

Contouring

Prof.Prafulla Kumar Panda



**Centurion University of Technology and
Management**

Contact:9438269572

E-mail: prafullapanda@cutm.ac.in

Contents

- Introduction
- Definition
- Contour interval
- Uses of contour
- Characteristics of contour
- Identification of terrain feature

A contour may be defined as a line of intersection of a level surface with the surface of the ground. This means every point on the contour line has the same altitude as that of the assumed intersecting surface.

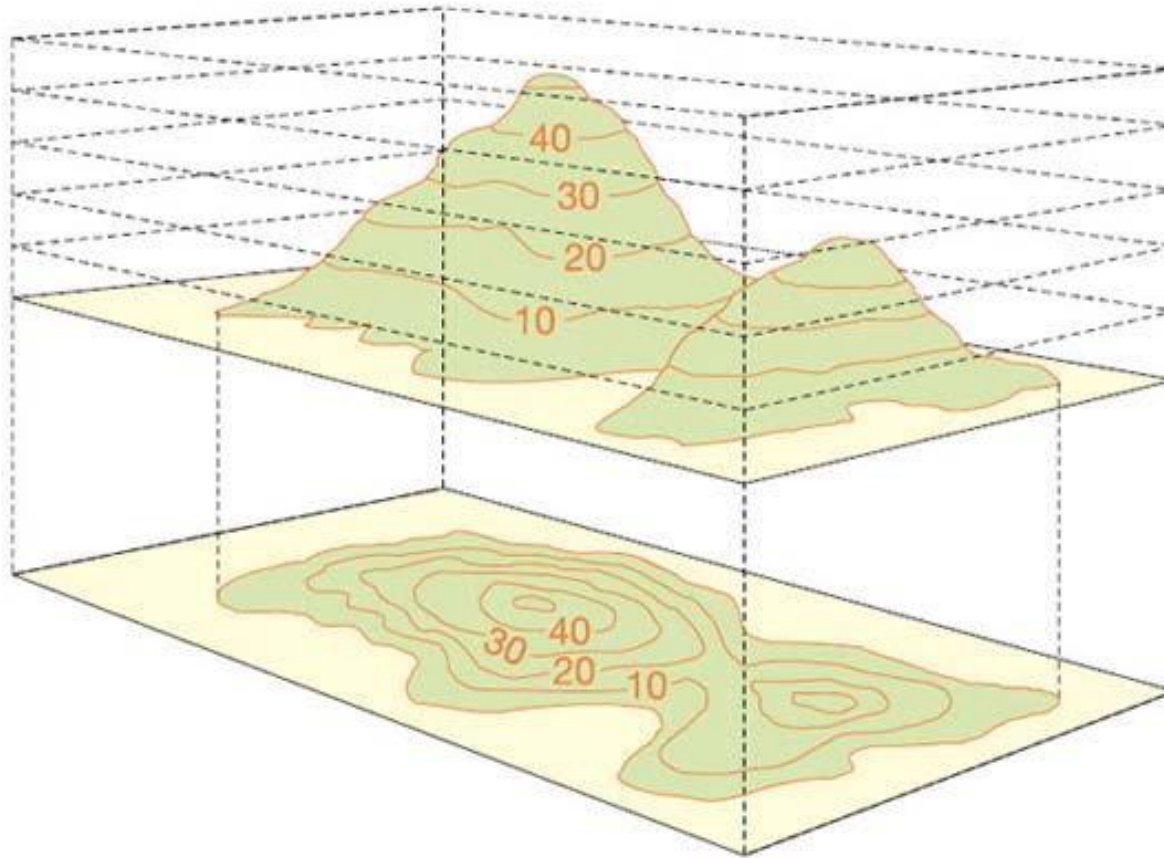
The process of tracing contour lines on the surface of earth is called contouring. A contour map gives the idea of the altitudes of the surface features as well as their relative positions in a plan.

A contour is an imaginary line on the ground passing through points of equal elevation. It may also be defined as a line in which a level surface intersects the earth's surface. A contour line on a map represents a contour of particular elevation.

Contour lines

- **Contour lines are a method of depicting the 3-dimensional character of the terrain on a 2-dimensional map.**
- **Understanding contours is a very useful navigation skill because you can identify the lay of the land and landscape features as they appear on the ground.**

View of contours in 3D and 2D



Contour Interval

The vertical distance between any two consecutive contours is called contour interval. Contour interval is kept constant for a contour plan. Contour interval depends upon the following factors :

- (a) Nature of the ground,
- (b) Scale of the map,
- (c) Purpose and extent of survey, and
- (d) Time and funds.

Nature of the Ground

Contour interval varies with the topography of the area. If the ground is steep, the contour interval will be large, whereas for flat grounds the contour interval will be small.

Scale of the Map

Contour interval is inversely proportional to the scale of the map. If the scale is large the contour interval should be small, whereas if the scale is small the contour interval should be large.

Purpose and Extent of Survey

Purpose and extent of survey affects the choice of contour interval, e.g. small contour interval is used for a survey intended for detailed design work and for accurate earthwork calculations. A large contour interval is used when the extent of survey is large, e.g. location surveys for communication lines, highways and railways.

Time and Funds

If the time and funds are short and limited the contour interval is kept large.

Horizontal Equivalent

The horizontal distance between any two consecutive contours is known as horizontal equivalent. For a given contour interval horizontal equivalent depends upon the steepness of the ground.

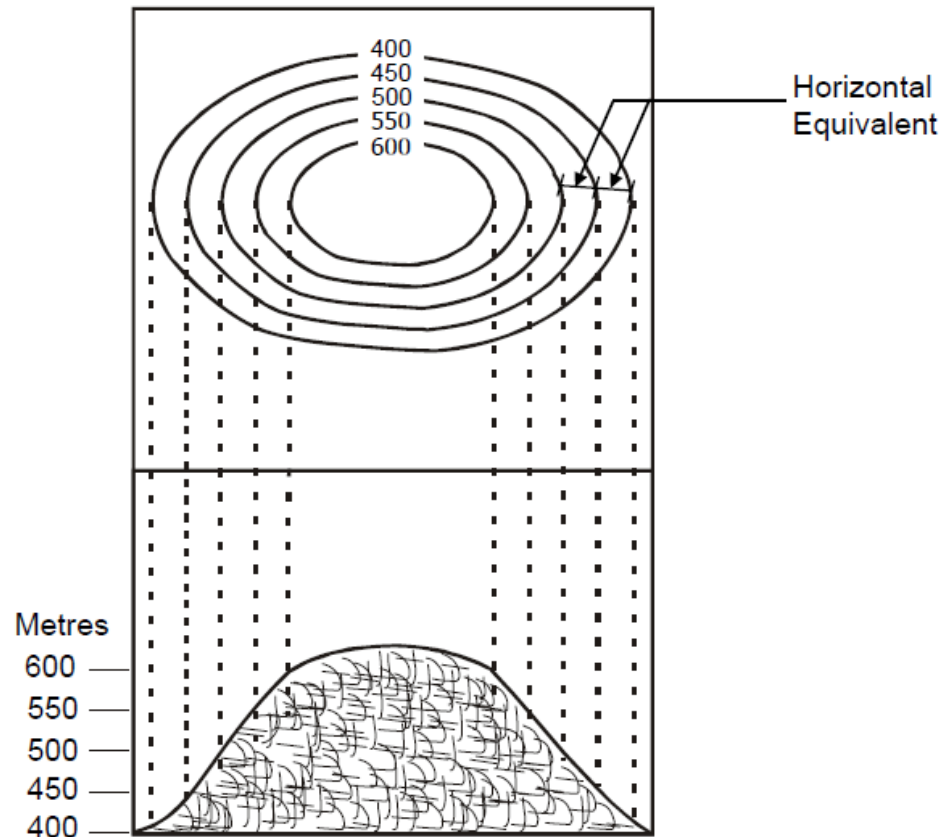


Figure 4.14: Contour Representation of a Plateau

Use of contours

- (i) By inspection of a contour map, information regarding the characters of the terrain is obtained, whether it is flat, undulating or rolling etc.
- (ii) Contour map is very useful for taking up land leveling works.
- (iii) With the help of contour map, suitable site for reservoirs, canal, drainage channels, roads, railway etc. can be selected.
- (iv) Total drainage area and capacity of reservoirs can be determined with the help of contour map.
- (v) Computation of earth work is possible from contour map.

- (vi) Contour maps are essential for taking up any soil conservation works like terracing, bunding, construction of structures and spillways.
- (vii) In coastal areas for construction of brackish water fish farm contour map is required to decide about the type of farm to be constructed i.e. tide-fed or pump-fed farm.
- (viii) Intervisibility of any two points can be known from the contour map.
- (ix) From the contour map of agricultural land, most suitable method of irrigation for a particular crop can be decided.
- (x) Section can easily be drawn from contours.
- (xi) A route with a given slope can be traced on a contour map.

Eleven (11) characteristics of contour lines

1. Contour lines are continuous.
2. Contour lines are relatively parallel unless one of two conditions exists.
3. A series of V-shape indicates a valley and the V's point to higher elevation.
4. A series U shape indicates a ridge. The U shapes will point to lower elevation.
5. Evenly spaced lines indicate an area of uniform slope.

Contour Line Characteristics-cont.

- 6. A series of closed contours with increasing elevation indicates a hill and a series of closed contours with decreasing elevation indicates a depression.**
- 7. Closed contours may be identified with a +, hill, or -, depression.**
- 8. Closed contours may include hachure marks. Hachures are short lines perpendicular to the contour line. They point to lower elevation.**

Contour Line Characteristics-cont.

9. The distance between contour lines indicates the steepness of the slope. The greater the distance between two contours the less the slope. The opposite is also true.
10. Contours are perpendicular to the maximum slope.
11. A different type of line should be used for contours of major elevations. For example at 100, 50 and 10 foot intervals. Common practice is to identify the major elevations lines, or every fifth line, with a bolder, wider, line.

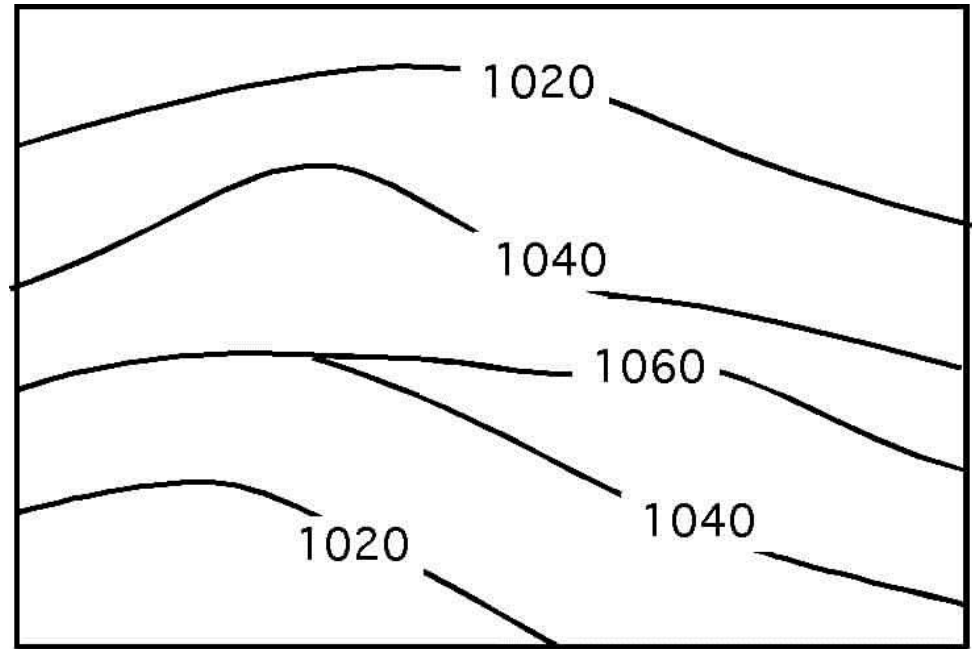
1. Contours are Continuous

- **Some contour lines may close within the map, but others will not.**
- **In this case, they will start at a boundary line and end at a boundary line.**
- **Contours must either close or extend from boundary to boundary.**



1. Continuous Contours-cont.

Is the topo map correct?



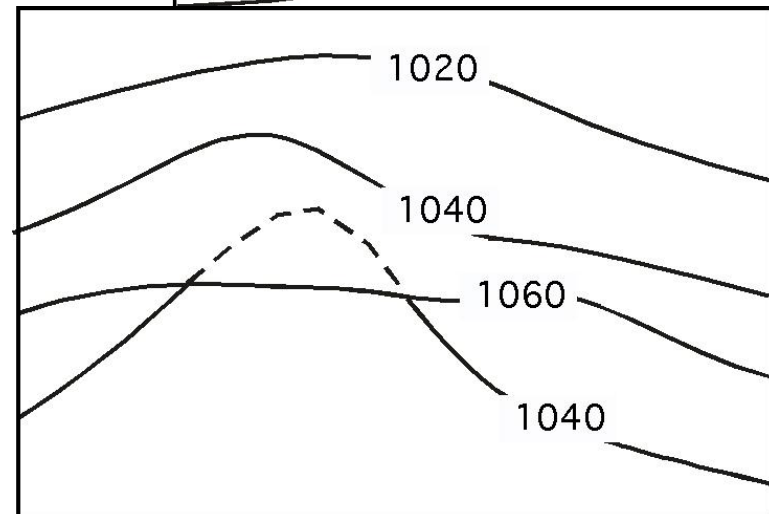
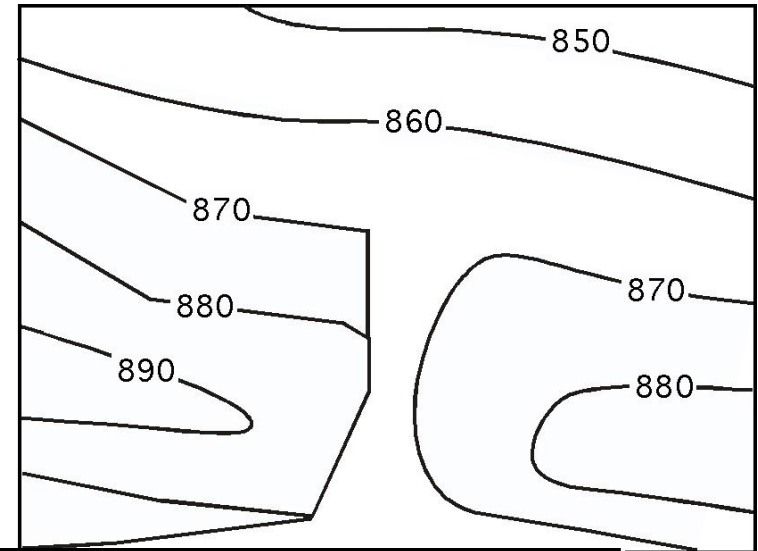
- No
- Contour 1040 is very unlikely
- This would only occur if there were a long vertical wall.

2. Contour lines are parallel

- **Two exceptions:**

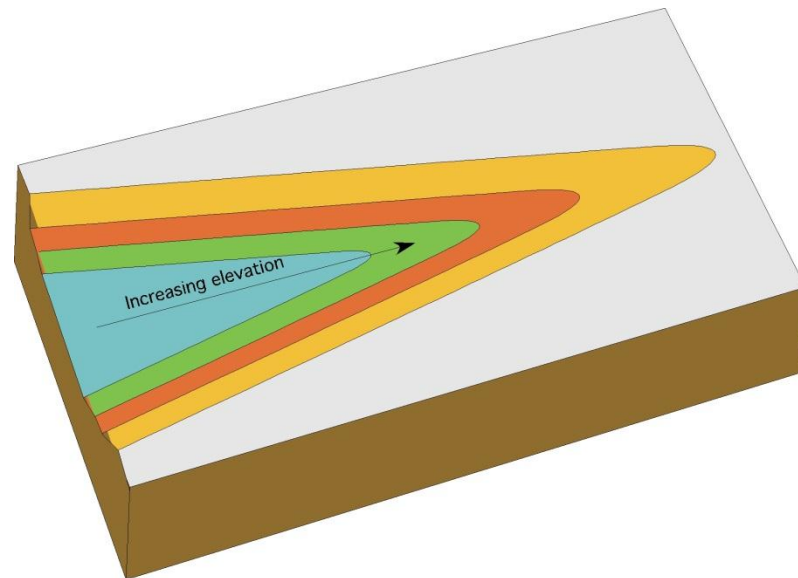
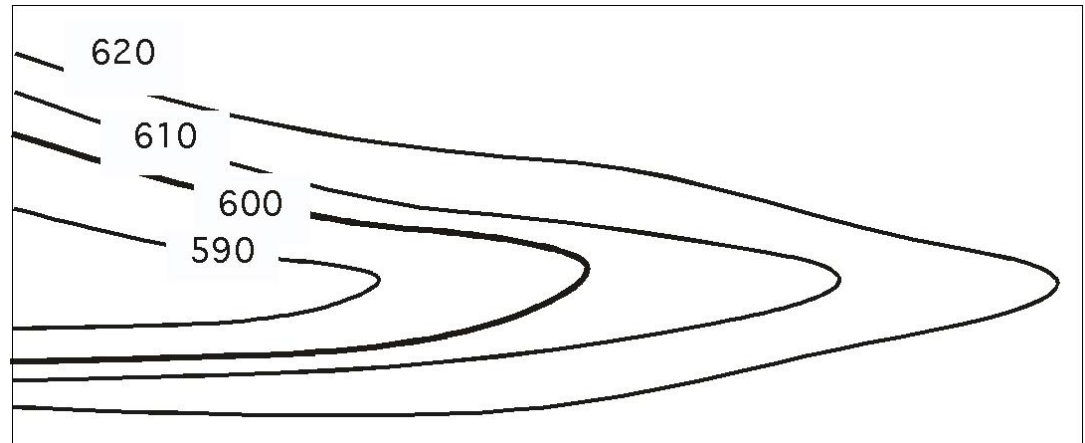
1. They will meet at a vertical cliff
2. They will overlap at a cave or overhang.

- 3. When contour lines overlap, the lower elevation contour should be dashed for the duration of the overlap.**



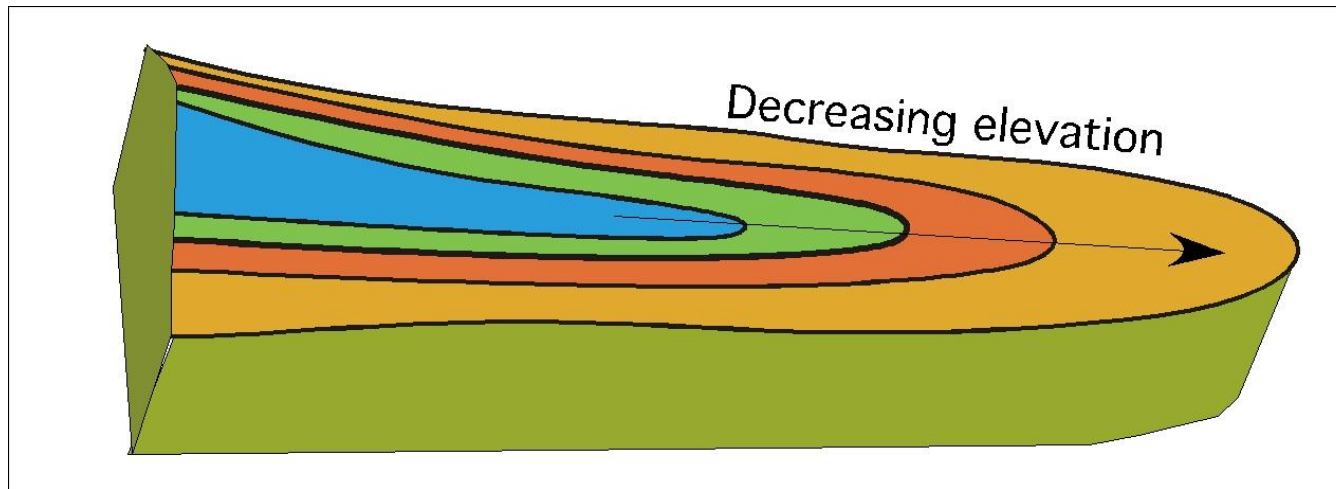
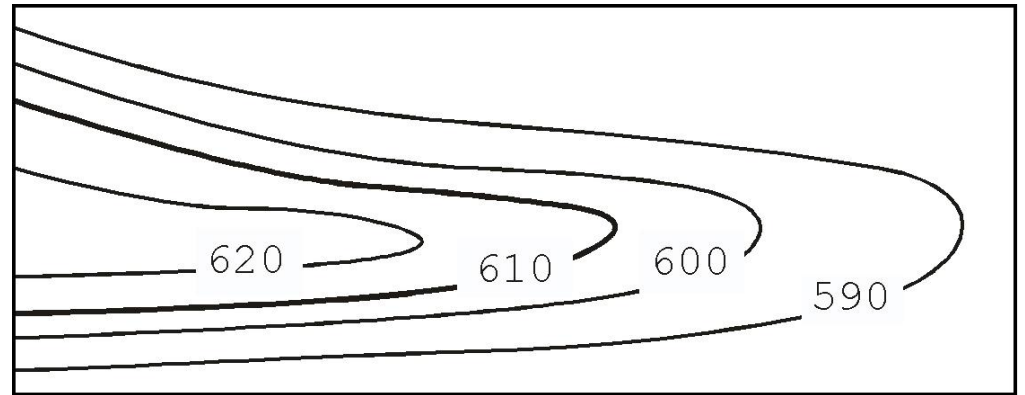
3. Valleys and higher elevation

A series of V-shapes indicates a valley and the V's point to higher elevation.



4. U shapes and ridge

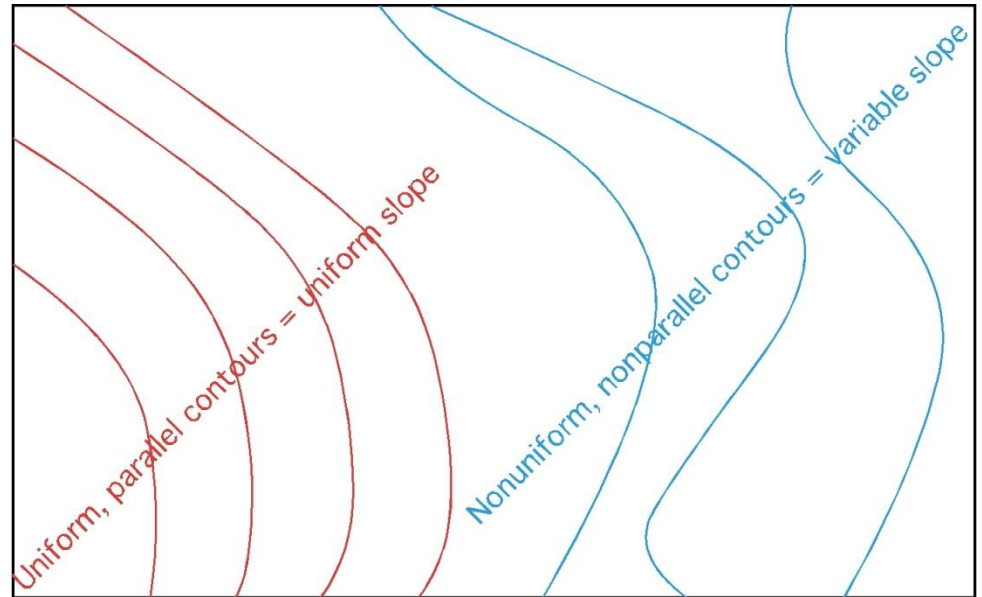
A series of U shapes indicates a ridge. The U shapes will point to lower elevation.



5. Contour Spacing

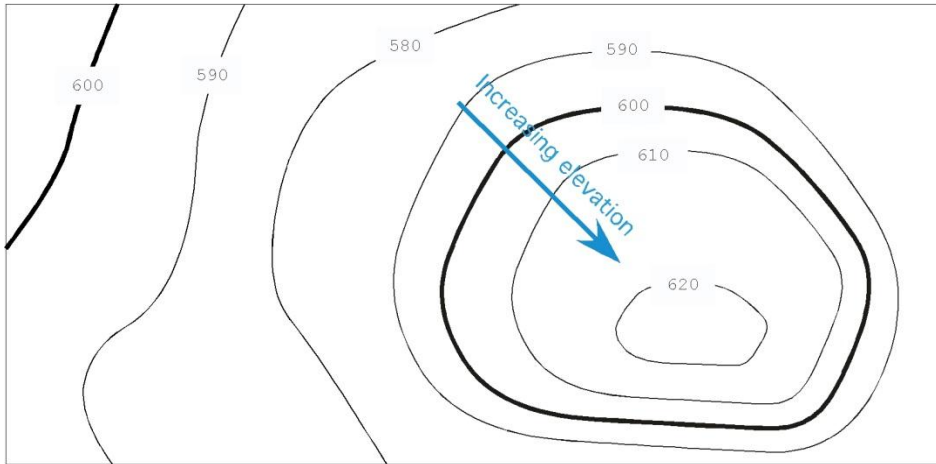
Evenly spaced contours indicate an area of uniform slope.

Unevenly spaced contours indicates an area with variable slope.



6. Hills and Depressions

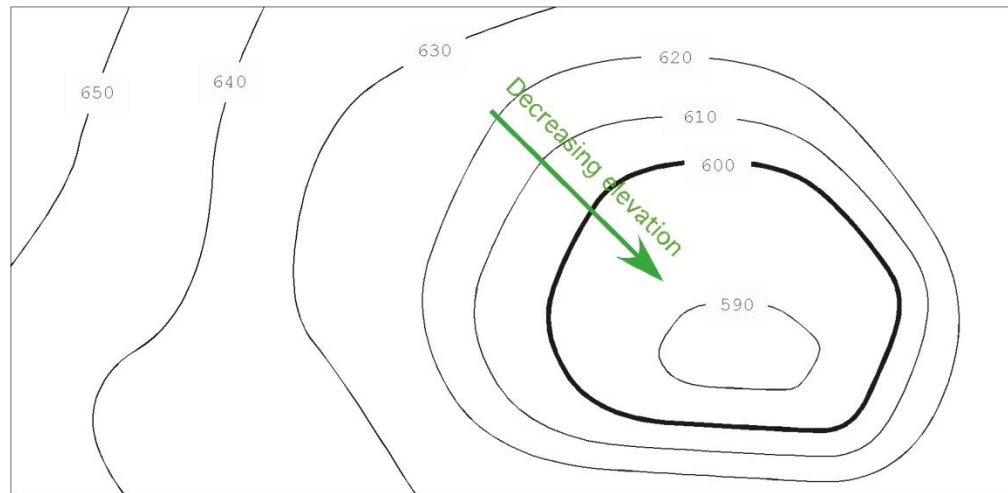
A series of closed contours with increasing elevation indicates a hill.



**Hills may be identified with a
“+” with the elevations**

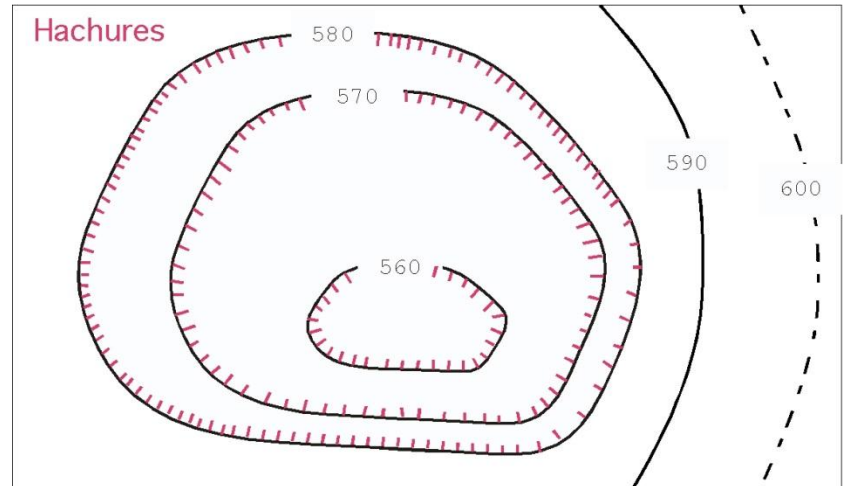
6. Hills and Depressions--cont.

- ❖ A series of closed contours with decreasing elevation indicates a depression.
- ❖ Depressions may be identified with a “-”.

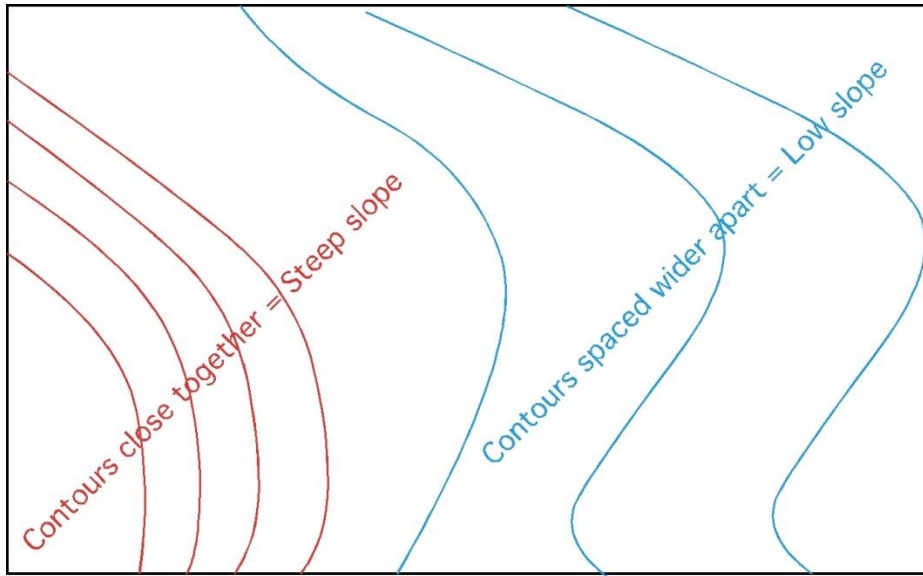


8. Hachures

- ❖ Hachures are short lines which are perpendicular to the contour line.
- ❖ Used to indicate a hill or a depression.
- ❖ Not used on modern maps.



9. Contour Spacing

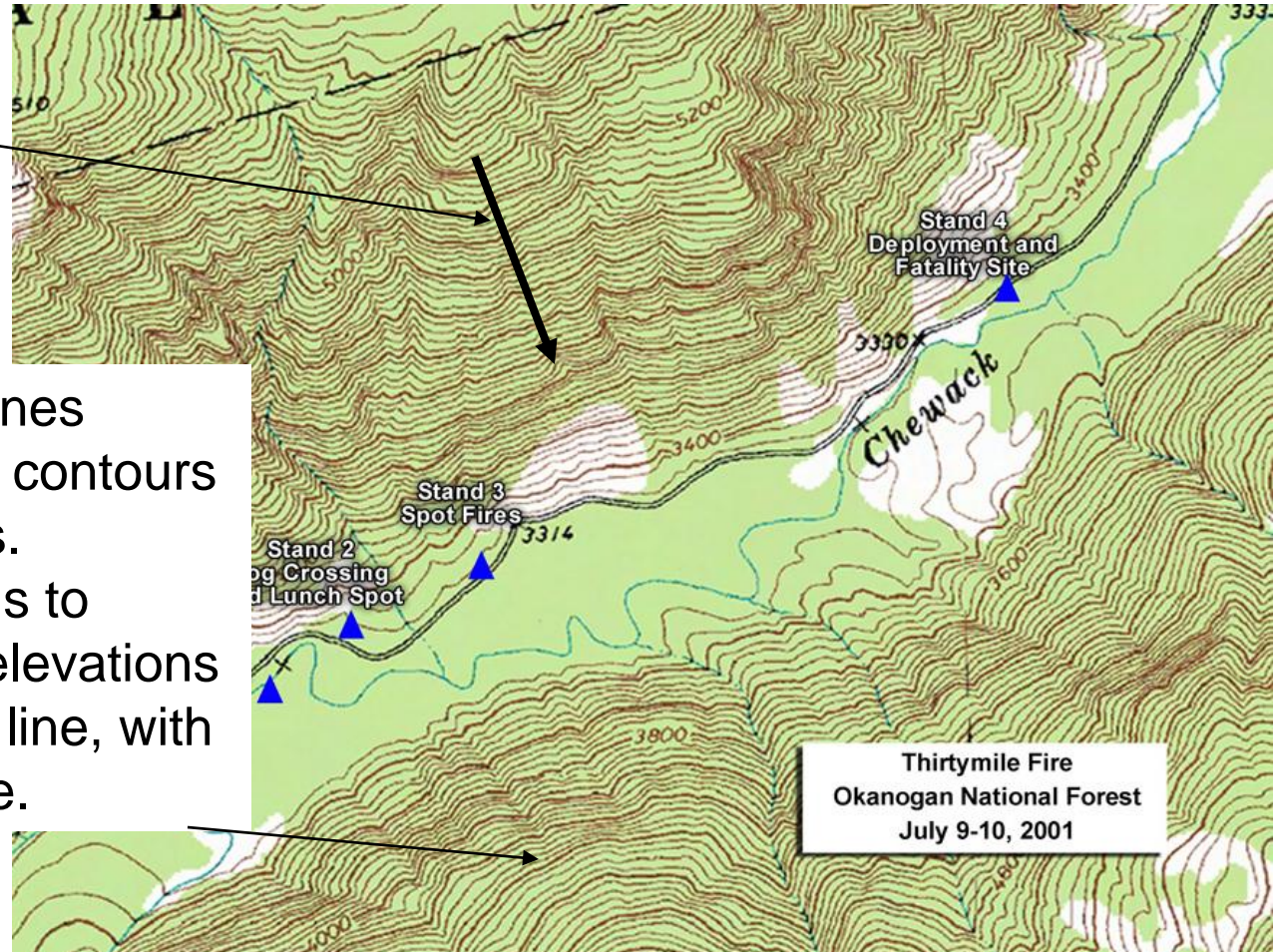


- Contours spaced close together indicate a higher % slope.
- Contours spaced wider apart indicate lower % slope.

9. Contour Spacing--cont.

Contours are perpendicular to maximum slope.

- Different types of lines should be used for contours of major elevations.
- Common practice is to identify the major elevations lines, or every fifth line, with a bolder, wider, line.



9. Contour Spacing-Intervals

- Another decision that must be made is the contour interval.
- The “best” interval depends on the use of the data.

Contour Intervals-- cont.

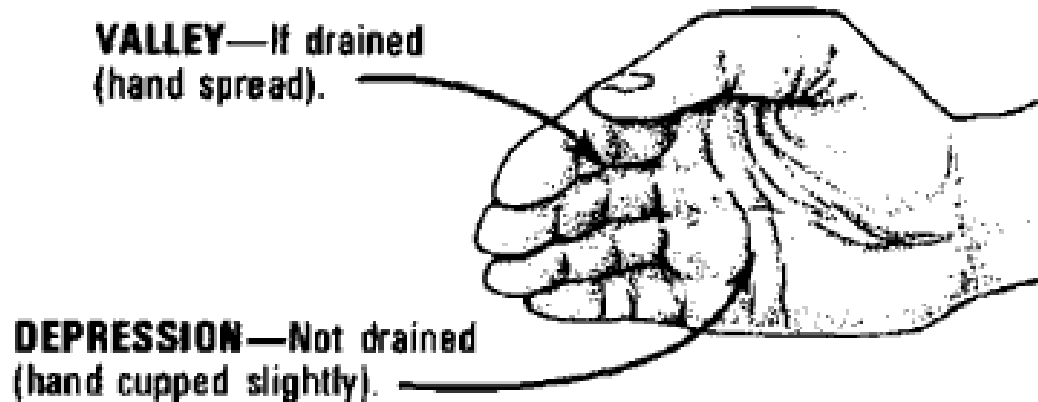
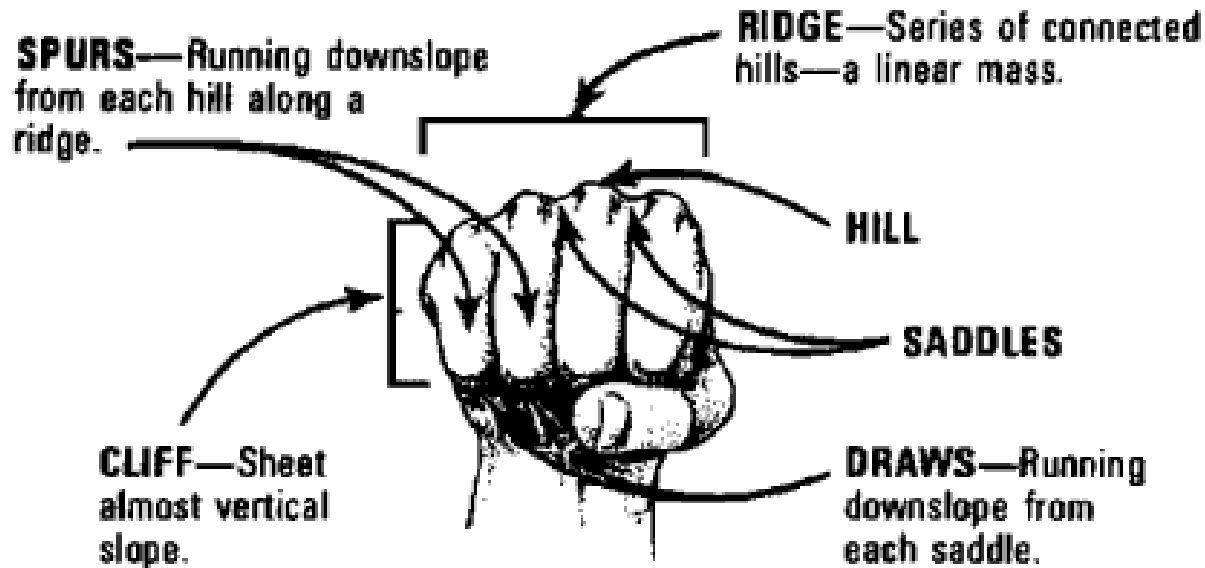
Types of topo map	Nature of terrain	Recommended interval (feet)
Large Scale	Flat	0.5 or 1
	Rolling	1 or 2
	Hilly	2 or 5
Intermediate scale	Flat	1, 2 or 5
	Rolling	2 or 5
	Hilly	5 or 10
Small scale	Flat	2, 5 or 10
	Rolling	10 or 20
	Hilly	20 or 50
	Mountainous	50, 100 or 200

- **Steep slopes - contours are closely spaced**
- **Gentle slopes - contours are less closely spaced**
- **Valleys - contours form a V-shape pointing up the hill - these V's are always an indication of a drainage path which could also be a stream or river.**
- **Ridges - contours form a V-shape pointing down the hill**
- **Summits - contours forming circles**
- **Depressions - are indicated by circular contour with lines radiating to the center**

- **Why do you need to know the terrain features on a map?**
- In order to locate a point on a map
- in order to navigate from one point to the next

- **Types of Terrain Features**
- **Major-Five**
- **Minor-Three**

Identification of Terrain Features using Hand

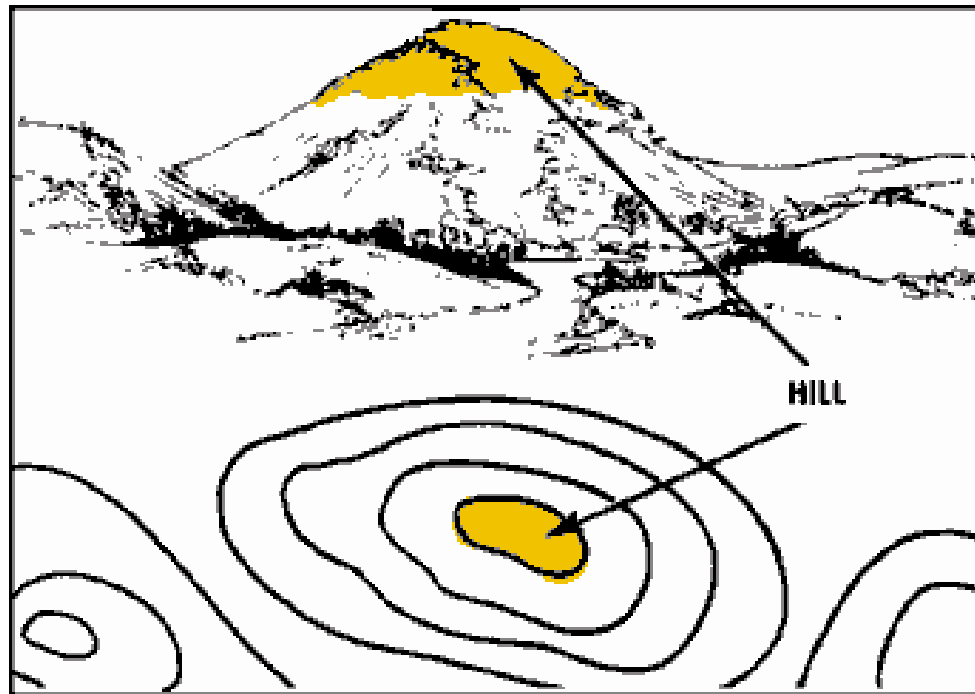


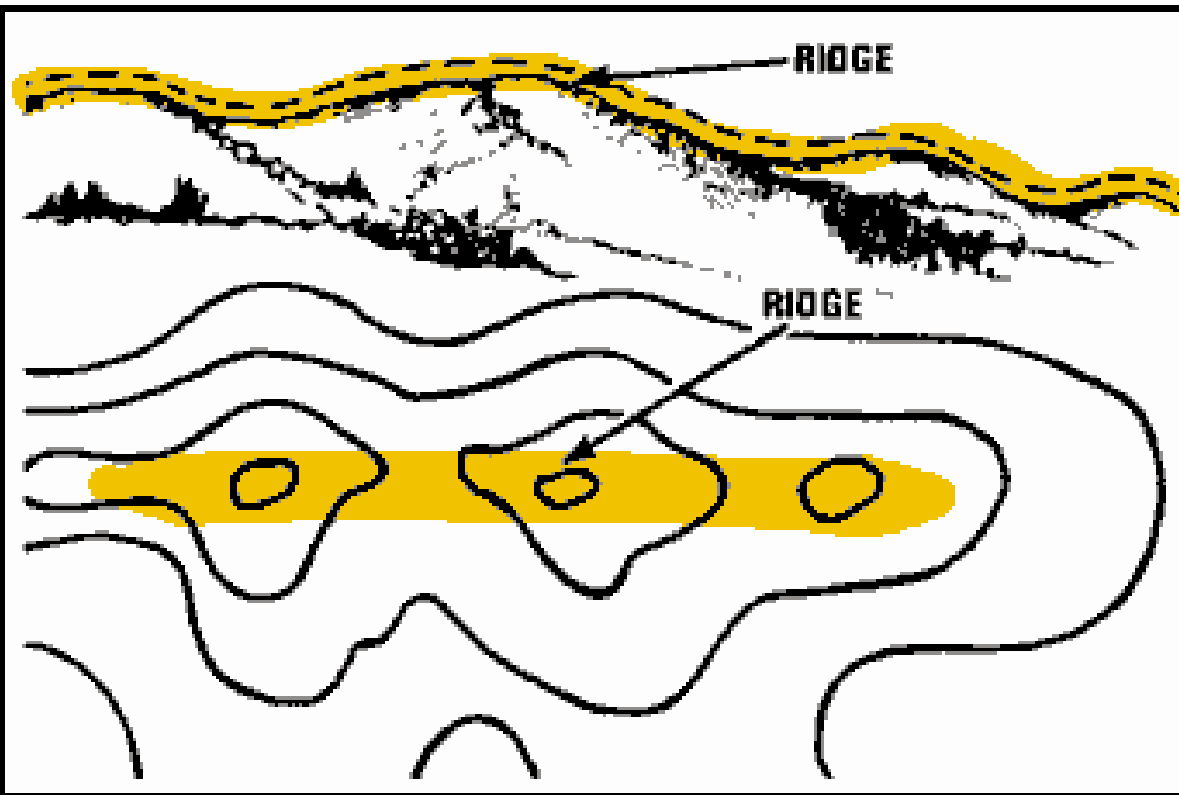
Five Major Terrain Features

- Hill
- Ridge
- Valley
- Saddle
- Depression

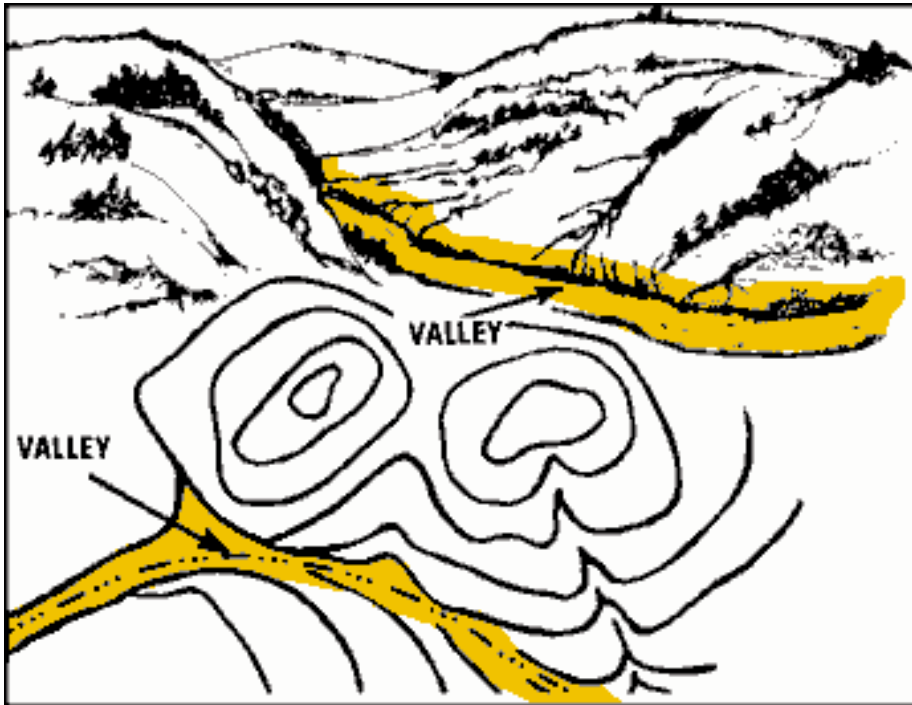
Hill

A hill is a point or small area of high ground. When you are on a hilltop, the ground slopes down in all directions. The height and slope of a hill are represented on a map by the number of concentric contour rings and the distance between the rings.



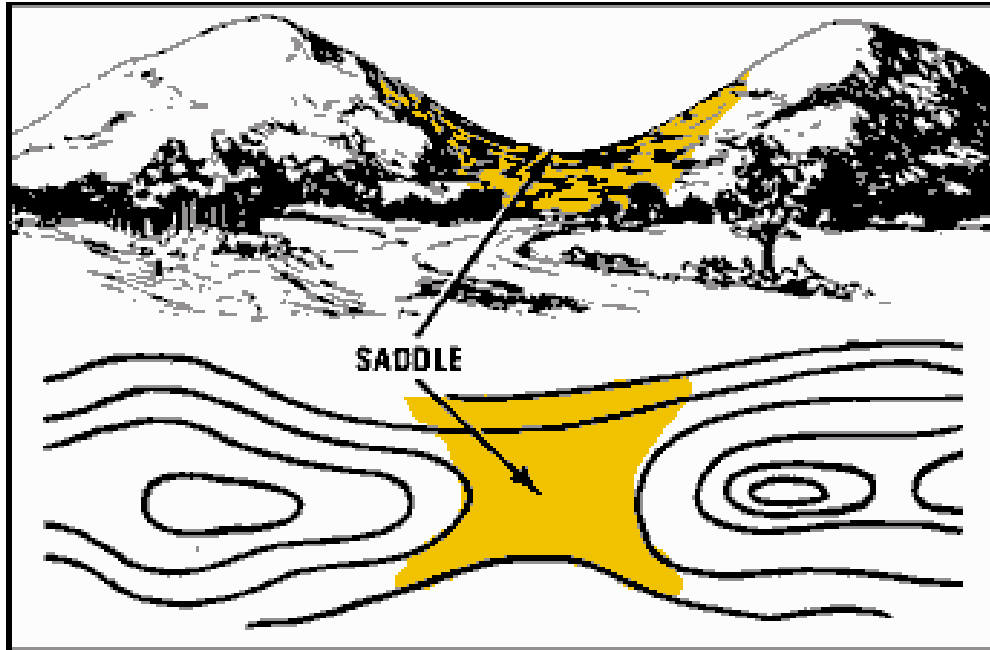


A ridge is a line of high ground with height variations along its crest. A ridge is not simply a line of hills. All of the points of the ridge crest are higher than the ground on both sides of the ridge. You can identify a ridge on a map by looking for contour lines forming a U or V. The closed end of the U or V points away from high ground.

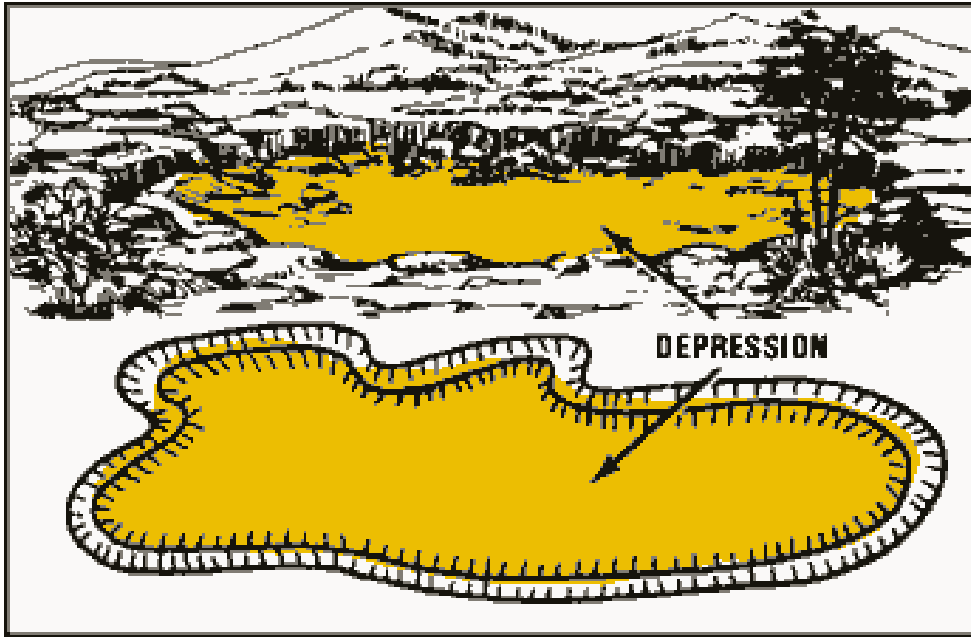


A valley is a reasonably level ground bordered on the sides by higher ground. It generally has room to maneuver within it. A valley may or may not contain a stream course running through it. Contour lines indicating a valley are U-shaped and are usually a dotted or broken line.

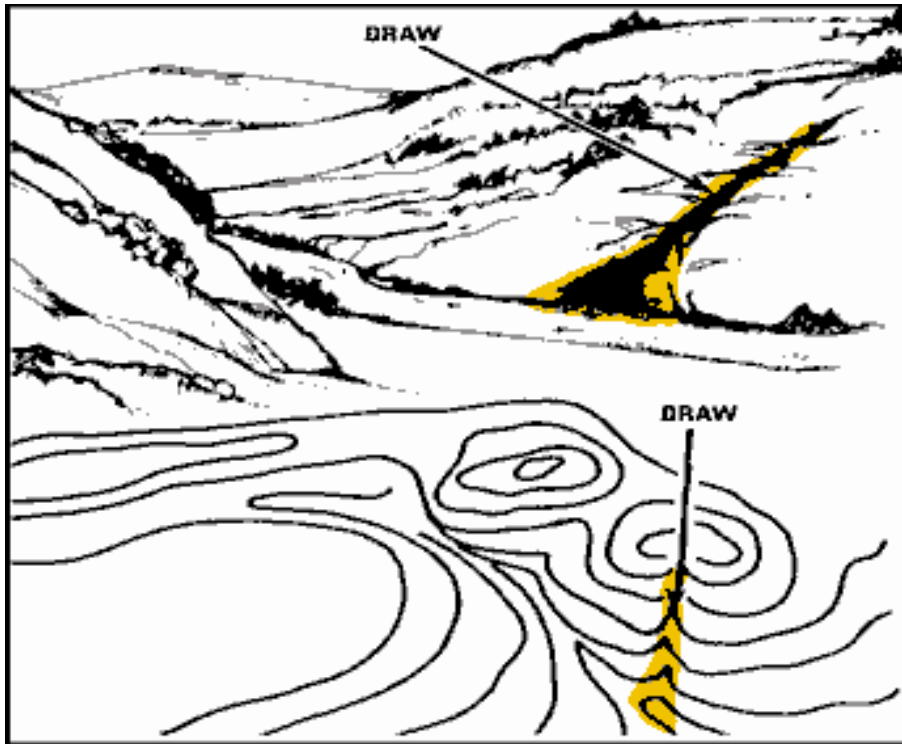
“Arrows” that point upstream are valleys



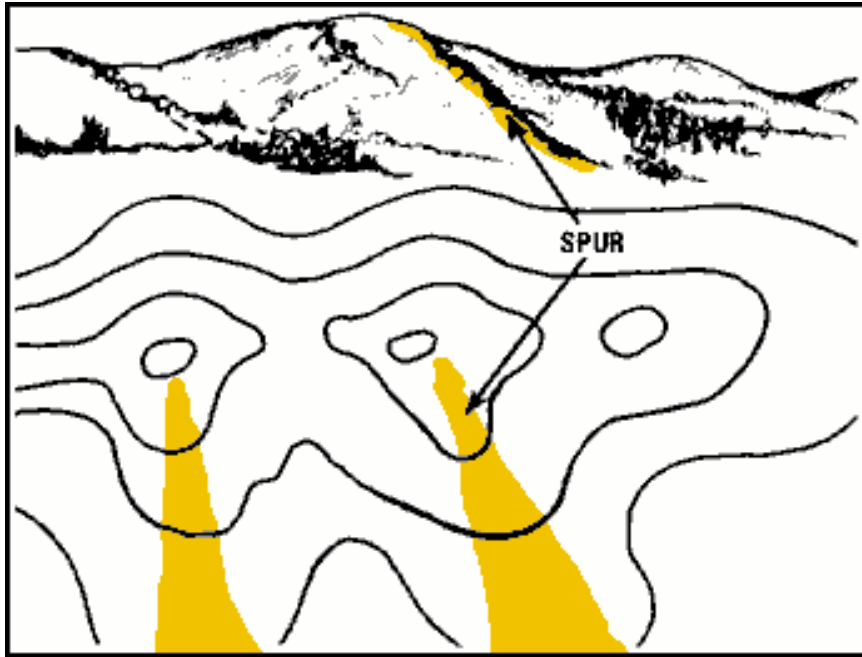
A saddle is a dip or low point along the crest of a ridge. A saddle is not necessarily the lower ground between two hilltops. It may also be a break along an otherwise level ridge crest. A saddle is normally represented as an hourglass shape on a map. The hourglass is made by contour lines narrowing between two groups of concentric circles that indicate hilltops or points of raised ground.



A depression is a low point or hole in the ground that is also surrounded on all sides by higher ground. A depression generally has no or little room to maneuver within it. The map symbol that represents a depression is closed contour lines that have tick marks. The tick marks point toward the low ground or down slope



A draw is similar to a valley except it usually has a less developed course. There is generally no level ground and, therefore, little or no room to maneuver. The ground slopes upward on each side and toward the head of the draw. Draws are caused by flash floods and can be found on flat terrain but are more often found along the sides of ridges. Contour lines indicating a draw are shaped like a V with the point of the V pointing toward the head of the draw. That means the point is pointing toward the high ground.



A spur is usually a short, continuously sloping line of higher ground, normally jutting out from the side of a ridge. A spur is often formed by two very parallel streams cutting gullies or draws down the side of a ridge. You can spot a spur on a map when the contour lines form a U or V shape that points away from the higher ground.

A cliff is a vertical or near-vertical slope. A cliff may be shown on a map by contour lines that are very close together. A cliff is also shown as a ticked contour line with the tick marks pointing towards the lower ground.

