Reading Topographic Maps

Symbolization - **Showing elevation on a map**

How cartographers you show 3 dimensions using just 2?

Topo Map Symbols

Symbol	
Primary highway, hard surface	
Secondary highway, hard surface	
Light-duty road, hard or improved surface	
Unimproved road	
Trail	
Railroad: single track	
Railroad: multiple track	
Bridge	
Drawbridge	
Tunnel	
Footbridge	
Overpass—Underpass	
Power transmission line with located tower	
Landmark line (labeled as to type)	TELEPHONE

COLORS OF THE MAP

BLACK: MAN-MADE FEATURES, SUCH AS BUILDINGS AND ROADS.

RED-BROWN: RELIEF FEATURES AND ELEVATION (CONTOUR LINES ON RED-LIGHT READABLE MAPS).

BROWN: RELIEF FEATURES & ELEVATION (CONTOUR LINES ON OLDER MAPS).

GREEN: VEGETATION (WOODS, ORCHARDS, VEGITATION).

BLUE: DRAINAGE (WATER).

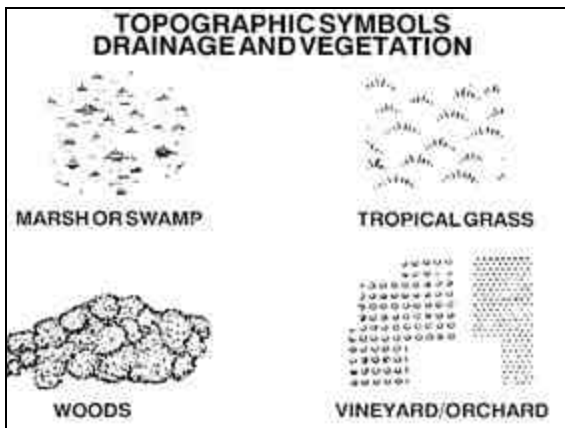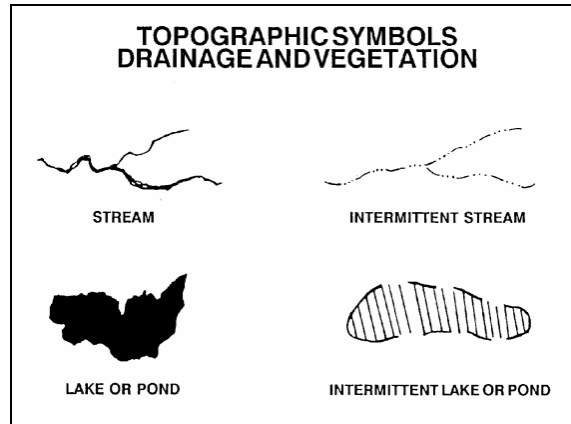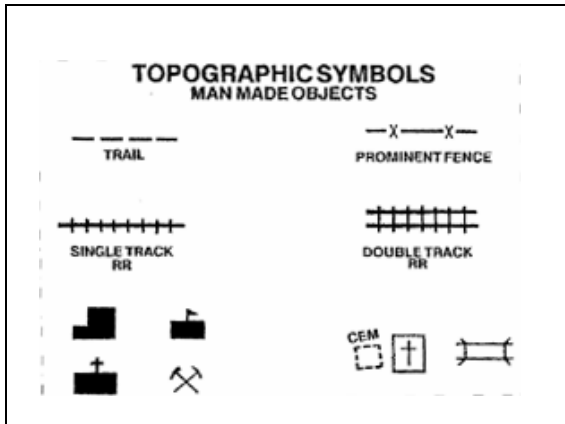**RED:** POPULATED AREAS, MAIN ROADS AND BOUNDARIES ON OLDER MAPS.

ORIENTING THE MAP

A MAP IS
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TOPOGRAPHIC SYMBOLS
MAN MADE OBJECTS

(RED/BROWN) HARD SURFACE (RED/BROWN)

HEAVY DUTY   MEDIUM DUTY

IMPROVED ROAD   UNIMPROVED ROAD

VGT 5

TOPOGRAPHIC SYMBOLS
MAN MADE OBJECTS

TRAIL

PROMINENT FENCE

SINGLE TRACK RR

DOUBLE TRACK RR

CEM

TOPOGRAPHIC SYMBOLS
DRAINAGE AND VEGETATION

STREAM

INTERMITTENT STREAM

LAKE OR POND

INTERMITTENT LAKE OR POND

TOPOGRAPHIC SYMBOLS
DRAINAGE AND VEGETATION

MARSH OR SWAMP

TROPICAL GRASS

WOODS

VINEYARD/ORCHARD

Symbolization - **Showing elevation on a map**

Shading and hachure

- In early maps cartographers used shading to show relief
- Later, map makers used short, controlled lines called *hachures* to show changes in elevation
- Hachure use ranges from the simple to ...

Topographic maps

- Also called quadrangles
- Nearly 54,000 for the U.S.
- Done by the US Geological Survey (USGS) since 1897
- Map out the entire country in a standard fashion

Topographic maps

- Till the 1940s, you climbed to the highest point and plotted what you could see from there
- Aerial photography after WWII
- Two overlapping photos are put in a stereoscope
- 10 photos for each 7.5 minute map

Topographic maps

- Show 2D features, point, line and area; also show 3D via contour lines
- Common symbols are in the appendix of the text
- Note the contour interval at the bottom of the map

Symbolization - **Showing elevation on a map**

Flooding a fish tank for science

- Another way of showing elevation is by drawing lines of equal elevation called *isohypses* or more commonly called *contour lines*
- Conceptually it's like the high tide line at the beach
- Adding progressively more and more water to a fish tank will leave a series of levels on various shaped objects

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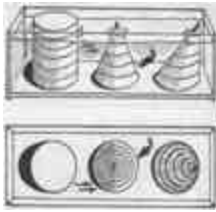
Symbolization - **Showing elevation on a map**
Interpolating isohypses

Each dot represents a measuring station, and the number next to each dot is the quantity measured or calculated at that station

The approximate location of one or more critical isolines(in this case the value 140) is interpolated and marked by Xs

The isolines are drawn

The other isolines at 10-unit intervals are interpolated and drawn

Shading is added for clarity

## Symbolization - **Showing more data on a map**

- *Contour lines* or *isohypses* are types of *isopleths*
- There are several other types of isopleths that can show:
  - barometric pressure - *isobar*
  - air/water temp. - *isotherm*
  - wind/water velocity - *isotach*
  - rainfall - *isohyet*

TERRAIN FEATURES

- Five Major

  Hidden Valley Ranch Salad Dressing

  Hilltop, Valley, Ridge, Saddle, Depression
- Three Minor

  Draw, Spur, Cliff
- Two Supplementary

  Cut, Fill

Interpreting Contour Lines

HILL: AN AREA OF HIGH GROUND. FROM A HILLTOP, THE GROUND SLOPE DOWN IN ALL DIRECTIONS.
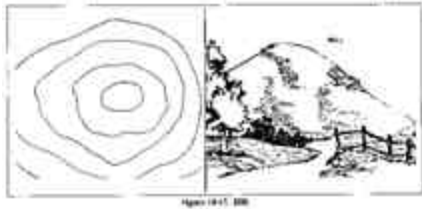
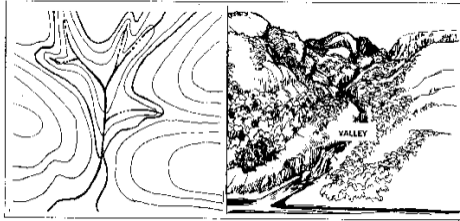**VALLEY:** A STRETCHED-OUT GROOVE IN THE LAND, USUALLY FORMED BY STREAMS OR RIVERS.

Figure 10-19. Valley.

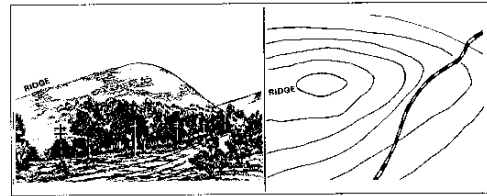**RIDGE:** A SLOPING LINE OF HIGH GROUND.

Figure 10-20. Ridge.

DEPRESSION: A LOW PO INT IN THE GROUND OR SINKHOLE. THEY ARE REPRESENTED BY CLOSE CONTOUR LINES THAT HAVE TICK MARKS POINTING TOWARD LOW GROUND.
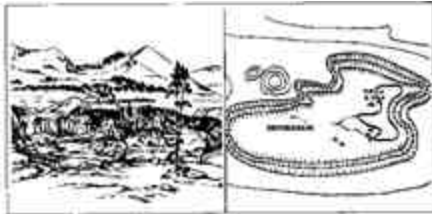
Figure 10-21. Depression.

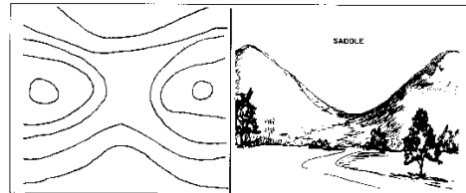**SADDLE:** A DIP OR LOW POINT BETWEEN TWO AREAS OF HIGHER GROUND.

Figure 10-18. Saddle.

SPUR: A SHORT, CONTINUOUS SLOPING LINE OF HIGHER GROUND, NORMALLY JUTTING OUR FROM THE SIDE OF A RIDGE.
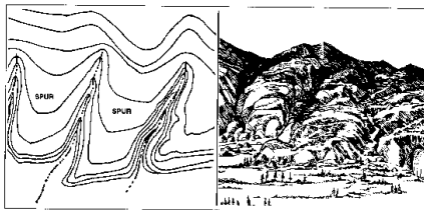
Figure 10-23. Spur.

DRAW: A LESS DEVELOPED STEAM COURSE THAN A VALLEY. THERE IS ESSENTIALLY NO LEVEL GROUND AND, THEREFORE, LITTLE OR NO MANEUVER ROOM WITHIN ITS CONFINES.
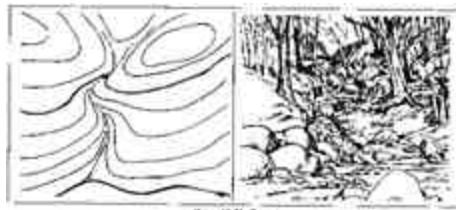
Figure 10-22. Draw.

CLIFF: A VERTICAL OR NEAR VERTICAL FEATURE; IT IS AN ABRUPT CHANGE OF THE LAND. THE SLOPE IS SO STEEP THAT THE CONTOUR LINES CONVERGE INTO ONE CONTOUR LINE OR THE LAST CONTOUR LINE HAS TICK MARKS POINTING TO LOW GROUND.

CLIFF: A VERTICAL OR NEAR VERTICAL FEATURE; IT IS AN ABRUPT CHANGE OF THE LAND. THE SLOPE IS SO STEEP THAT THE CONTOUR LINES CONVERGE INTO ONE CONTOUR LINE OR THE LAST CONTOUR LINE HAS TICK MARKS POINTING TO LOW GROUND.

CUT: A MAN-MADE FEATURE RESULTIING FROM CUTTING THROUGH RAISED GROUND, USUALLY TO FROM A LEVEL BED FOR A ROAD OR RAILROAD TRACK.

FILL: A MAN-MADE FEATURE RESULTING FROM FILLING A LOW AREA, USUALLY TO FORM A LEVEL BED FOR A ROAD OR RAIL-ROAD TRACK.
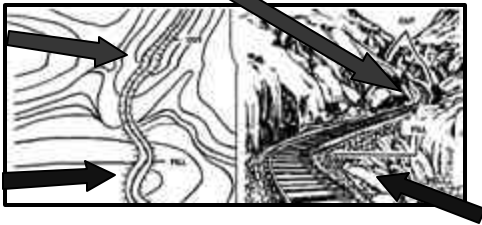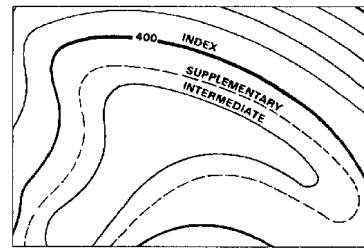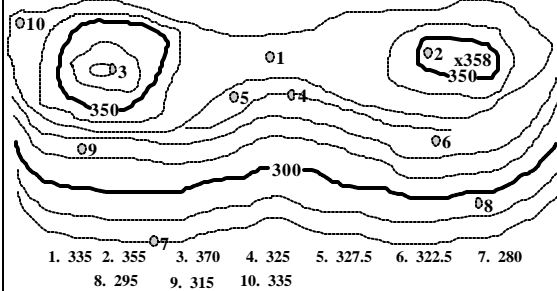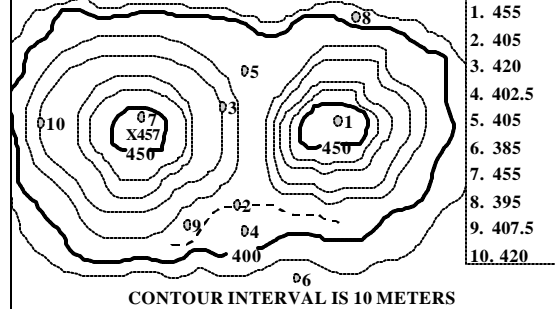

Contour Lines

Figure 10-1. Contour lines.

DETERMINING ELEVATION
CONTOUR INTERVAL IS 10M

1. 335 2. 355   3. 370   4. 325   5. 327.5   6. 322.5   7. 280
8. 295   9. 315   10. 335

DETERMINING ELEVATION

1. 455
2. 405
3. 420
4. 402.5
5. 405
6. 385
7. 455
8. 395
9. 407.5
10. 420

CONTOUR INTERVAL IS 10 METERS
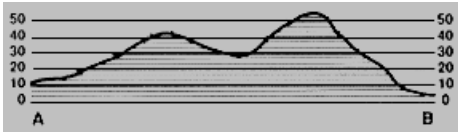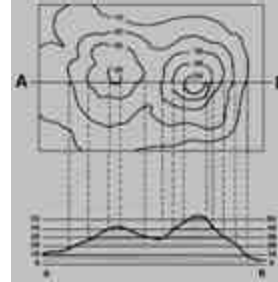
A Profile Map

A Profile map shows the landscape as if it was cut vertically and viewed from the side. The elevation values are shown with horizontal graph lines

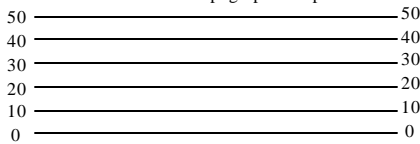## Creating a Profile Map

Concept

A horizontal line is drawn through the Topographic map.

The intersection points of the horizontal line and the contour lines are projected vertically to a graph
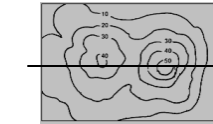
Creating a Hand Drawn Profile

1. Draw equally spaced horizontal lines on the sheet of paper you will be using to create the profile map (graph paper is good to use since the grid lines help keep lines parallel).
2. Label the horizontal lines with the values of the elevations from the Topographic map.
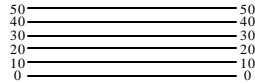

CONTINUE ▶

Creating a Hand Drawn Profile

3. Tape the Topographic map above the graph lines you created for the profile map
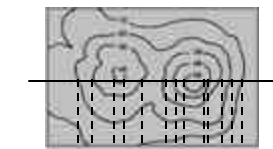

4. Draw a horizontal line through the Topographic map at a desired location. This line will be referred to as a cutting line through the remainder of the presentation.
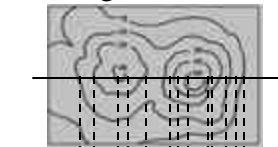
CONTINUE ▶

Creating a Hand Drawn Profile

5. Draw vertical lines from the points where the contour lines intersect with the cutting line down through the graph lines.

These are drawn as solid lines but are shown dashed here for better visualization.

CONTINUE ▶
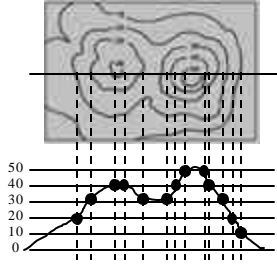
Creating a Hand Drawn Profile

6. Determine where the vertical lines intersect the appropriate graph lines and draw a dot, i.e. the vertical line drawn for the 20 contour line must be marked on the 20 graph line, etc…
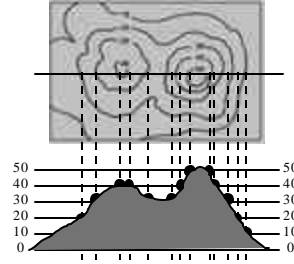
Dots are drawn exaggerated for visualization

CONTINUE ▶

Creating a Hand Drawn Profile

7. Draw curve lines through the dots to create the profile map

50 40 30 20 10 0

50 40 30 20 10 0

Creating a Hand Drawn Profile

Profile can be colored in to better visualize the cross section of the landscape

50 40 30 20 10 0

50 40 30 20 10 0