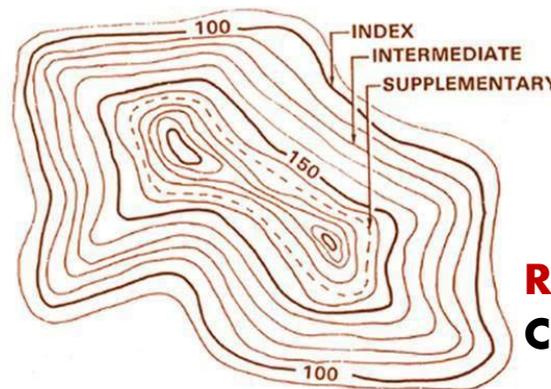
**MEDIUM DUTY  
SECONDARY ROAD**



**IMPROVED  
ROAD  
LIGHT DUTY**



**UNIMPROVED  
ROAD**



**RED-LIGHT READABLE  
CONTOUR LINES**



# Blue - Topographic Symbols

## DRAINAGE



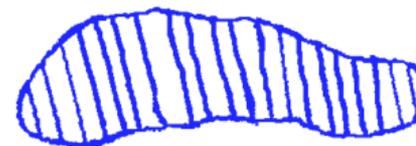
**STREAM**



**INTERMITTENT STREAM**



**LAKE OR POND**

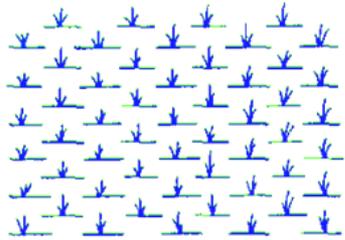


**INTERMITTENT LAKE  
OR POND**



# Green - Topographic Symbols

## VEGETATION



**MARSH OR SWAMP**



**GRASSLAND**



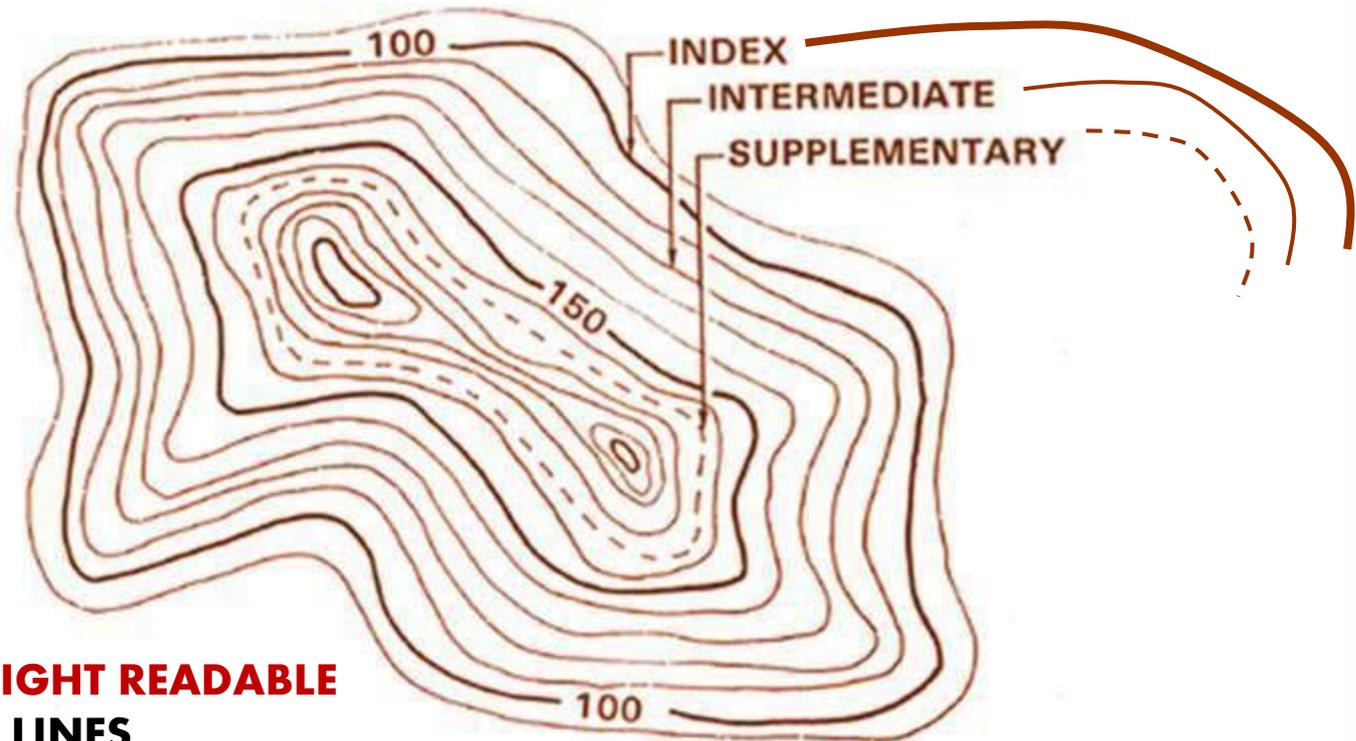
**WOODS**



**VINEYARD/ORCHARD**

# Brown - Topographic Symbols

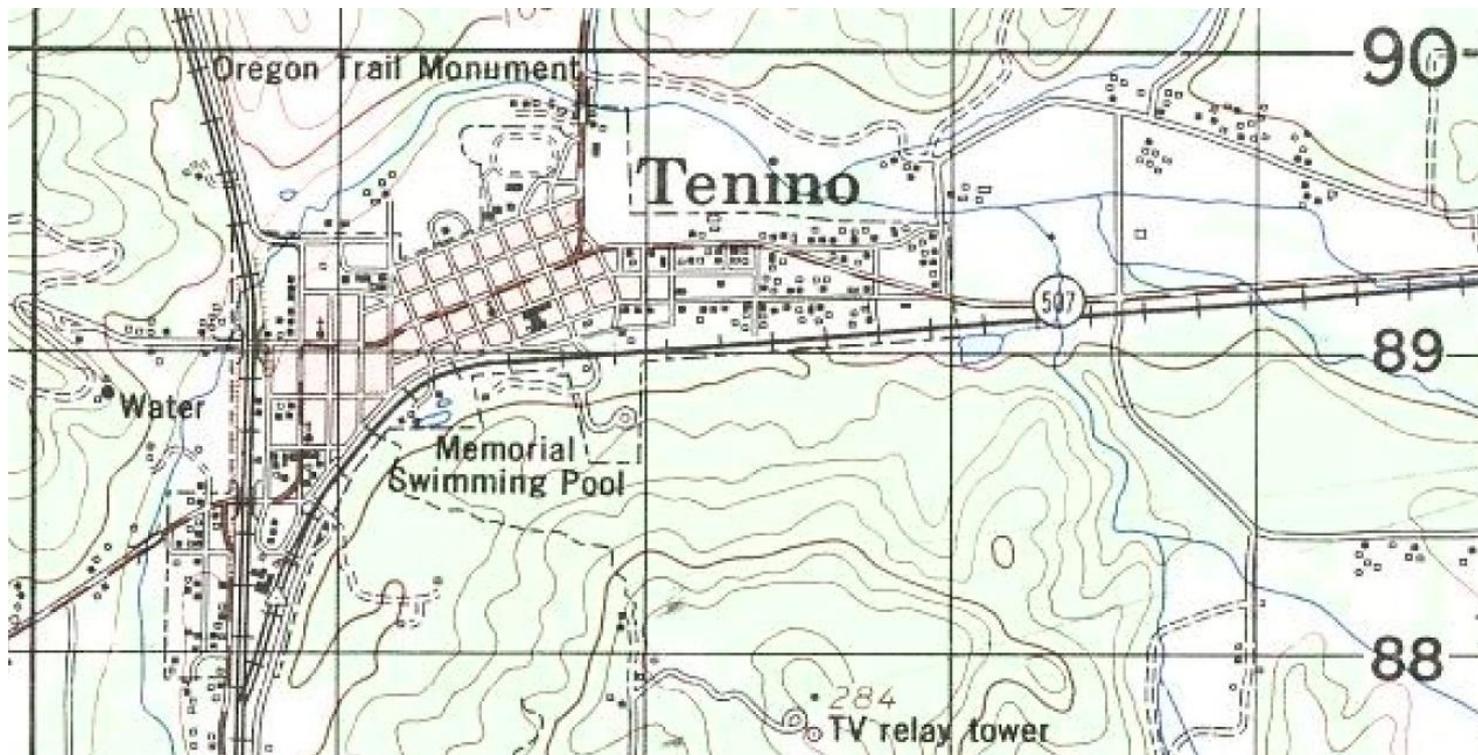
## Contour Lines



**Non RED-LIGHT READABLE  
CONTOUR LINES**

## Red - Topographic Symbols

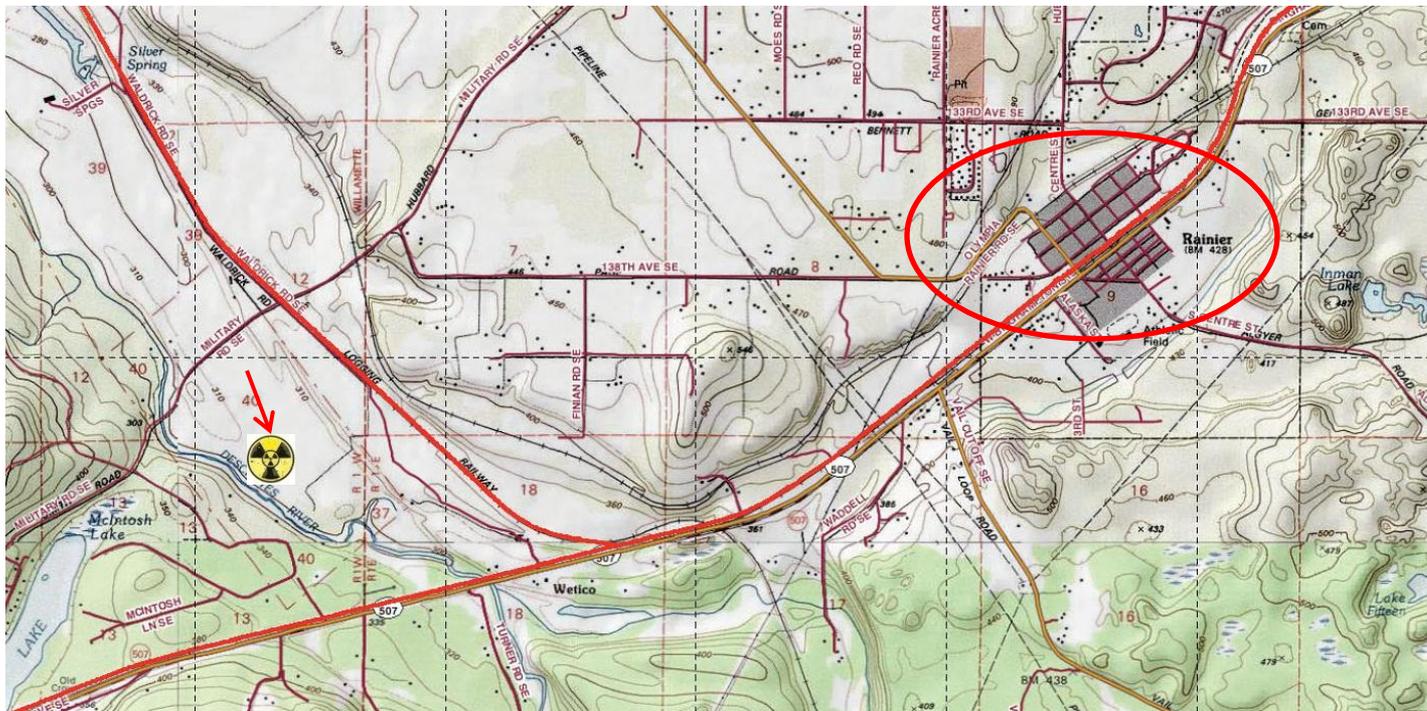
- Populated Areas (military site/urban area)
- Main Roads





# Other - Topographic Symbols

- Populated Areas (shaded gray) ■
- Important Facilities (yellow/black icon) ☢





# Terrain Features: 10 Natural or Man-made

## Five Major

- Ridge
- Hill
- Saddle
- Valley
- Depression

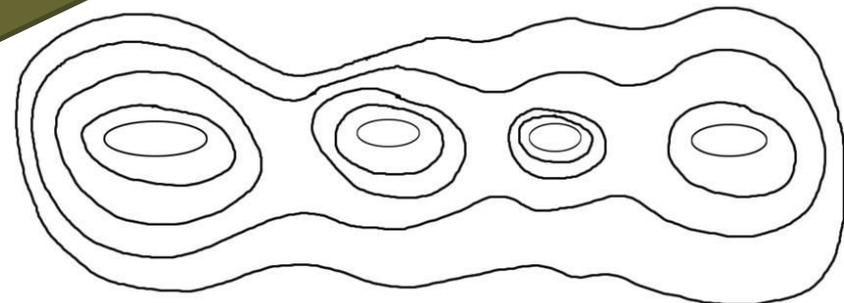
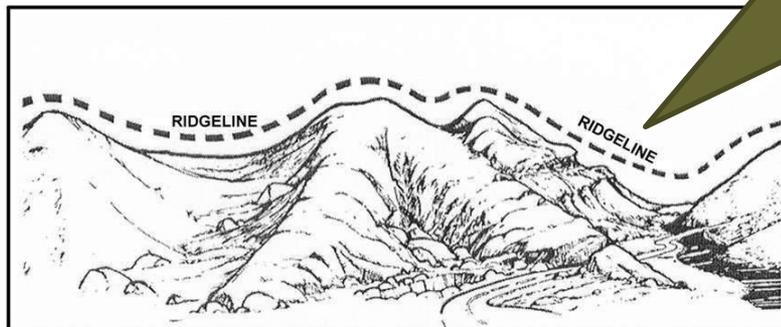
## Three Minor

- Spur
- Draw
- Cliff

## Two Supplementary

- Cut
- Fill

Terrain features are derived from a complex landmass known as a mountain or ridgeline.

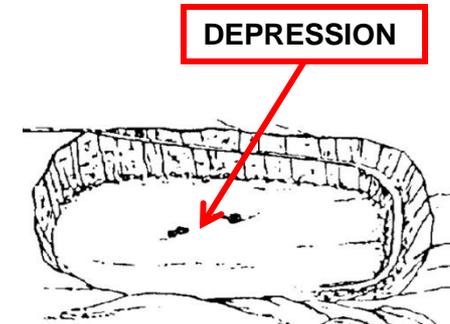
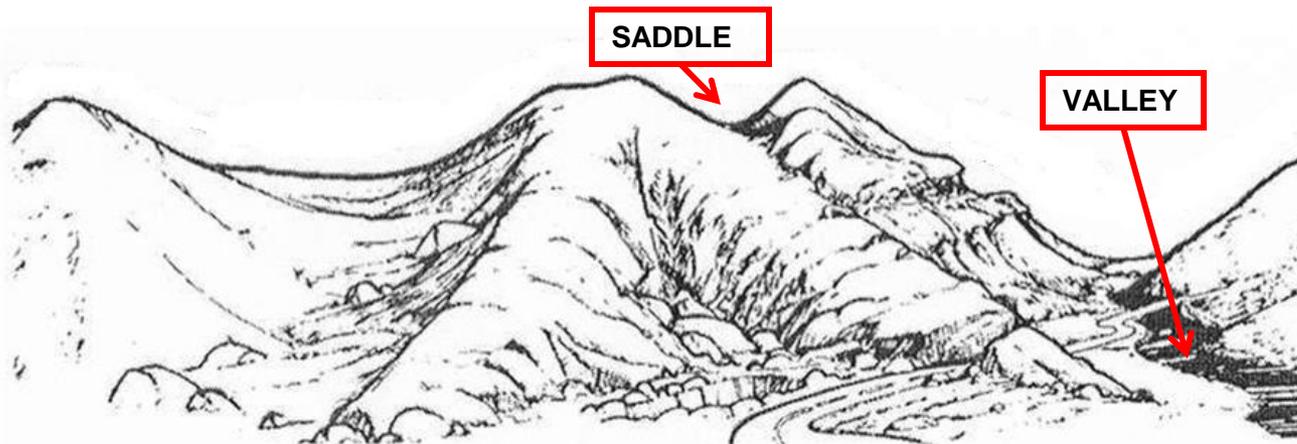
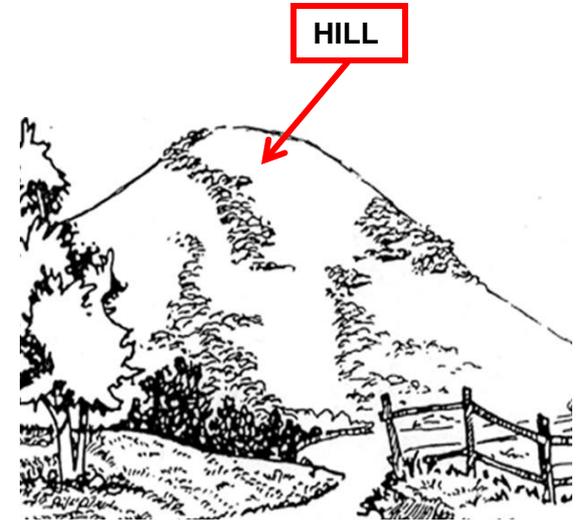




# Actual Terrain

### Five Major

- ❑ Ridge
- ❑ Hill
- ❑ Saddle
- ❑ Valley
- ❑ Depression

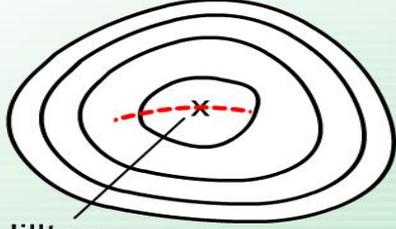




# 5 Major Terrain Features

Macromedia Flash Player 7

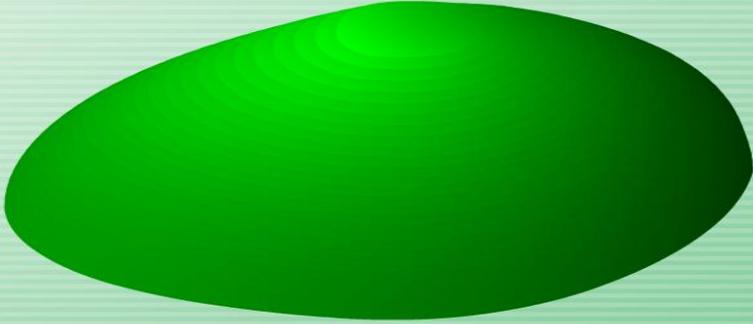
## Land Navigation



Hilltop

### Hill

Hills are represented by contour lines forming concentric circles. You can use your fist to help remember and visualize terrain features. A hill looks like one of the knuckles of your fist. A hill is a major terrain feature.



Menu

[www.550cord.com](http://www.550cord.com)

The diagram shows a topographic map representation of a hill with concentric contour lines. A red dashed line with an 'X' at its center indicates the hilltop. A line points from the label 'Hilltop' to this 'X'. Below the map is a 3D perspective view of a green hill. The entire content is framed within a Macromedia Flash Player 7 window with standard navigation controls (back, forward, menu) and a URL at the bottom.

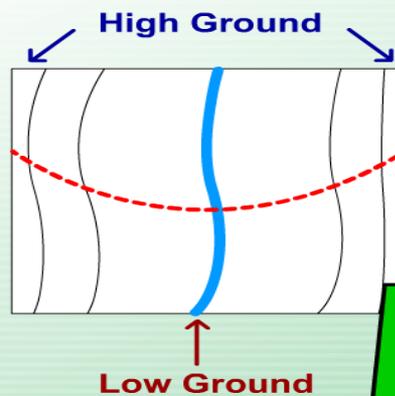


# Valley

Macromedia Flash Player 7

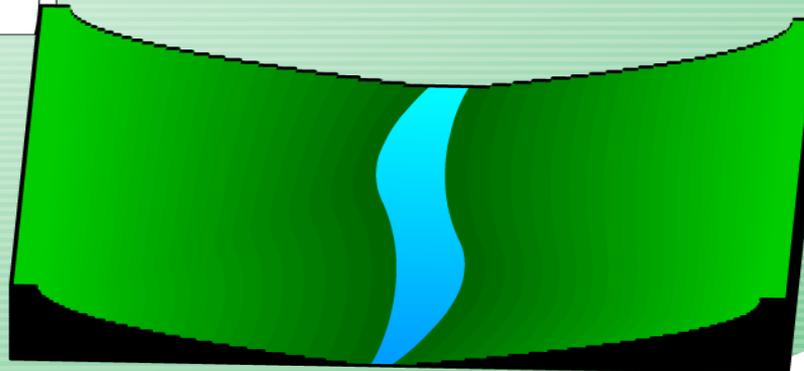
- □ ×

## Land Navigation



### Valley

Valleys usually have maneuver room and contain a stream or river. Valleys are depicted as contour lines forming a U. The lines tend to parallel a stream before crossing. The contour line crossing a stream always points upstream. You can visualize a valley as your open hand. A valley is a major terrain feature.



Menu

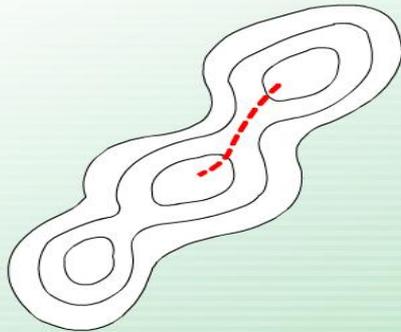
[www.550cord.com](http://www.550cord.com)



# Ridge

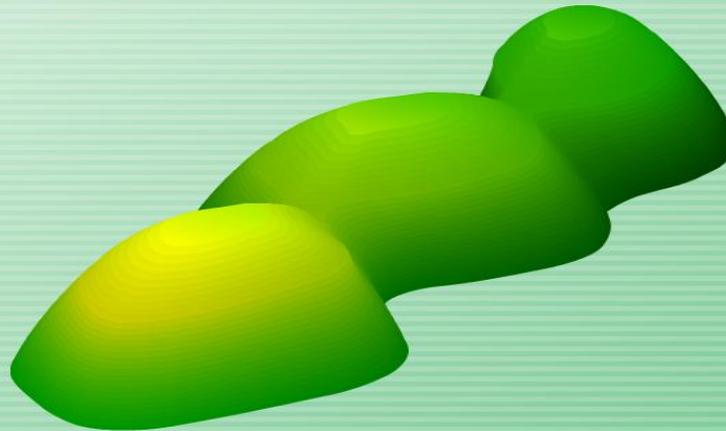
Macromedia Flash Player 7

## Land Navigation



### Ridge

Ridges are depicted as contour lines forming a U or V; the closed end of the contour points away from high ground. A ridge is a series of connected hills. You can visualize it as the four knuckle of your fist. A ridge is a major terrain feature.

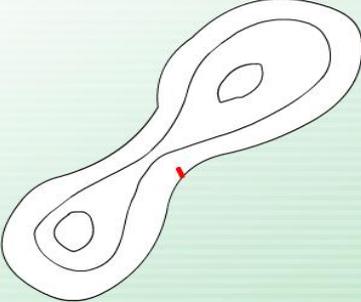




# Saddle

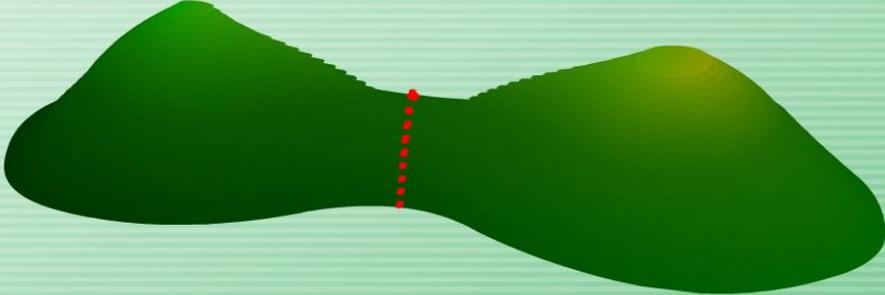
Macromedia Flash Player 7

## Land Navigation



**Saddle**

A saddle can be either lower ground between two hills or a break in a level crest. A saddle is depicted as an hourglass. You can visualize saddles as the spaces between the knuckles or your fist. A saddle is a major terrain feature.



Menu

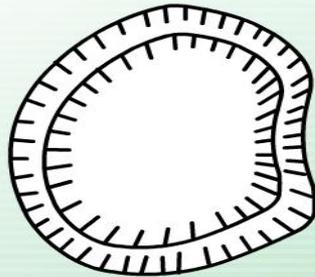
[www.550cord.com](http://www.550cord.com)



# Depression

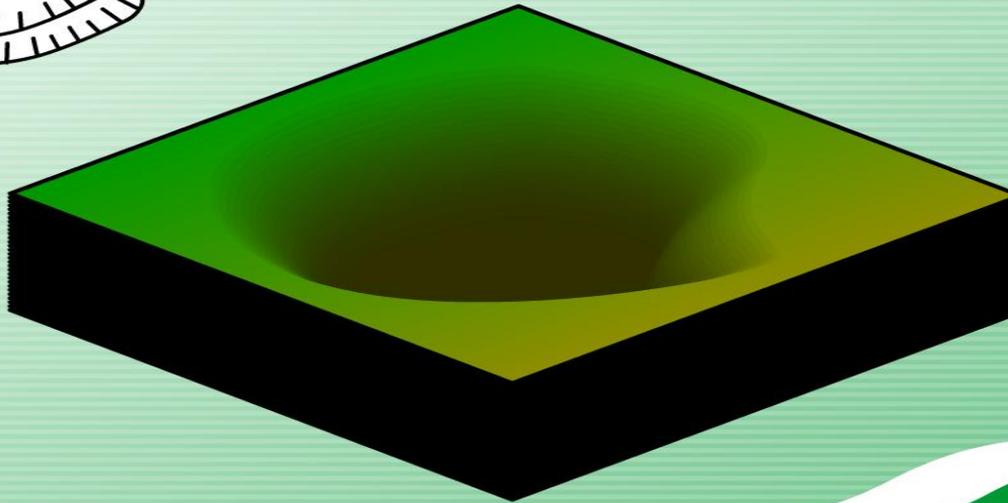
Macromedia Flash Player 7

## Land Navigation



### Depression

A depression is depicted by closed contour lines that have tick marks pointing towards low ground. You can visualize a depression as your open hand with your palm cupped slightly. A depression is a major terrain feature.



Menu

[www.550cord.com](http://www.550cord.com)



# 3 Minor Terrain Features

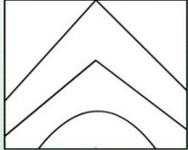
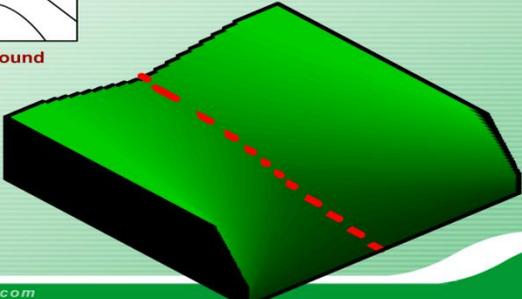
**Land Navigation**

**High Ground**

**Draws**

Draws are depicted as contour lines shaped like a V with the point of the V toward the head (high ground) of the draw. You can visualize draws as the spaces between your fingers running down from the spaces between the knuckles of your fist. A draw is a minor terrain feature.

**Low Ground**

www.550cord.com

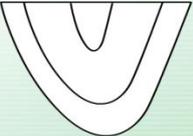
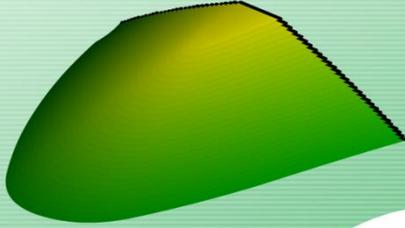
**Land Navigation**

**High Ground**

**Spurs**

Spurs are often formed by parallel streams cutting draws down a ridge. Spurs are depicted by U or V shaped contour lines with the U or V pointing away from high ground. You can visualize spurs as the slopes of your fingers running downhill from the knuckles of your fist. A spur is a minor terrain feature.

**Low Ground**

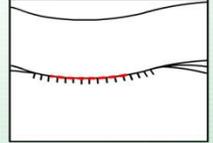
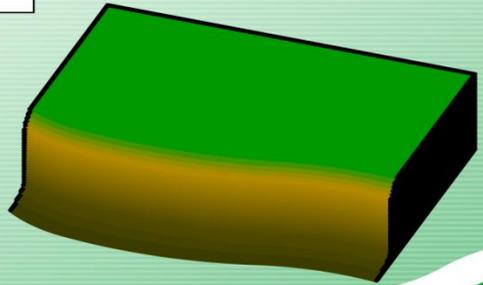



www.550cord.com

**Land Navigation**

**Cliff**

Cliffs are depicted by contour lines drawn close together or by ticked or carrying contour lines (ticks point to lower ground). You can visualize a cliff as the outside edge of your fist. A cliff is a minor terrain feature.

www.550cord.com

# 2 Secondary Terrain Features

Macromedia Flash Player 7

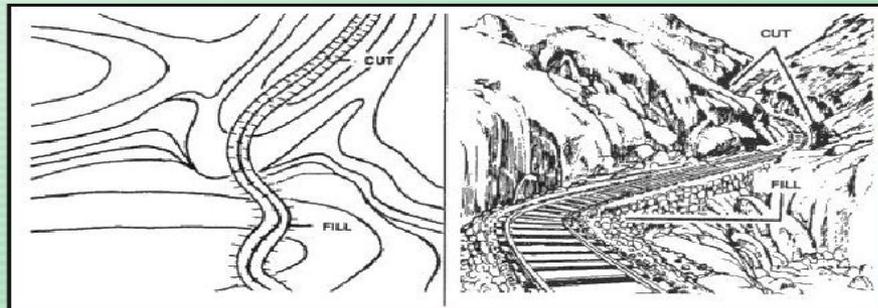
## Land Navigation



### Supplementary Terrain Features

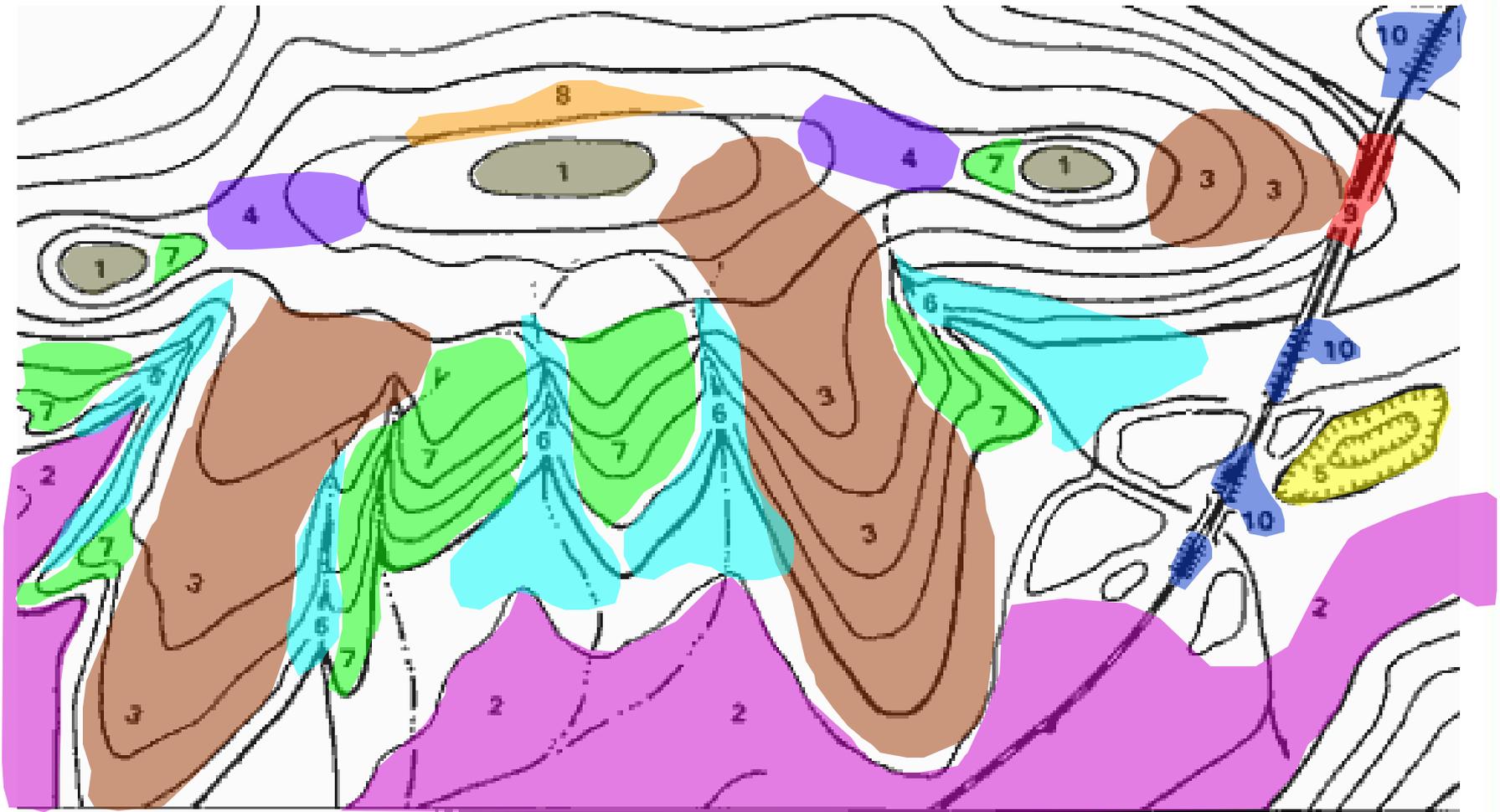
**Cut** - A cut is a man-made feature resulting from cutting through raised ground, usually to form a level bed for a road or railroad track. Cuts are drawn with a contour line along the cut line. This contour line extends the length of the cut and has tick marks that extend from the cut line to the roadbed, if the map scale permits this level of detail.

**Fill** - A fill is a man-made feature resulting from filling a low area, usually to form a level bed for a road or railroad track. Fills are drawn with a contour line along the fill line. This contour line extends the length of the filled area and has tick marks that point toward lower ground. If the map scale permits, the length of the fill tick marks are drawn to scale and extend from the base line of the fill symbol





# Contour Lines Show 10 Terrain Features



- |           |           |               |          |          |
|-----------|-----------|---------------|----------|----------|
| 1. HILL   | 3. RIDGE  | 5. DEPRESSION | 7. SPUR  | 9. CUT   |
| 2. VALLEY | 4. SADDLE | 6. DRAW       | 8. CLIFF | 10. FILL |

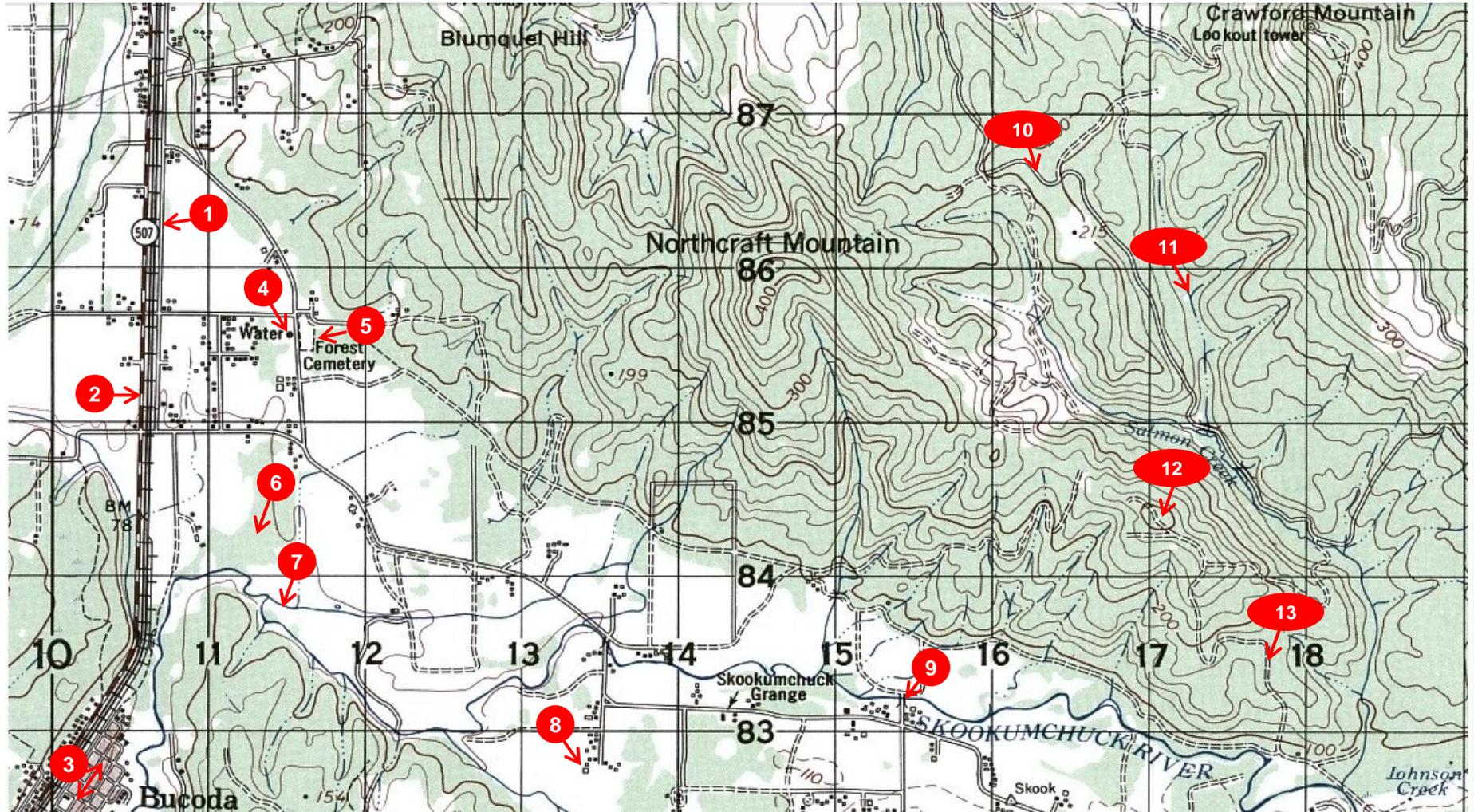


# Sand Run





# Describe Map Features





# Map Symbols and Surroundings



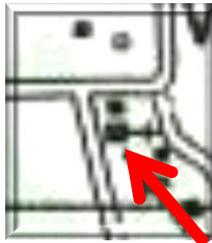
1. \_\_\_\_\_



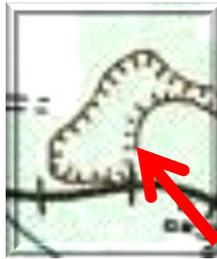
2. \_\_\_\_\_



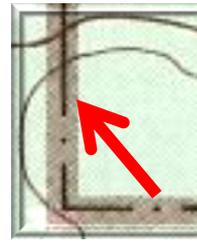
3. \_\_\_\_\_



4. \_\_\_\_\_



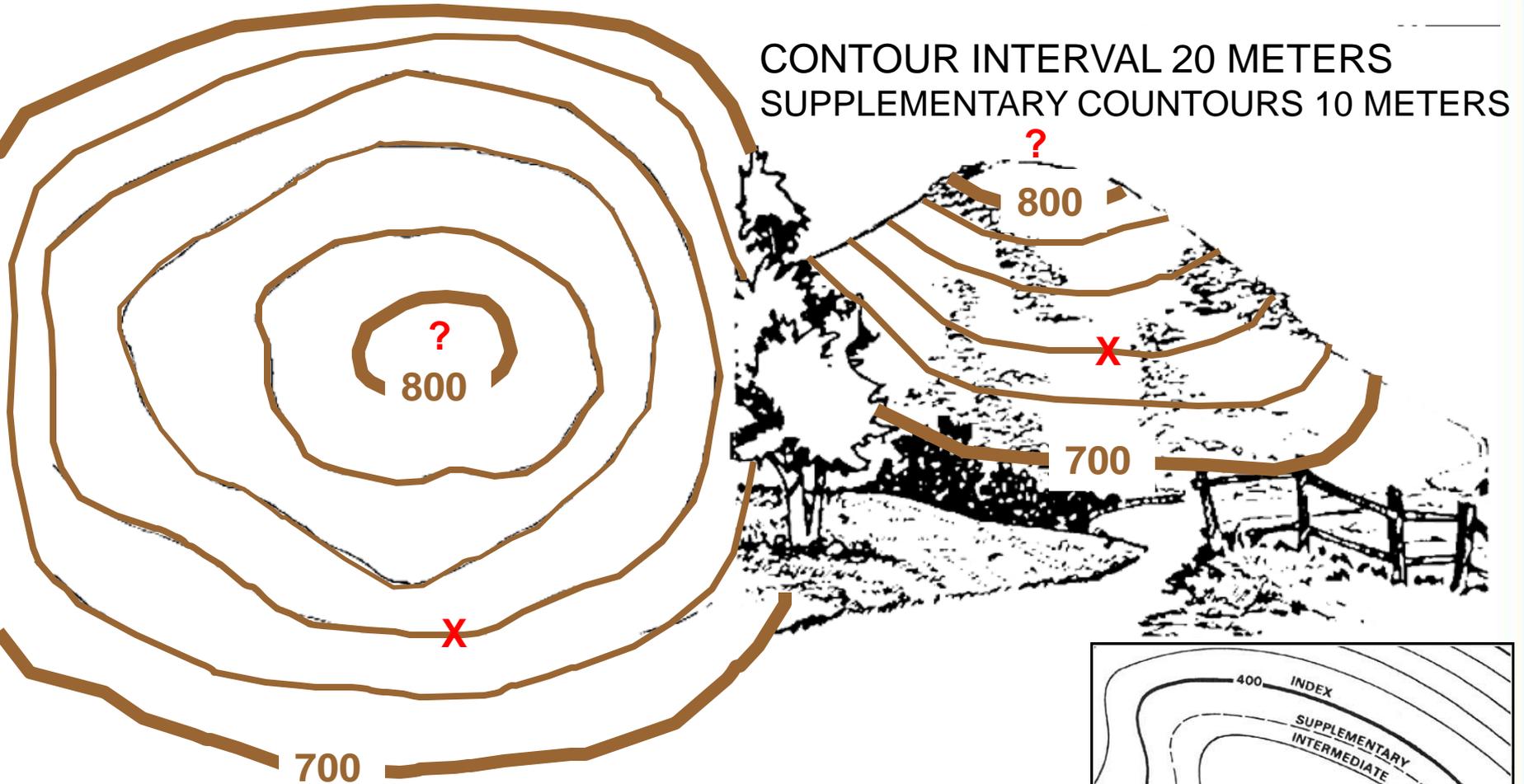
5. \_\_\_\_\_



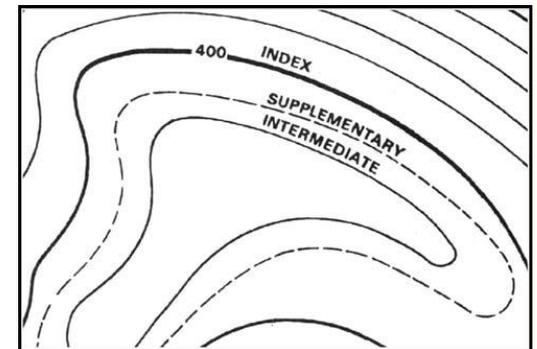
6. \_\_\_\_\_



## Determine Hilltop Elevation

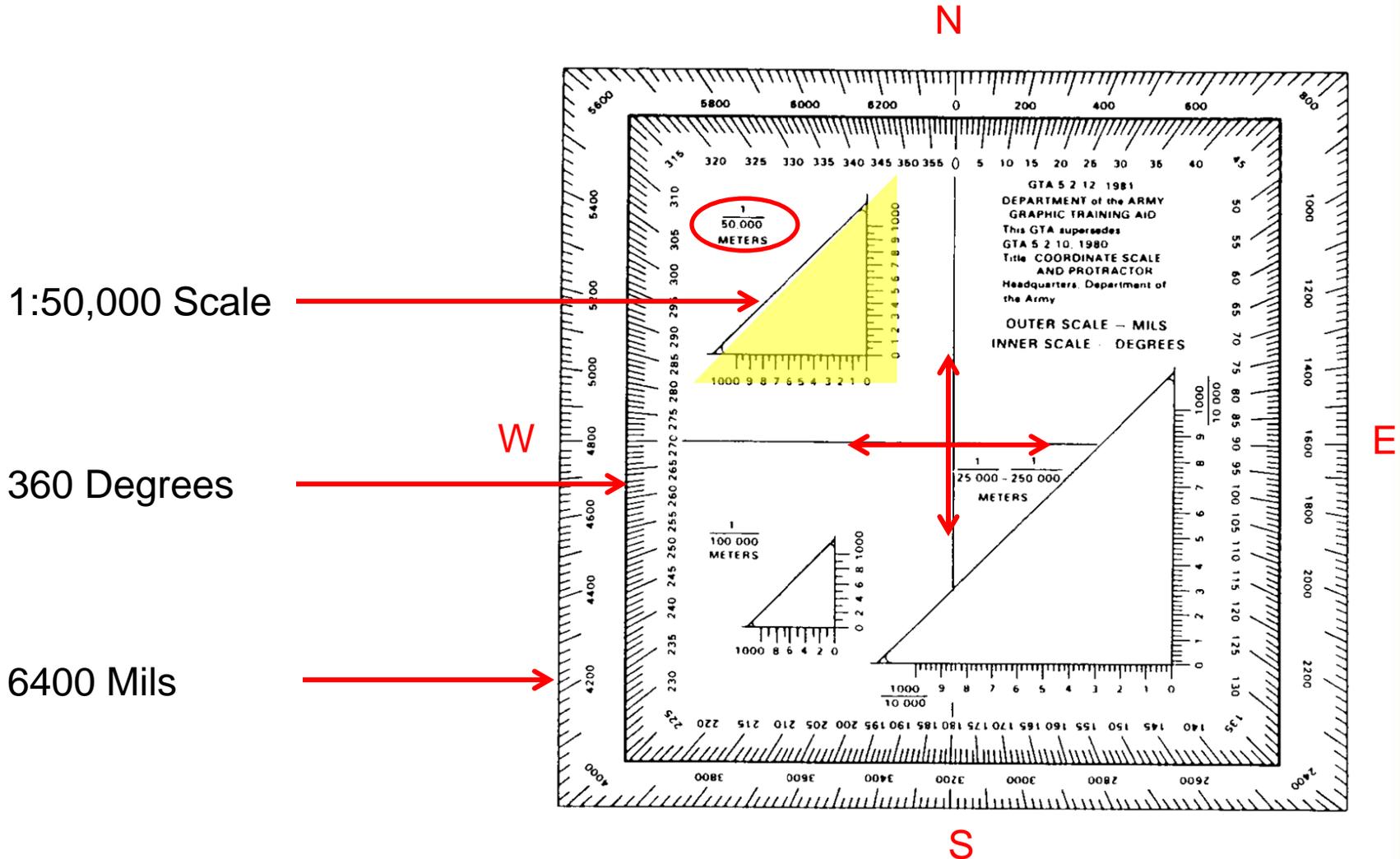


To determine the elevation to a hilltop, add one-half the contour interval to the elevation of the last contour line.





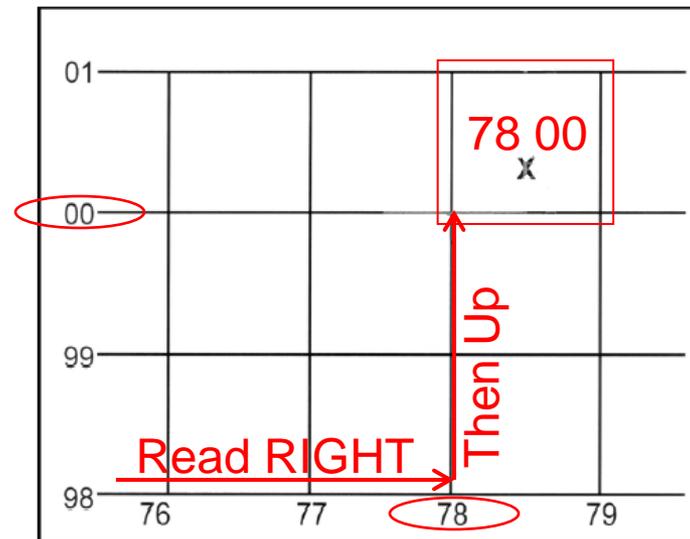
# Protractor (GTA 5-2-12, 1981)





## Four-Digit Grid Coordinate

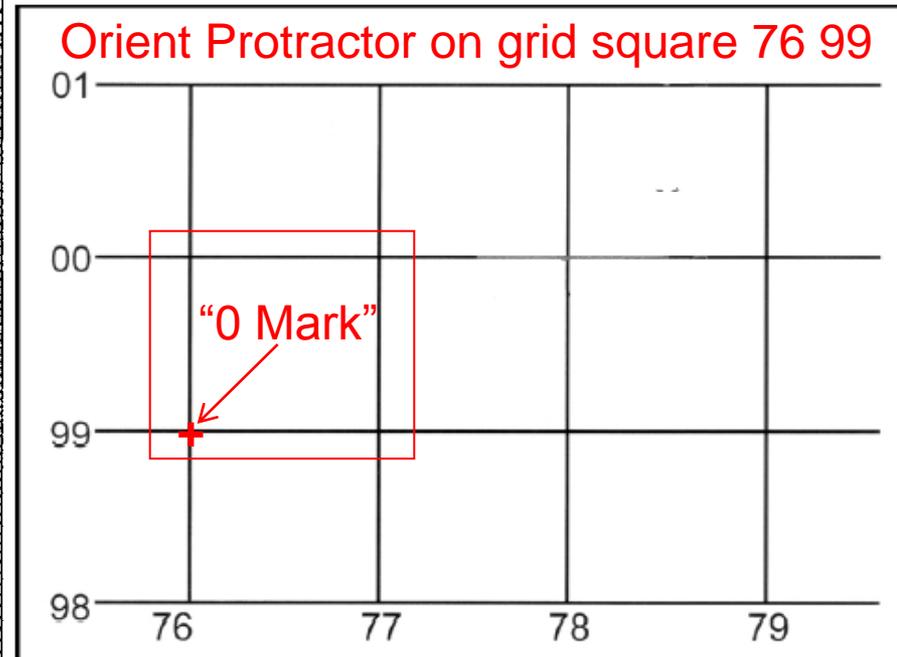
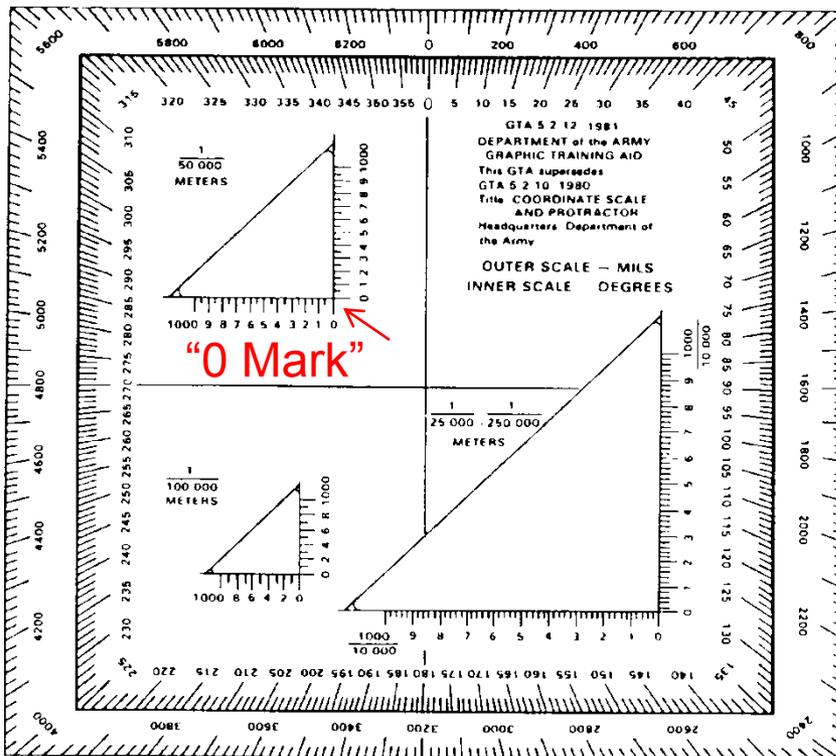
- The cardinal rule of map reading:
  - Read RIGHT, then
  - Read UP
- Remember to always orient each grid square from the lower left-hand corner





# Orient Protractor with “0 Mark” on Map

- ❑ Select the correct scale on the protractor.
- ❑ Put horizontal scale on the grid line with “0 mark” at the lower left-hand corner of the grid square.

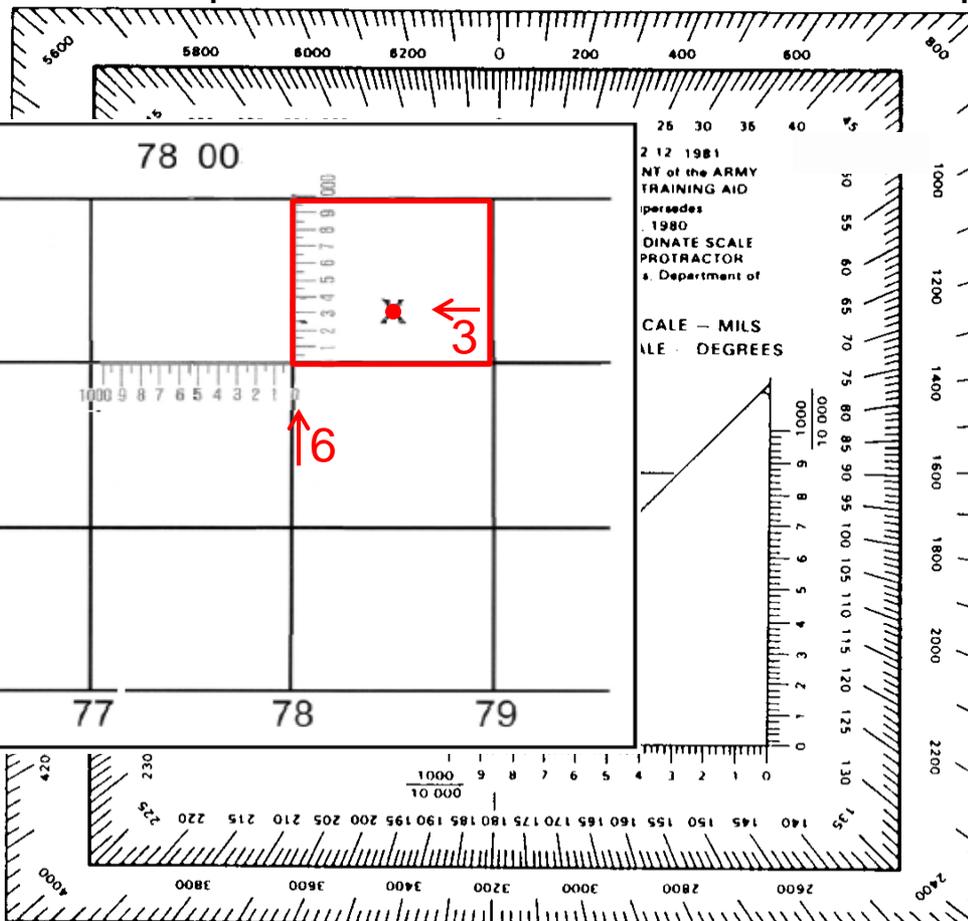


Map Scale is 1:50,000



# Determine Six-Digit Grid Coordinate

1. Place your protractor scale on the Zero-Mark(+)
2. Slide the protractor scale along the horizontal axis
3. Stop as the vertical axis intersects the plot point



4. Read RIGHT along the horizontal axis

5. Round to the nearest whole number: **6**

6. Read UP along the vertical axis

7. Round to the nearest whole number: **3**

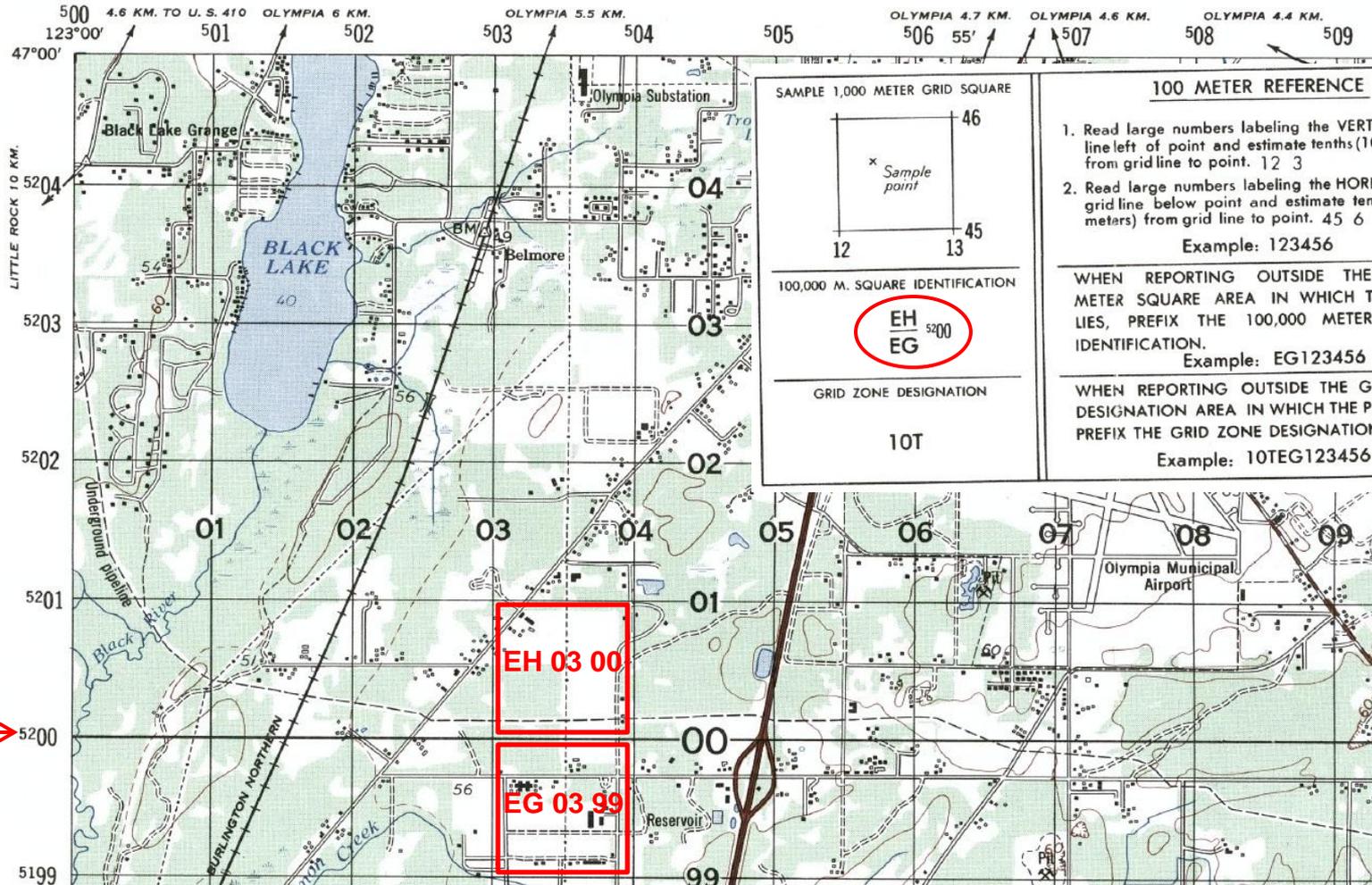
The 6 digit grid coordinate is **786 003**



# 100,000 Meter Square Identification

WASHINGTON 1:50,000

# TEN



<p>SAMPLE 1,000 METER GRID SQUARE</p>	<p><b>100 METER REFERENCE</b></p> <ol style="list-style-type: none"> <li>1. Read large numbers labeling the VERTICAL grid line left of point and estimate tenths (100 meters) from grid line to point. 12 3</li> <li>2. Read large numbers labeling the HORIZONTAL grid line below point and estimate tenths (100 meters) from grid line to point. 45 6</li> </ol> <p>Example: 123456</p>
<p>100,000 M. SQUARE IDENTIFICATION</p> <p><b>EH 5200</b> <b>EG</b></p>	<p>WHEN REPORTING OUTSIDE THE 100,000 METER SQUARE AREA IN WHICH THE POINT LIES, PREFIX THE 100,000 METER SQUARE IDENTIFICATION.</p> <p>Example: EG123456</p>
<p>GRID ZONE DESIGNATION</p> <p>10T</p>	<p>WHEN REPORTING OUTSIDE THE GRID ZONE DESIGNATION AREA IN WHICH THE POINT LIES, PREFIX THE GRID ZONE DESIGNATION.</p> <p>Example: 10TEG123456</p>

EH →  
EG →



# Practical Exercise:

## Determine Six-Digit Grid Coordinates

- Identify the following major terrain feature or object at each of the following coordinates:

1. EH 107031      Terrain/Object: \_\_\_\_\_

2. EG 145859      Terrain/Object: \_\_\_\_\_

3. EH 074017      Terrain/Object: \_\_\_\_\_

4. EG 097827      Terrain/Object: \_\_\_\_\_



# Closing

- Summary
- Questions
- Next Lesson: MSL 102, Lesson 03, Introduction to Land Nav.
- Read Student Textbook, MSL I, Introduction to Leadership: Tactics & Techniques Section, *Introduction to Land Navigation* and answer “Critical Thinking” questions; prepare to discuss in class
- Review FM 3-25.26 Map Reading and Land Navigation; 18 January 2005 (C1/dated 30 August 2006); (Ch 6, par 6-2 thru 6-9), Ch 10, pp 10-4 and 10-5
- Download and review from Blackboard any additional materials such as; Student Handouts, ppt. slides, and/or charts/graphs, etc for the next class