

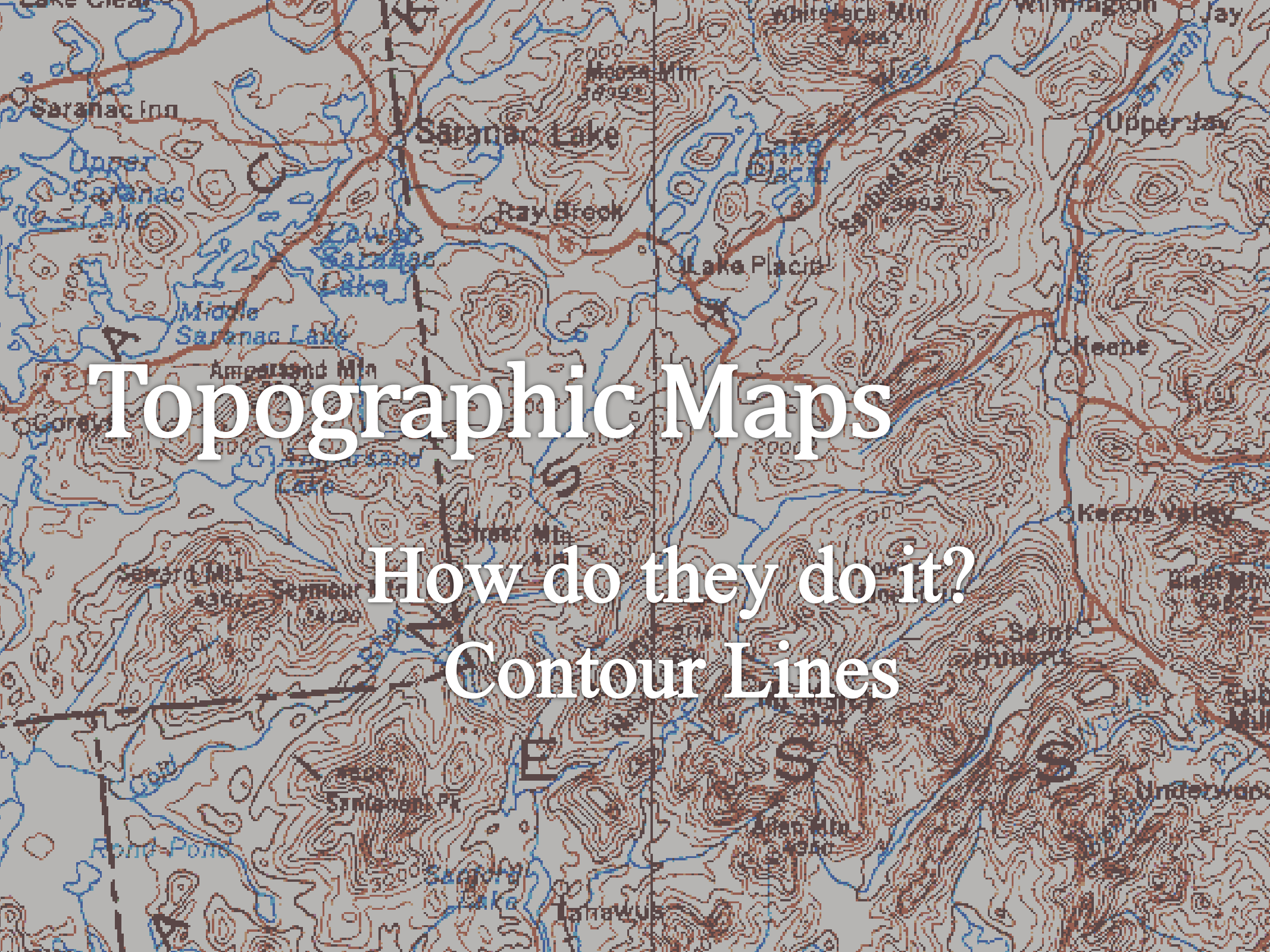
# Topographic Maps and Contours

Academic Resource Center



**Topography:** The relief features or configuration of an area.

*\*How do we measure it?*

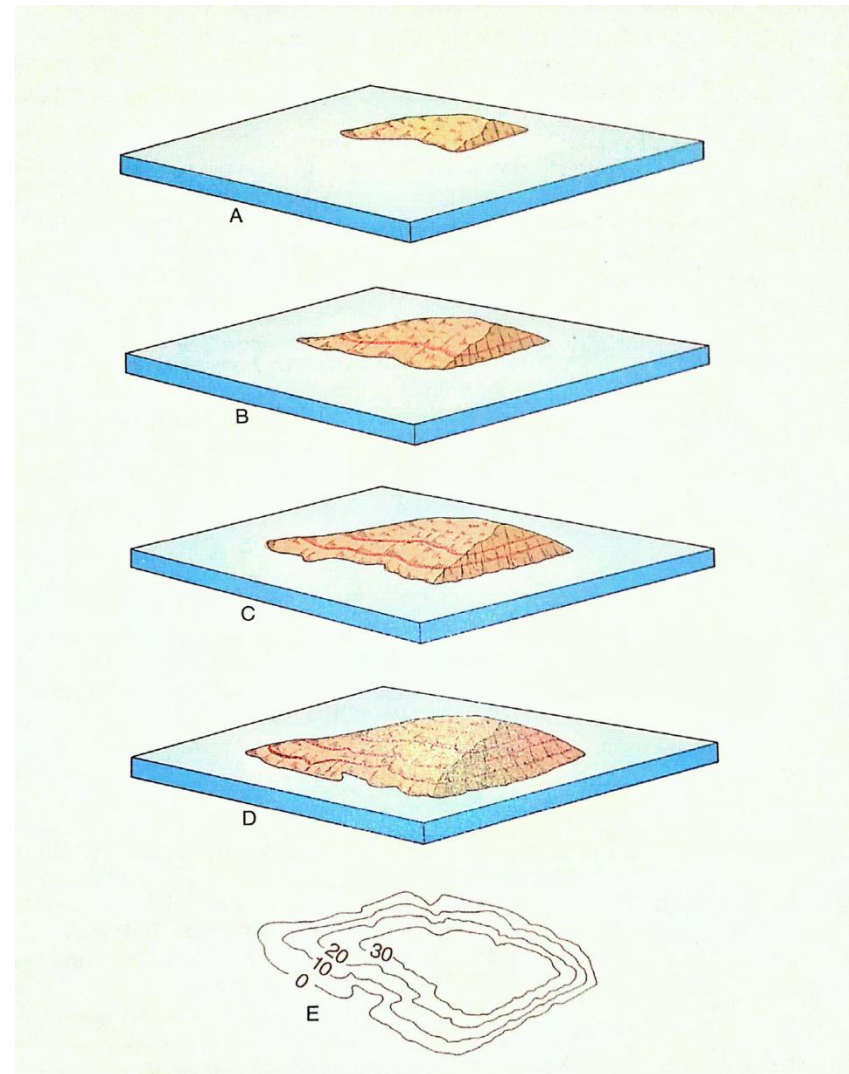


# Topographic Maps

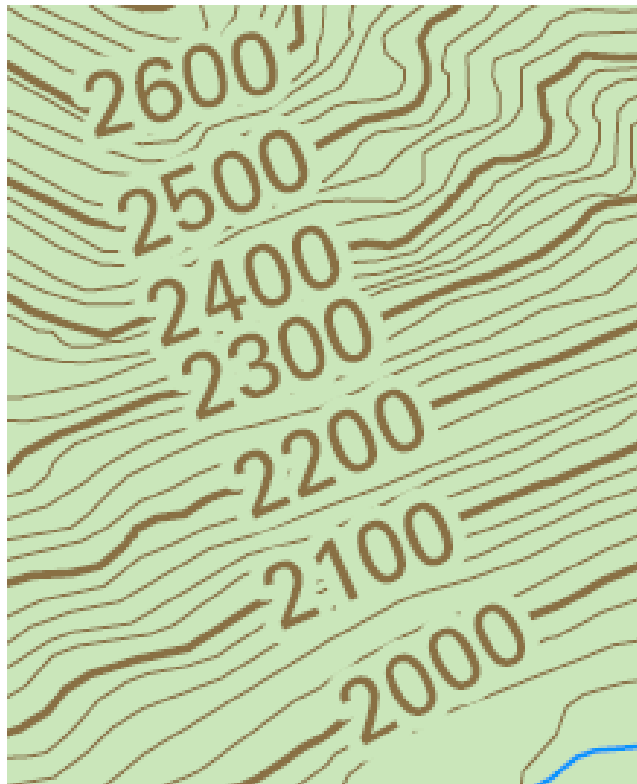
How do they do it?  
Contour Lines

# Contour Lines

- Contour lines, or **isohypses**, connect points of equal elevation.
- Consider a receding water level.



# Contour Map Characteristics



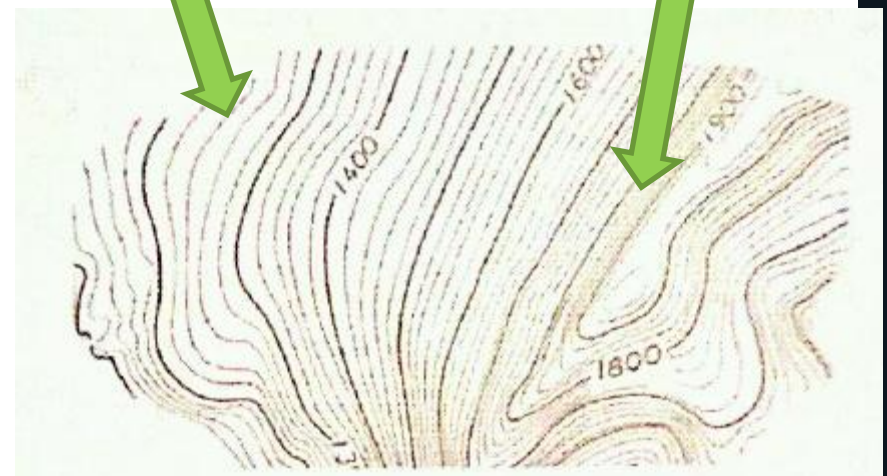
- **Index Contours** are used to label the elevation of the their associated points.
- Bolded to facilitate reading of the map.
- Often occur in intervals of five contour lines.

# Contour Map Characteristics

- **Contour Interval:**  
Horizontal distance between two contours
- **Close together:** Steep slope
- **Far apart:** Gradual slope

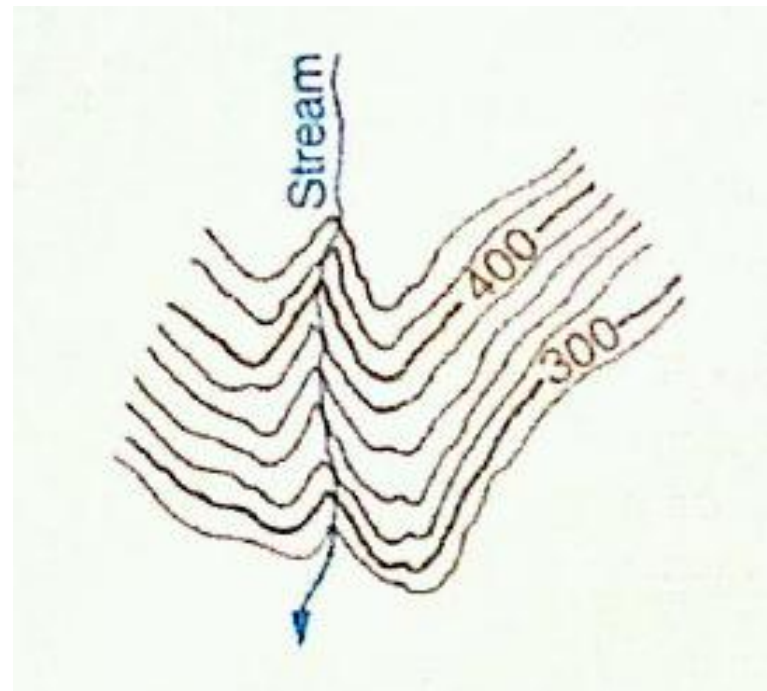
Gradual Slope

Steep Slope



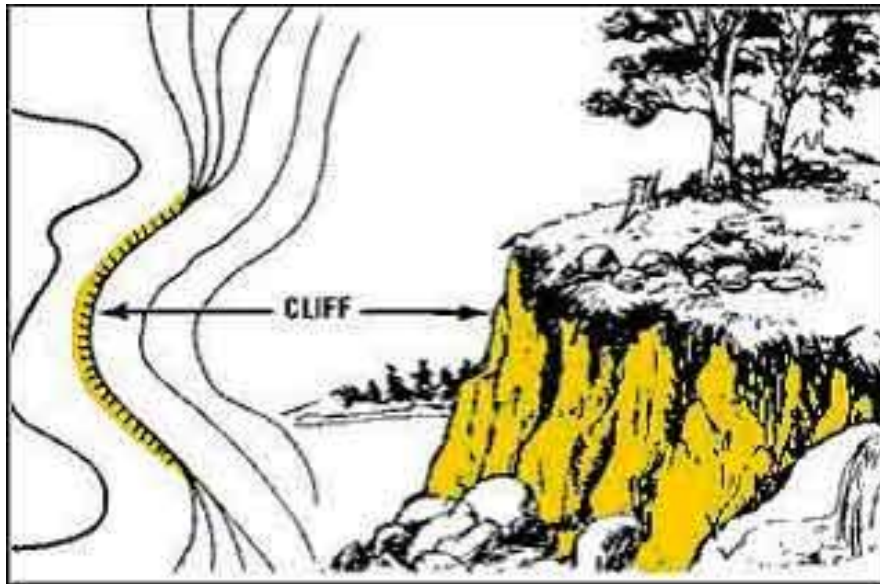
# Contour Map Characteristics

- **Valleys:** Lines form a “V” pattern along valleys
  - “Vs” point upstream; indicating the direction of the stream flow.
  - Streams **always** flow downhill
  - Contours can and do **cross streams**



# Contour Map Characteristics

- **Concurrency:** Contour lines **never** cross or divide.



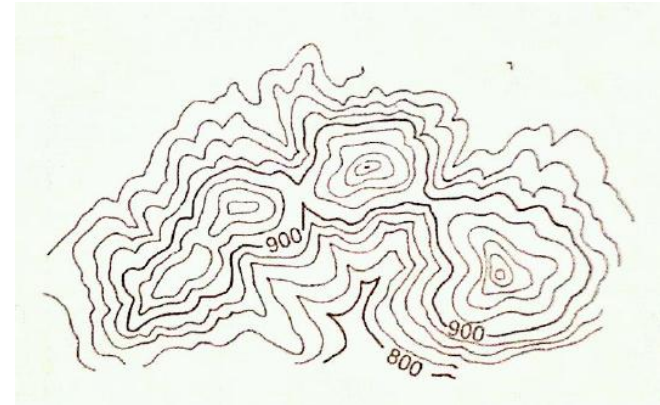
- **Cliffs:** May appear to merge on vertical cliffs, but are stacked.
- **Caves:** May appear to cross in caves, but go under one another.



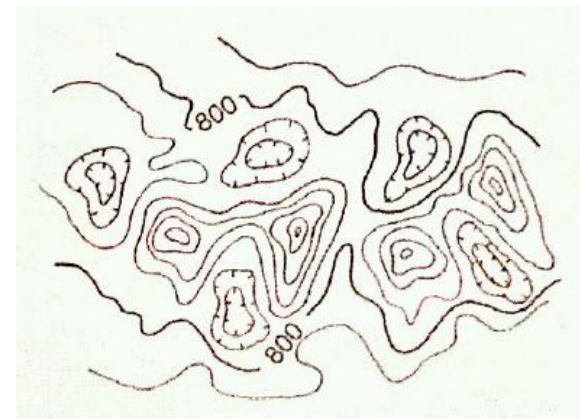
# Contour Map Characteristics

- **Hills and knobs** are shown as closed, concentric contours.
- **Closed depressions and basins** are shown as closed contours with hatches pointing downslope.

Hills:

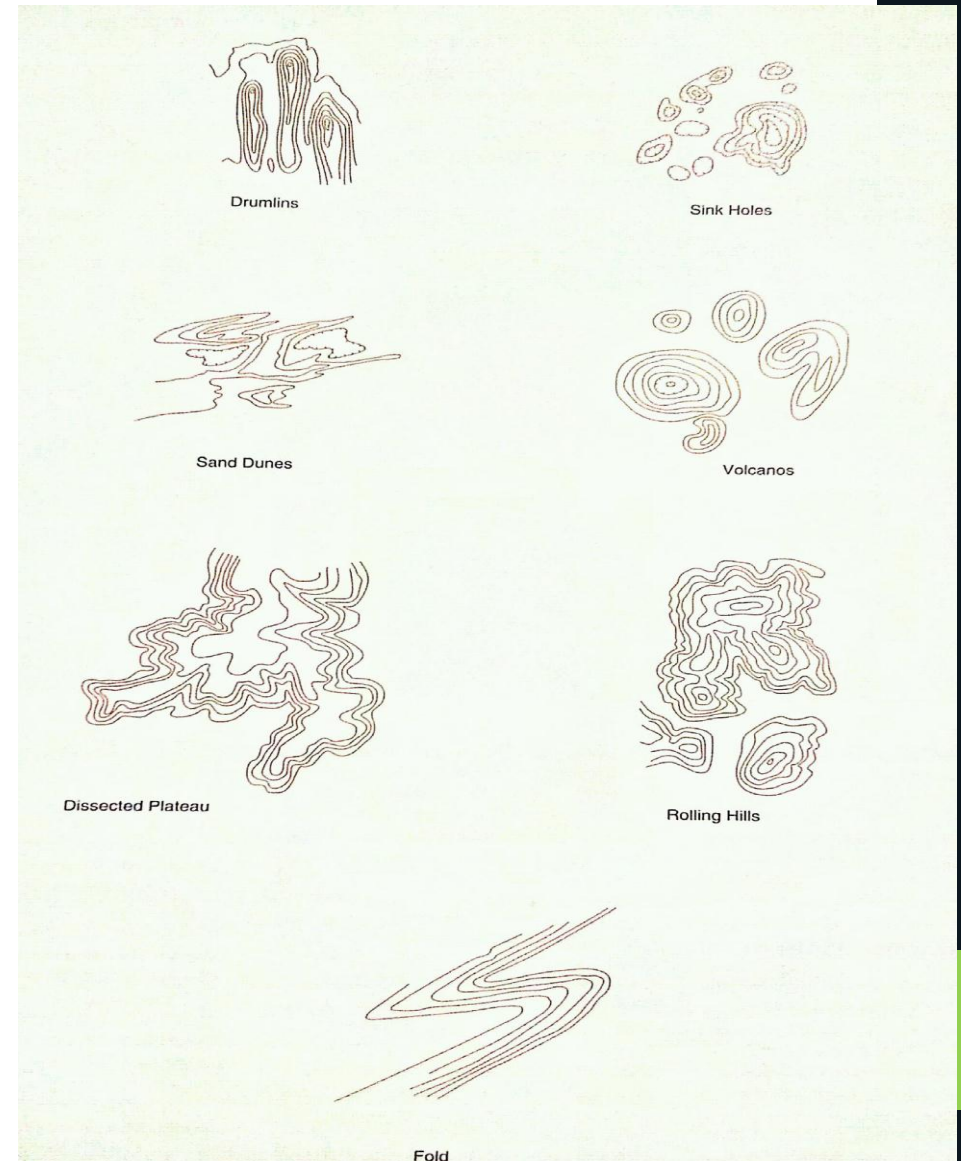


Depressions:



# Contour Map Characteristics

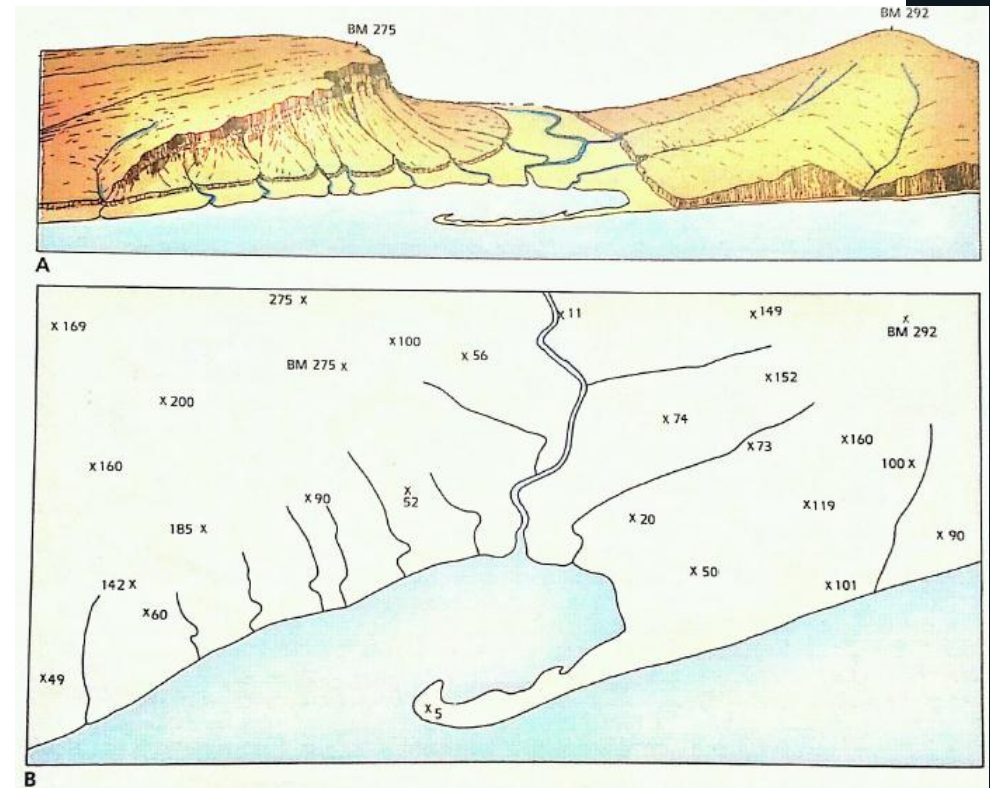
- **Other geologic features commonly expressed by contour maps include:**
  - **Drumlins**
  - **Sink Holes**
  - **Sand Dunes**
  - **Volcanos**
  - **Dissected Plateaus**
  - **Rolling Hills**
  - **Folds**



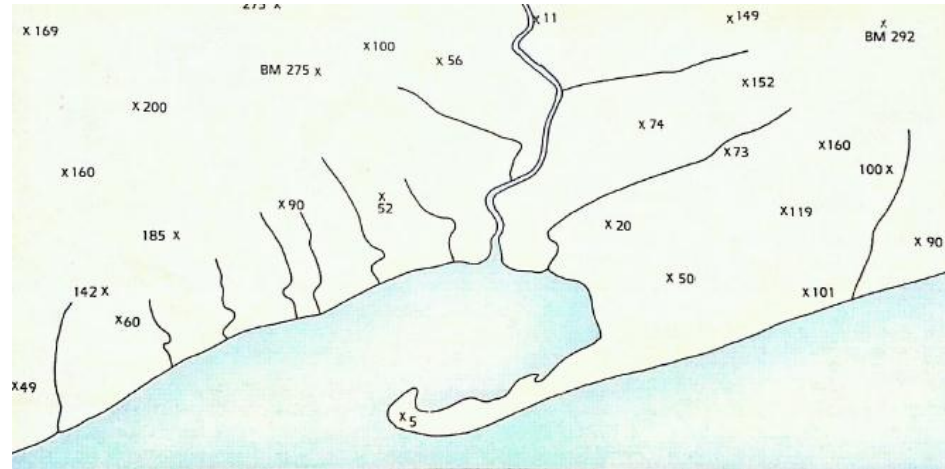
Fold

# Contour Map Generation

- In the field, points and their elevations are measured using automatic levels, total stations, or GPS devices
- Geotechnical engineers use these points to generate topographic maps.



# Contour Map Generation



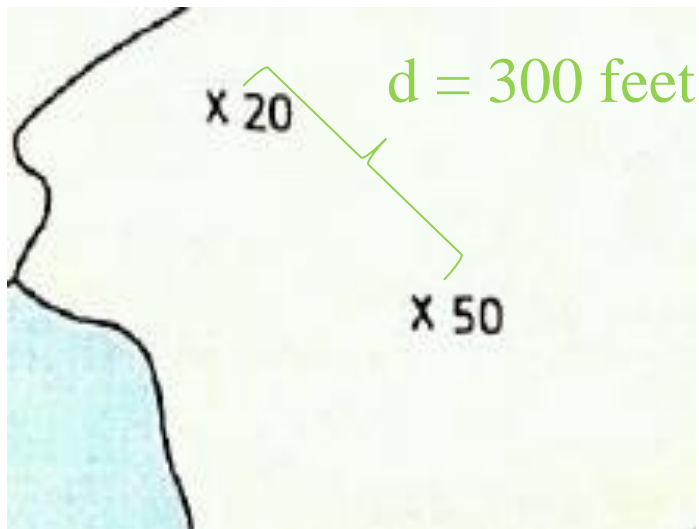
# Contour Map Generation

- **Estimating Contour Intervals:**
  - Use an engineering scale
  - Measure the distance between two points
  - Divide the distance by the number of contours
  - Mark the points along the interval

# Contour Map Generation

- Example:

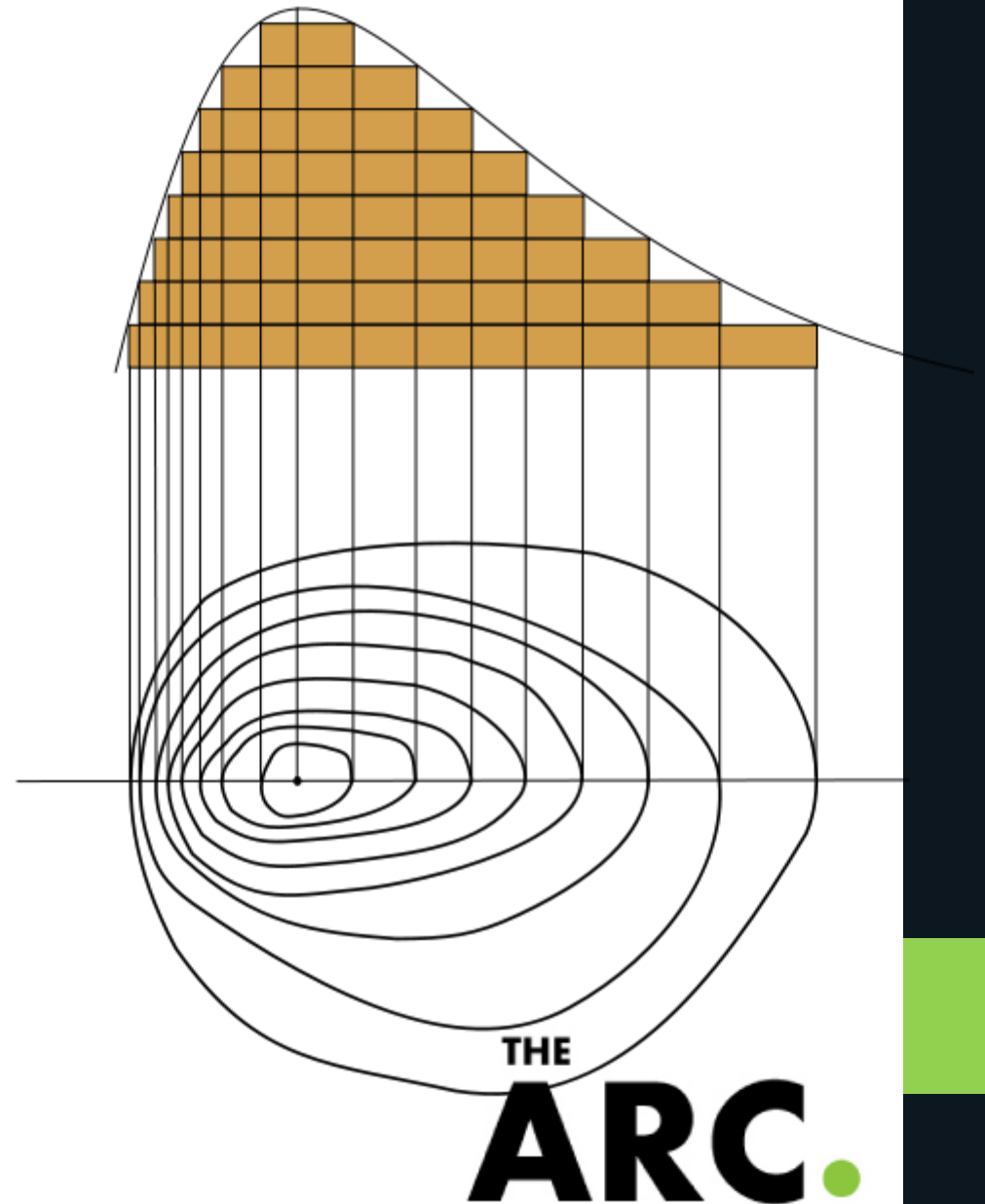
- Contours are to be placed every ten feet.



- There are to be three contour lines on this interval.
- Divide 300 feet by 3 to get one contour every 100 feet.
- Mark four points (two on the endpoints, and two between) and draw the contours.

# Topographic Profiles

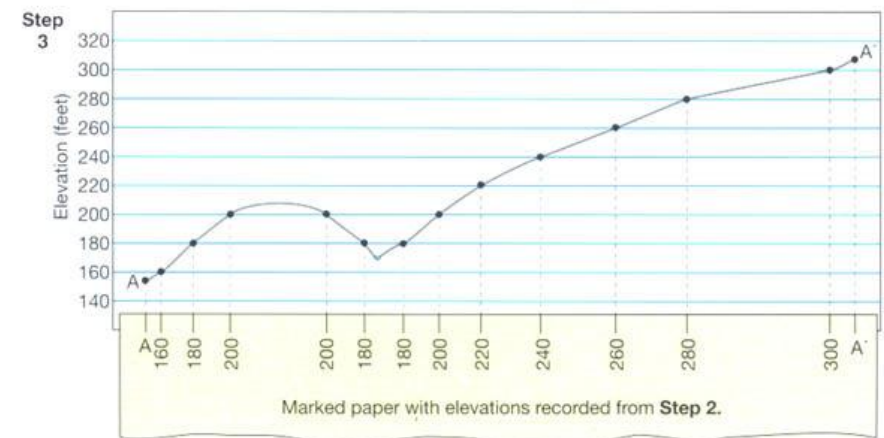
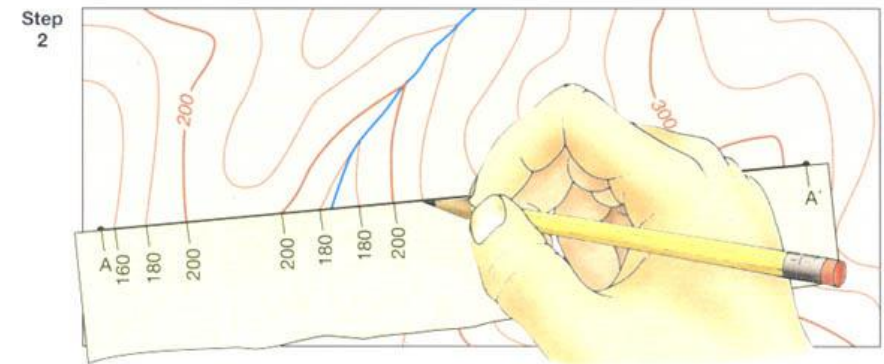
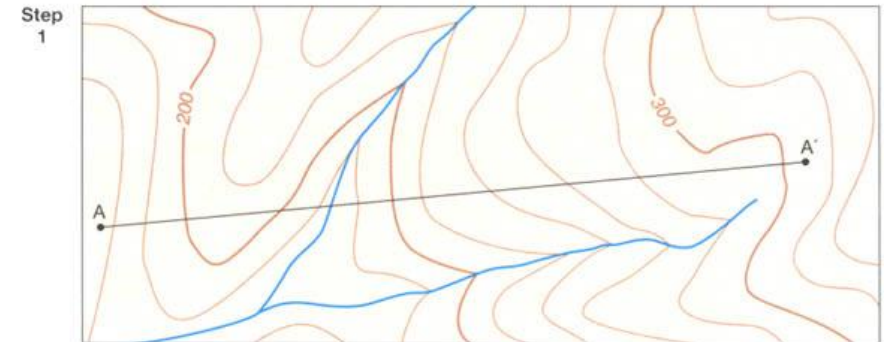
- **Cross-sectional view** of a portion of a topographic map.
- Used to demonstrate the vertical scale of landforms.
- Usually use an exaggerated scale.



# Topographic Profiles

- **Generating profiles:**

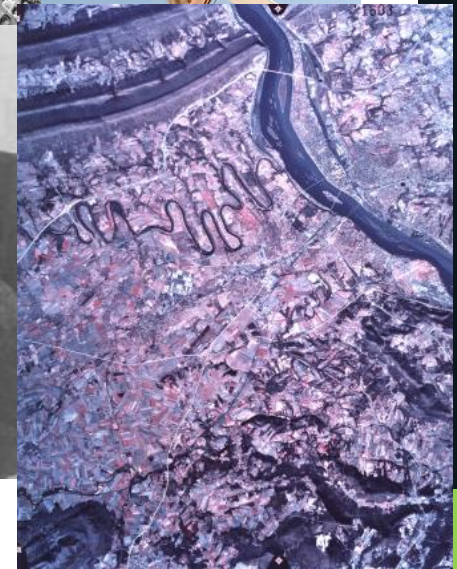
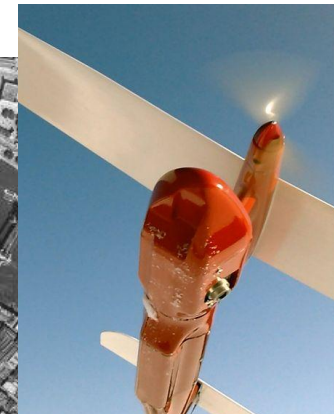
- Draw a line between the two points bounding the desired profile area.
- Place a folded sheet of paper along the line.
- Mark each contour line intersecting the paper.
- From each mark, indicate the vertical height with a dot on a scale.
- Connect the height dots with a smooth line.



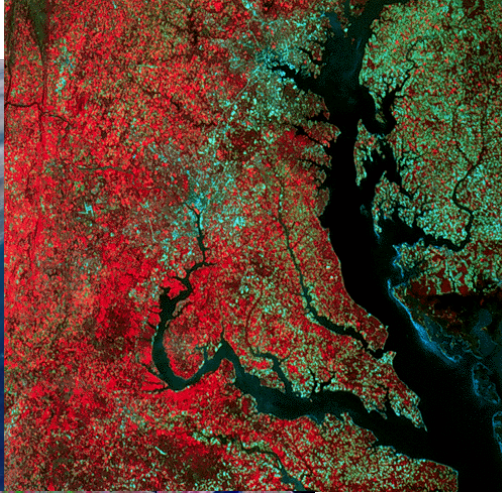


# Other Mapping Methods

- **Aerial Photography**
  - Extensive visual details
  - Allow **stereoscopic viewing**
  - Lack information about rock bodies, terrain, and other geologic features



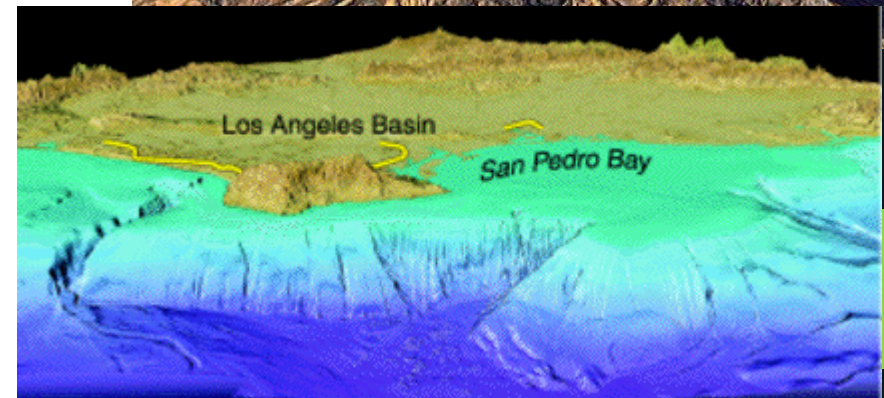
# Other Mapping Methods



- Landsat and Radar
  - Earth Resources Observation System (EROS): satellite array
  - Can see through cloud cover
  - Can be enhanced with false color
  - Used by Google Earth

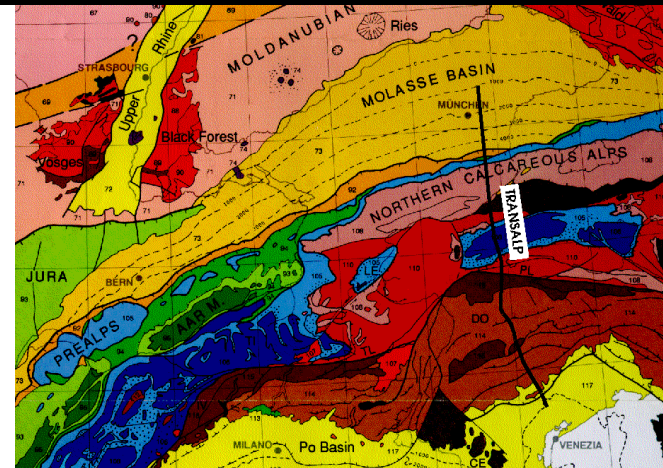
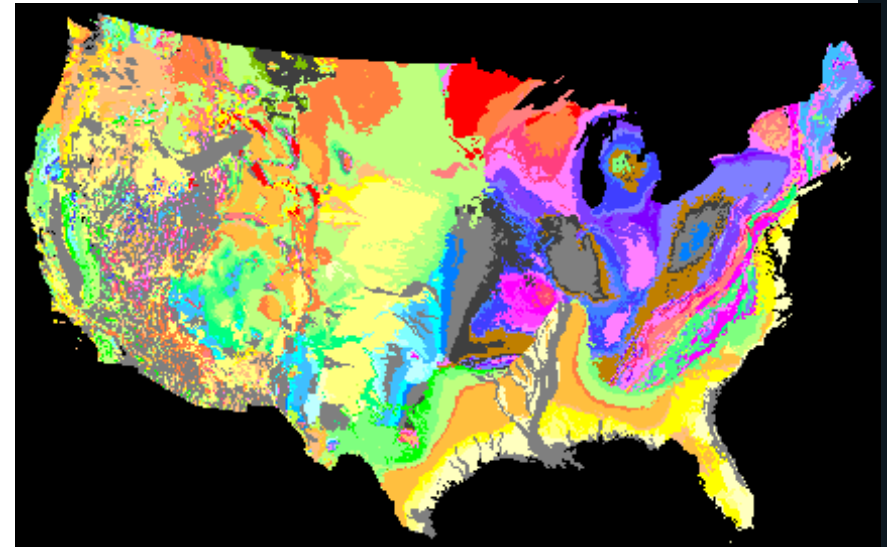
# Other Mapping Methods

- **Computer Generated Terrain Models**
  - Store vast amounts of data
  - Can be rendered from Landsat and radar data
  - Vertical scale can be exaggerated
  - Reveals features that may not be immediately apparent



# Other Mapping Methods

- **Geologic Maps**
  - Display different rock types in an area
  - Readily available on United States Geological Survey websites
  - Usually lack elevation information



Questions?