

MAPS AND MAPWORK-II

Map interpretation and map reading

RELIEF

- ✓ **Relief** is the difference in height between the highest and the lowest land surface in a locality.
- ✓ **Altitude or elevation**: it is the height of the land above the sea level.
- ✓ **Topographic maps** : show elevation and shape of the land by using **contour lines** (iso lines)
- ✓ The method most commonly used for representing elevation and relief is contour lines

Contour lines

- ✓ Contour line is an imaginary line on the ground connecting points of the same elevation.
- ✓ **Contour lines** are lines drawn on a map connecting points of equal elevation,
- ✓ Contour lines indicate a vertical distance above or below sea level.

Contour intervals : it is vertical distances between two adjacent contour lines.

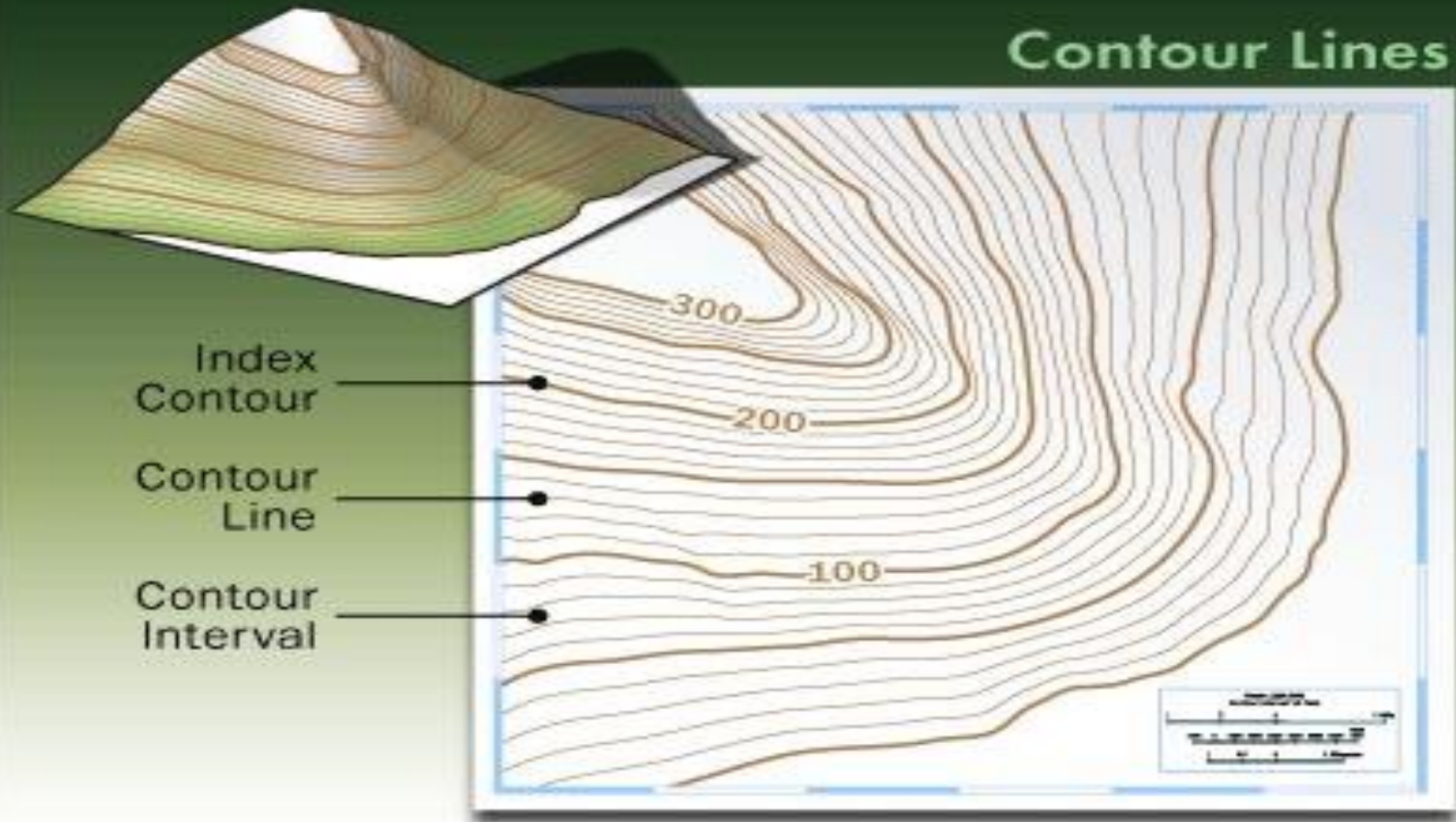
- Contour lines never meet each other.
- Contour lines never crossed each other.

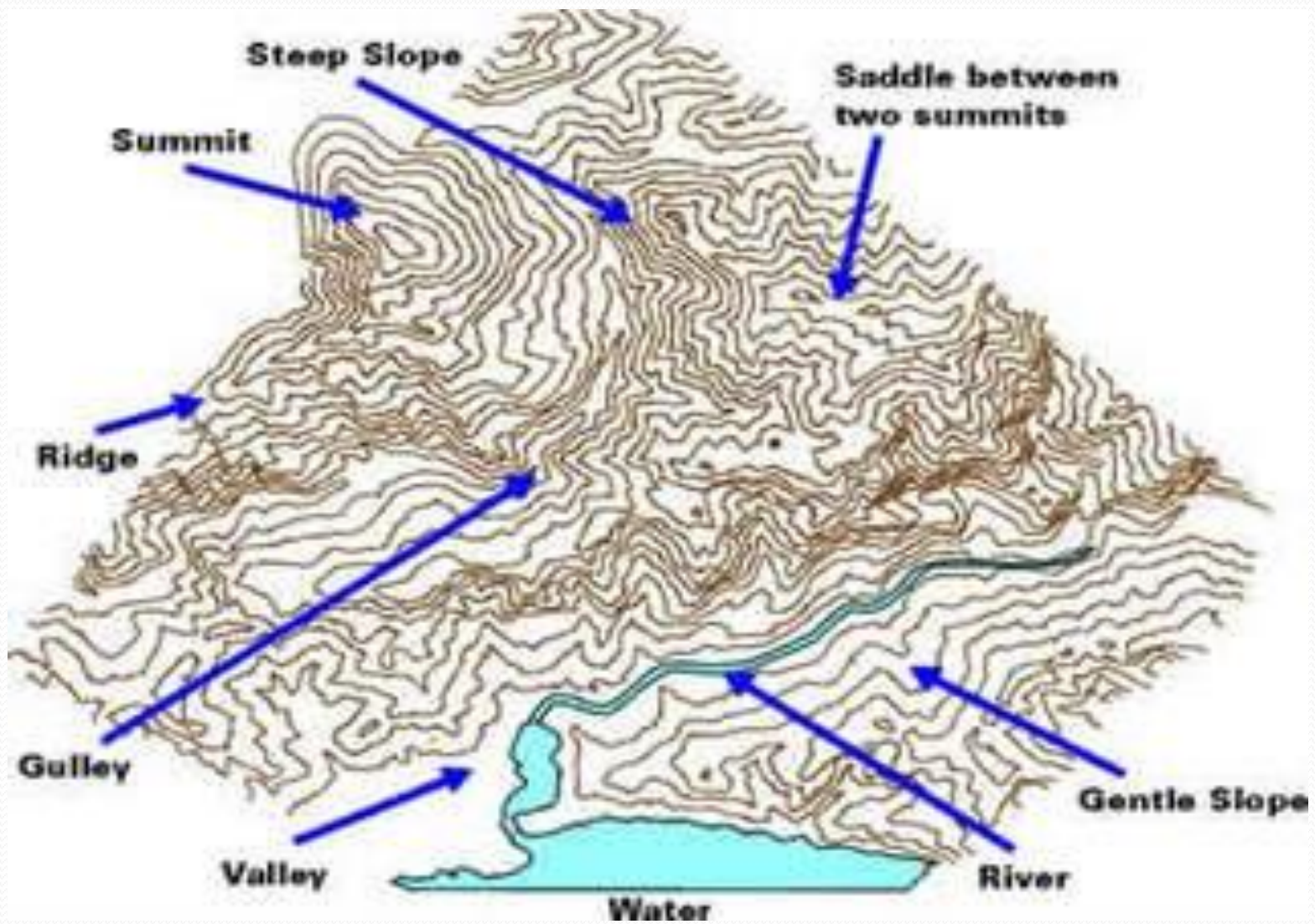


How Topographic Maps Work

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Contour Lines





How to calculate contour intervals

- ✓ Topographic maps show the contours, or shape, of the land.
- ✓ Every map has a legend that explains the different colors and patterns.
- ✓ Normally contour lines will be brown colour
- ✓ **To calculate** contour intervals, find the elevation difference between two adjacent index lines or index contours.
- ✓ Divide that elevation difference by the number of contour intervals between index lines (usually **five**). The result equals the contour interval

Example 1 Calculate the Contour Intervals



- ✓ Considering the above map, the steps involved in contour interval calculation are,
- ✓ Let's assume, 7000 and 7100 are the lowest and highest, calculate the interval between it.
- ✓ Now difference between 7100 and 7000 is $7100 - 7000 = 100$
- ✓ The number of contour lines in-between 7000 and 7100 are 4.
- ✓ Adding 1 to 4, $4 + 1 = 5$
- ✓ Now dividing 100 by 5,
- ✓ $100/5 = 20$ units

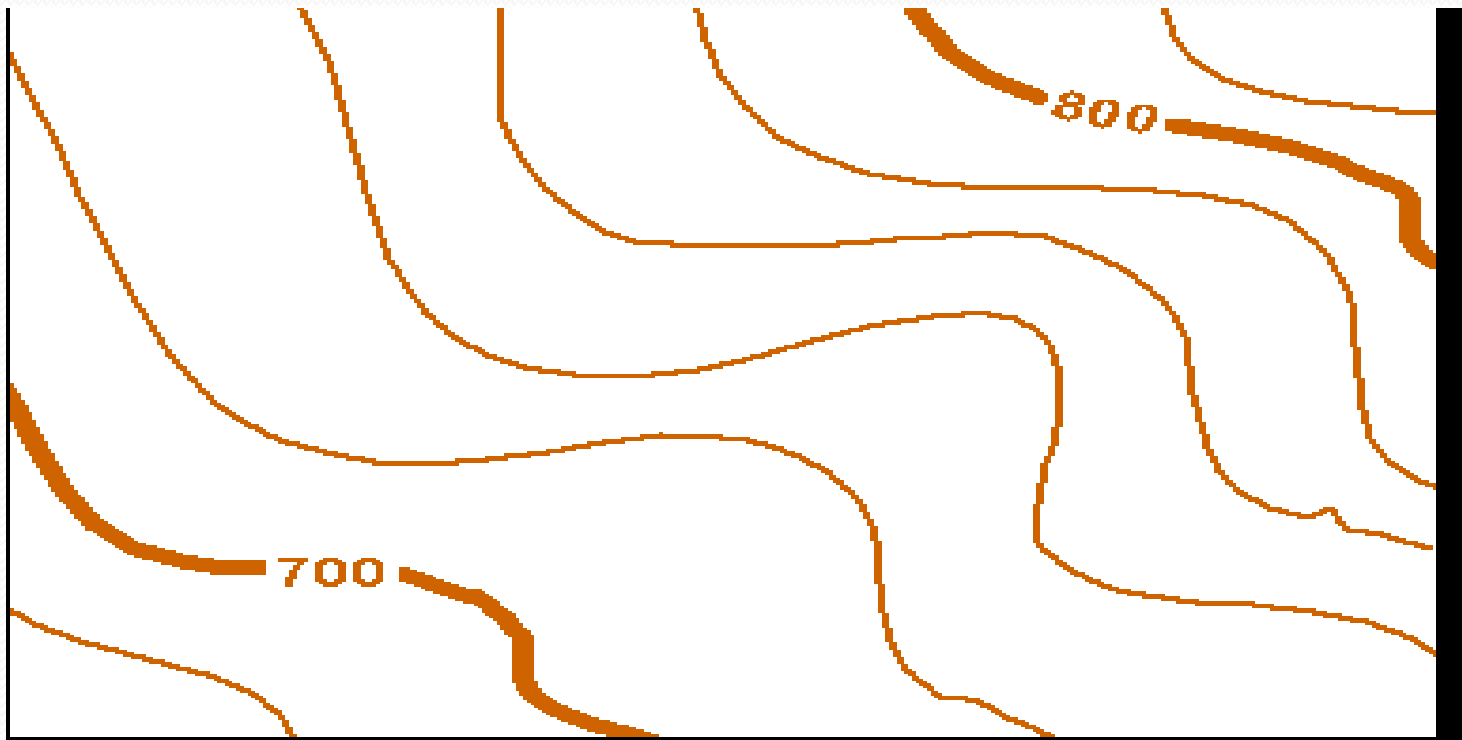
The Contour Interval of the above map is 20 Units.

Example 2

- Example find out the contour interval of the below contour lines

- $C.i = 800 - 700 = 100$

$= 100 / 5 = 20$. Therefore 700, 720, 740, 760, 780, 800



Horizontal equivalent

- ✓ As contour intervals are for the calculation of vertical elevation of an area, same way to calculate the horizontal distance it is termed as Horizontal Equivalent.
- ✓ The **horizontal** distance between two points on two consecutive contour lines for a given slope is known as **horizontal equivalent**.
- ✓ It is not constant for a given map, it varies according to the steepness of the ground.

The difference between Contour intervals and Horizontal Equivalent are tabulated below

Contour Interval

- ✓ It is based on vertical levels
- ✓ No measurement or scaling is required since the contour levels are indicated on the contour lines
- ✓ In a given map the contour interval is a constant

Horizontal Equivalent

- ✓ Represents horizontal distance
- ✓ The distance must be measured on the map and converted to actual distance by multiplying with the scale of the map
- ✓ The horizontal equivalent varies with slope. Closer distance indicates steep slope and wider distance gentle slope

Types of slope

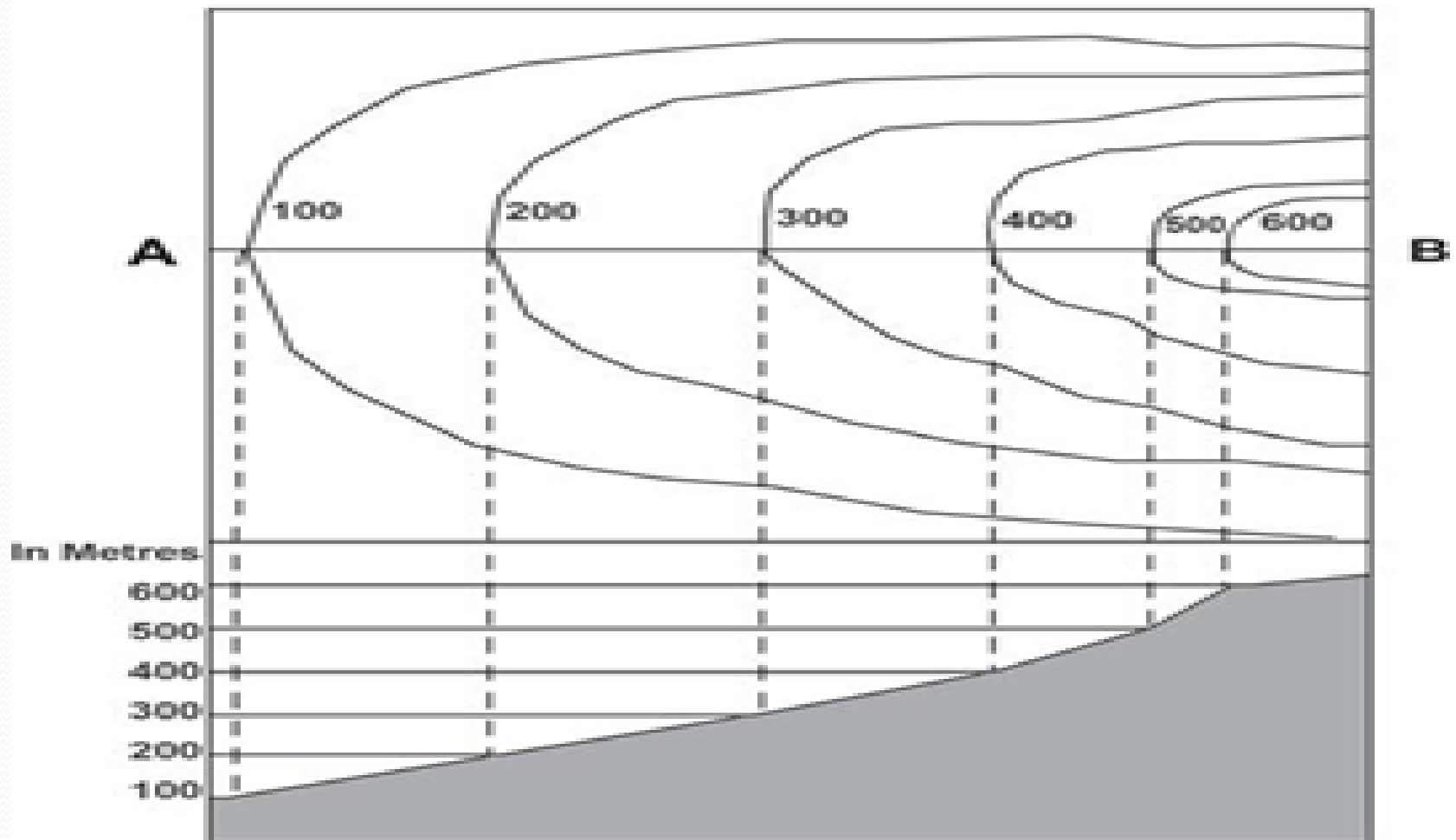
- A **slope** is the rise or fall of the land surface
- Slope is the gradient of land surface.
- **Types of Slope include**
 1. **Gentle slope**
 2. **steep slope**
 3. **Concave Slopes**
 4. **Convex slopes**

1. GENTLE SLOPE

When the degree or angle of slope of a feature is very low, the slope will be gentle. The contours representing this type of slope are far apart



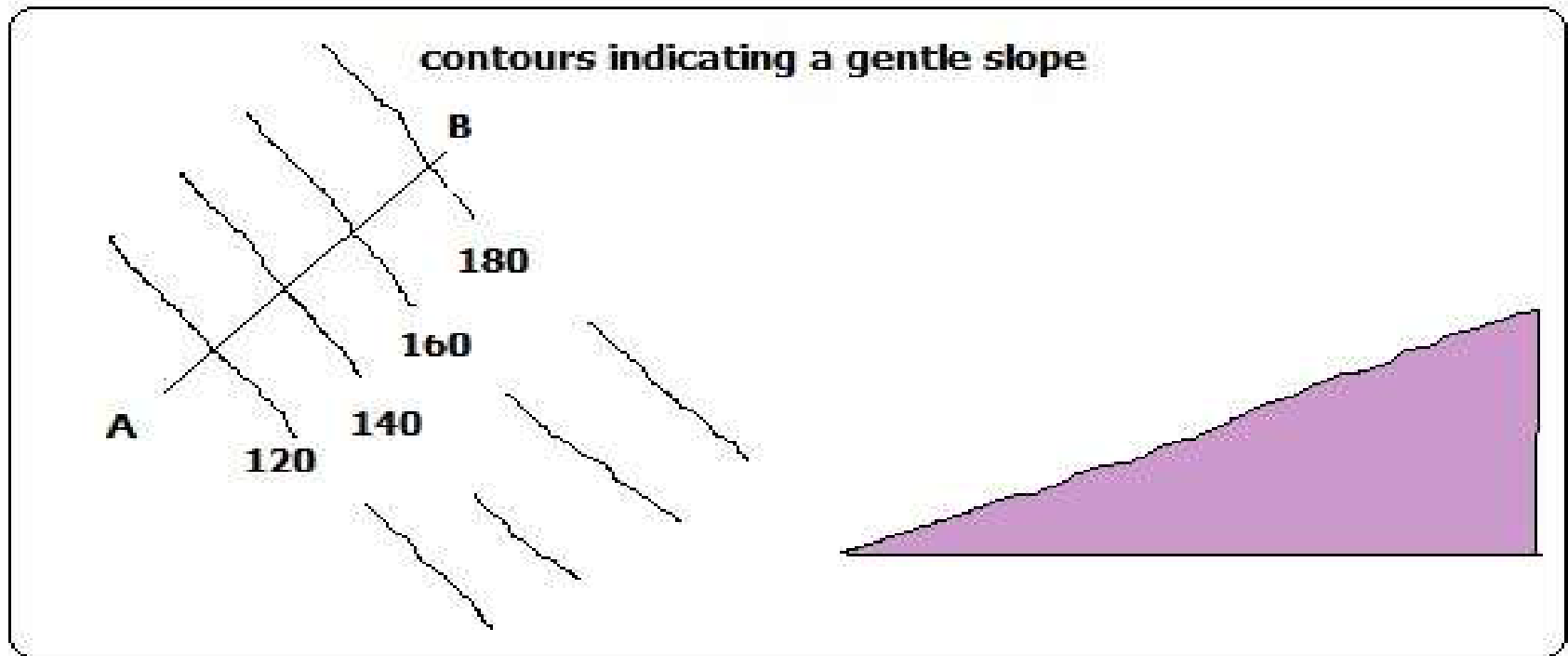
GENTLE SLOPE



Gentle Slope

Gentle slope

- ✓ Gentle slope is one in which land doesn't rise or fall steeply
- ✓ Contours are wide apart

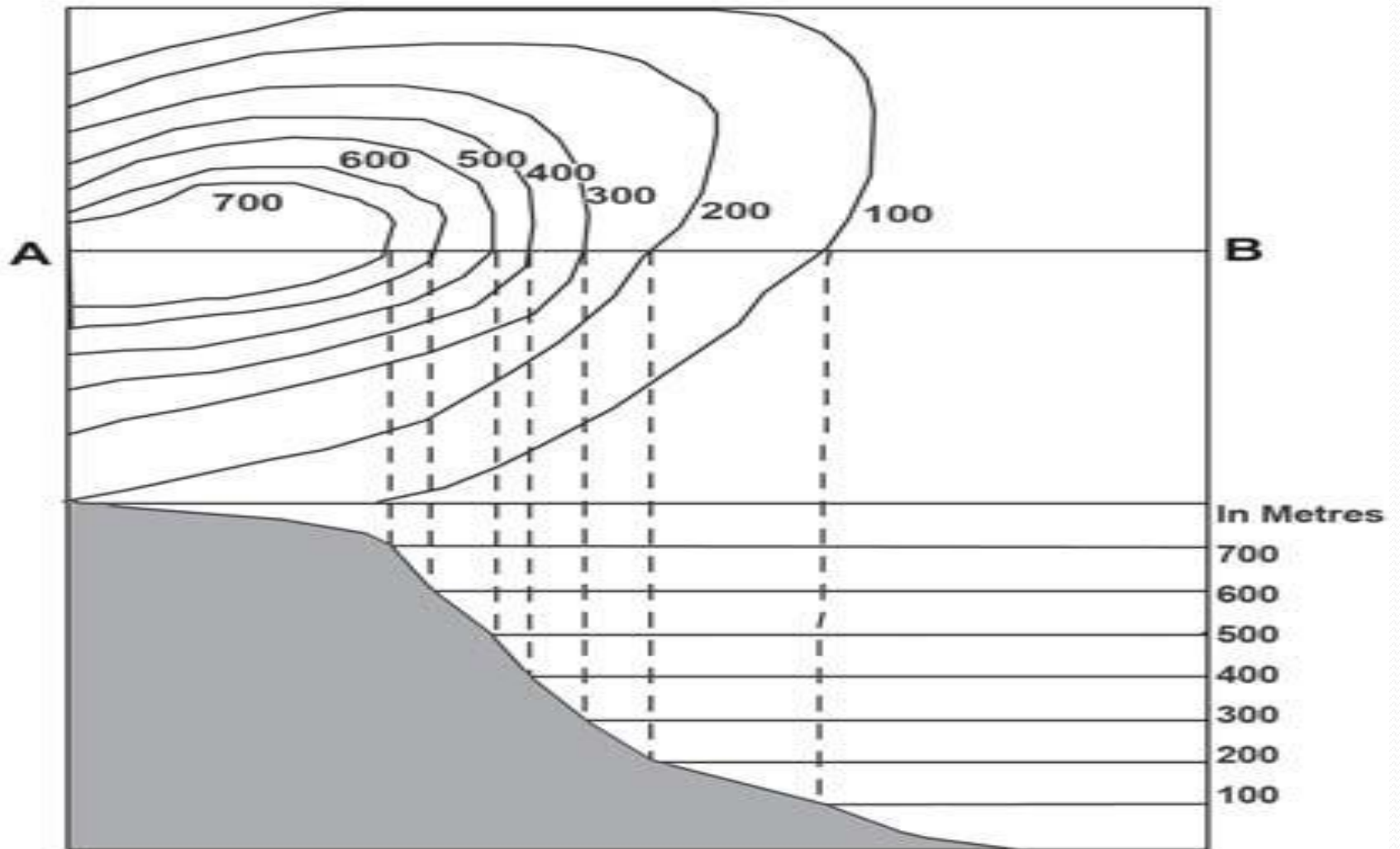


2. STEEP SLOPE

- When the degree or angle of slope of a feature is high and the contours are closely spaced, they indicate steep slope.



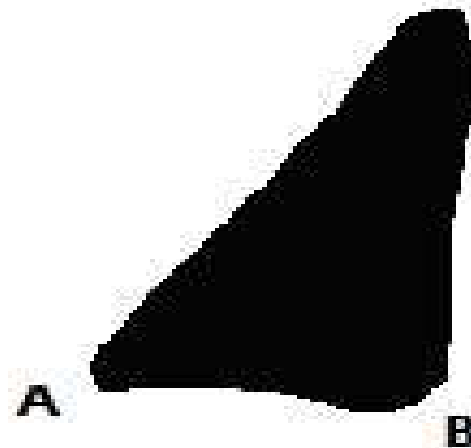
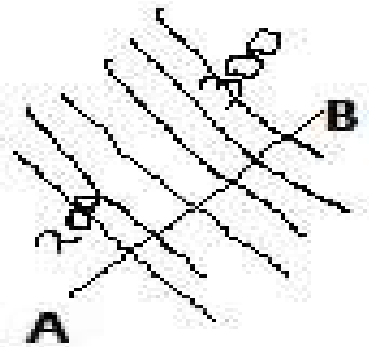
STEEP SLOPE



Steep slopes

- ✓ Where land rises or falls sharply
- ✓ Contours are close to each other

steep slopes

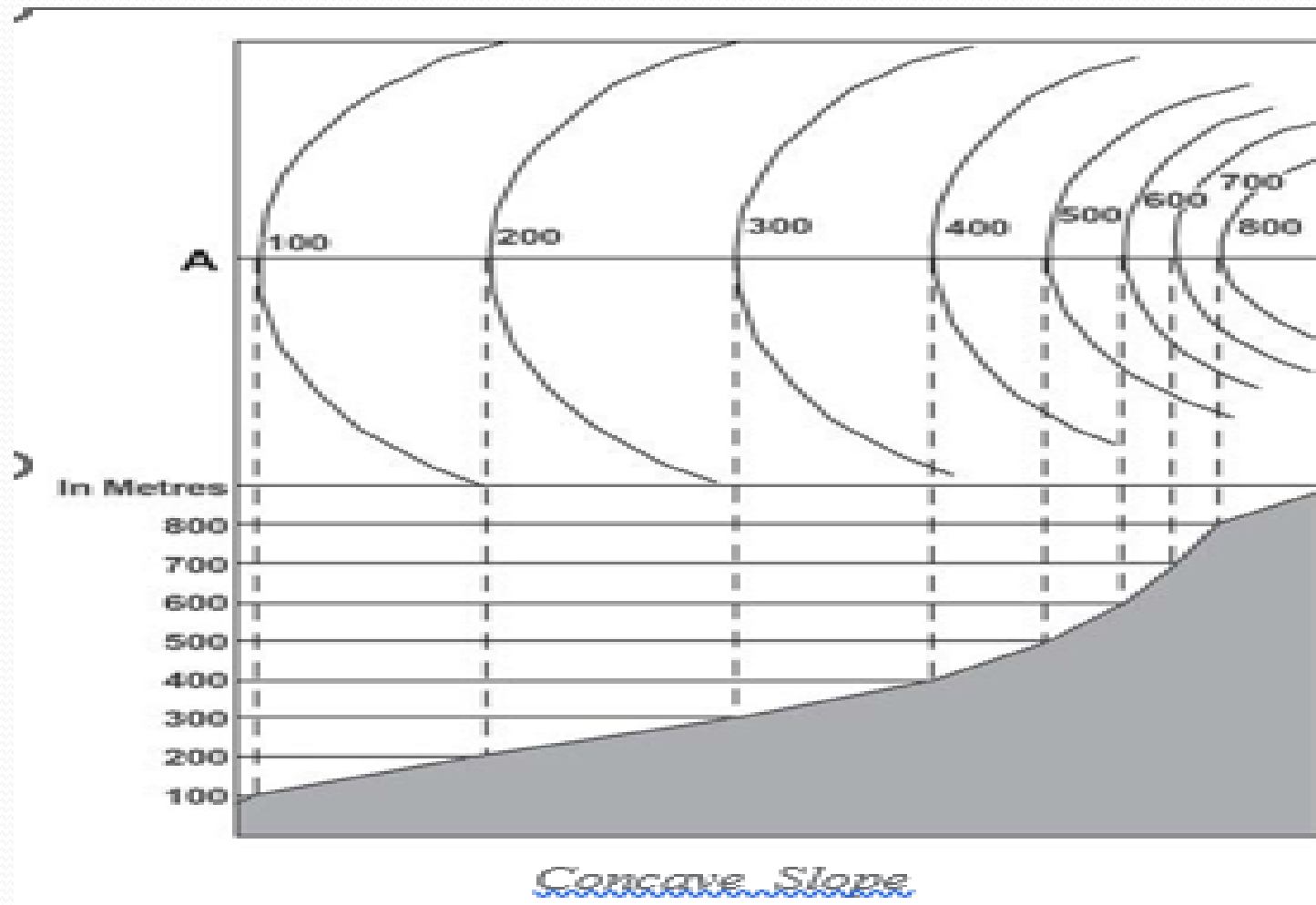


3. CONCAVE SLOPE

- A slope with a gentle gradient in the lower parts of a relief feature and steep in its upper parts is called the *concave slope*.
- Contours in this type of slope are widely spaced in the lower parts and are closely spaced in the upper parts.



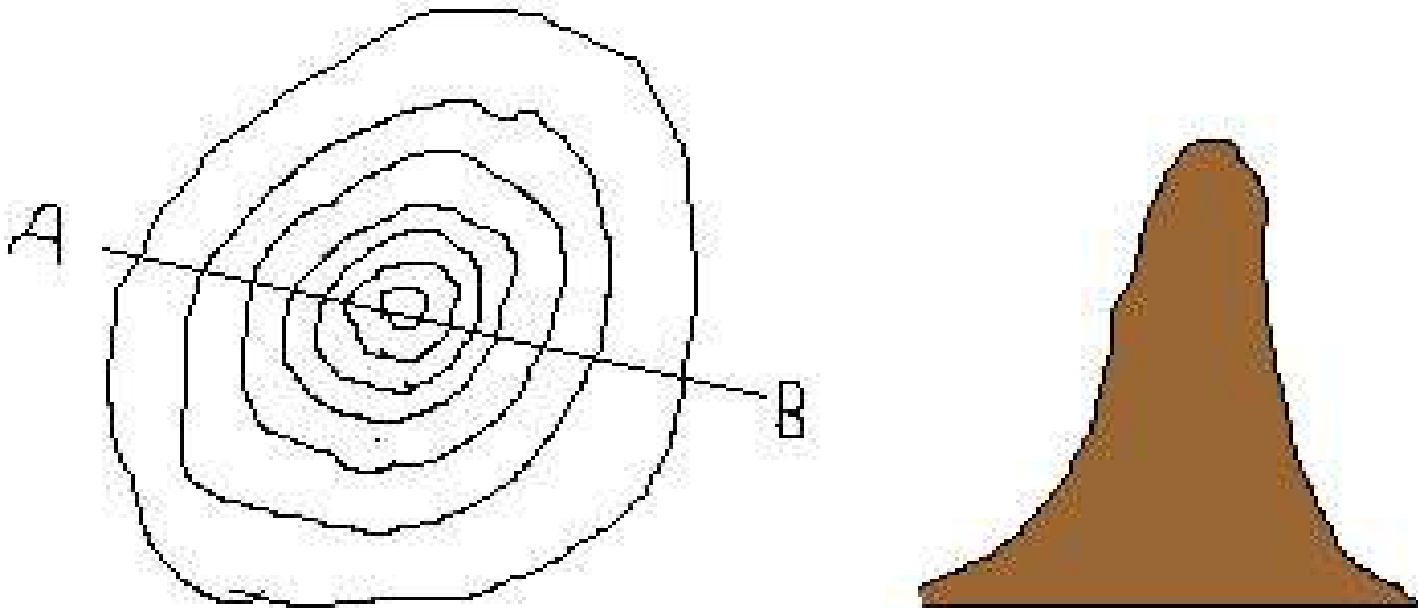
Concave slope



Concave Slopes

- ✓ Contours are close together at the top and widely spaced at the bottom.

Contours indicating a convex slope

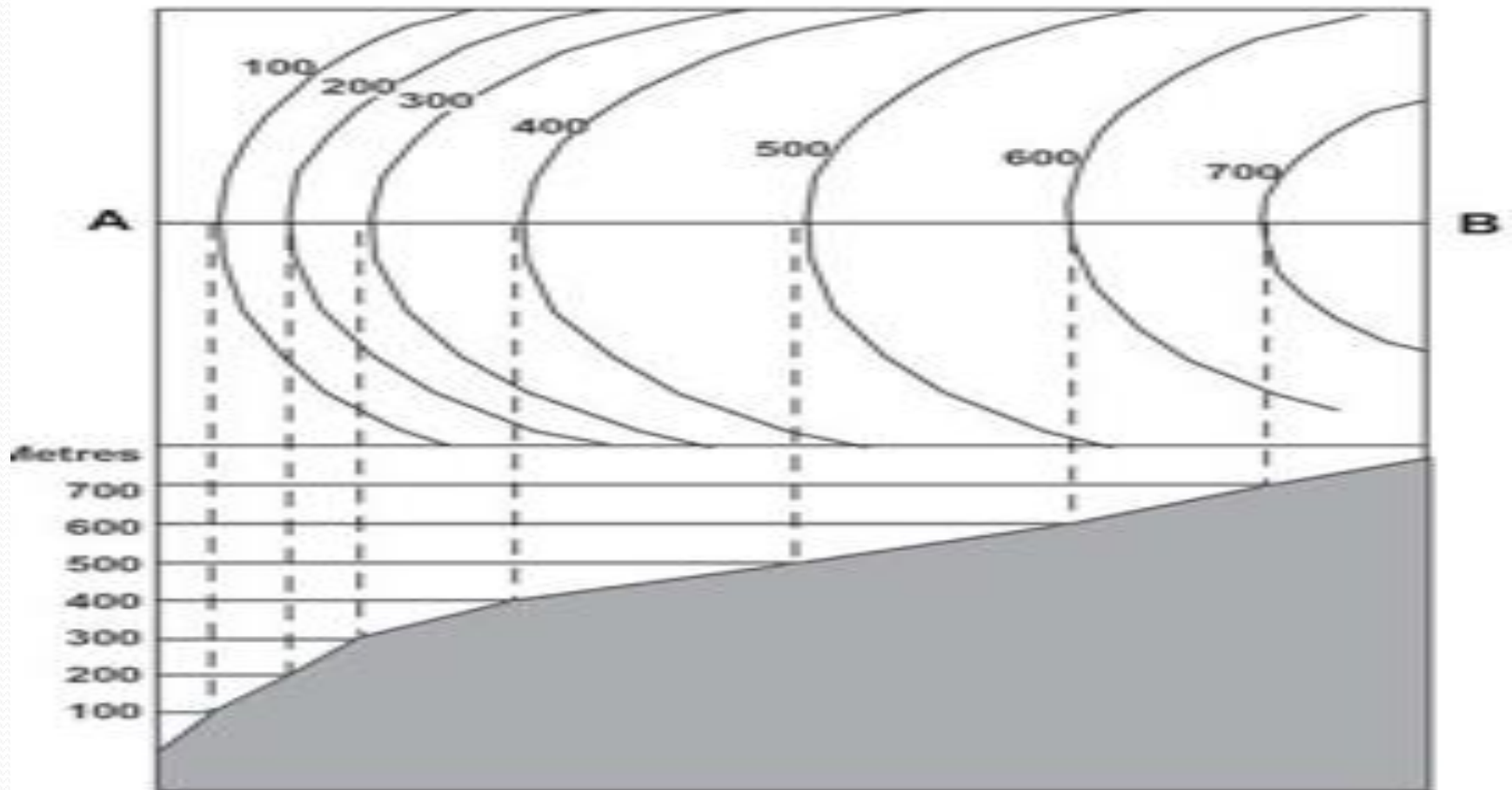


4. CONVEX SLOPE

- Unlike concave slope, the *convex slope* is fairly gentle in the upper part and steep in the lower part. As a result, the contours are widely spaced in the upper parts and are closely spaced in the lower parts



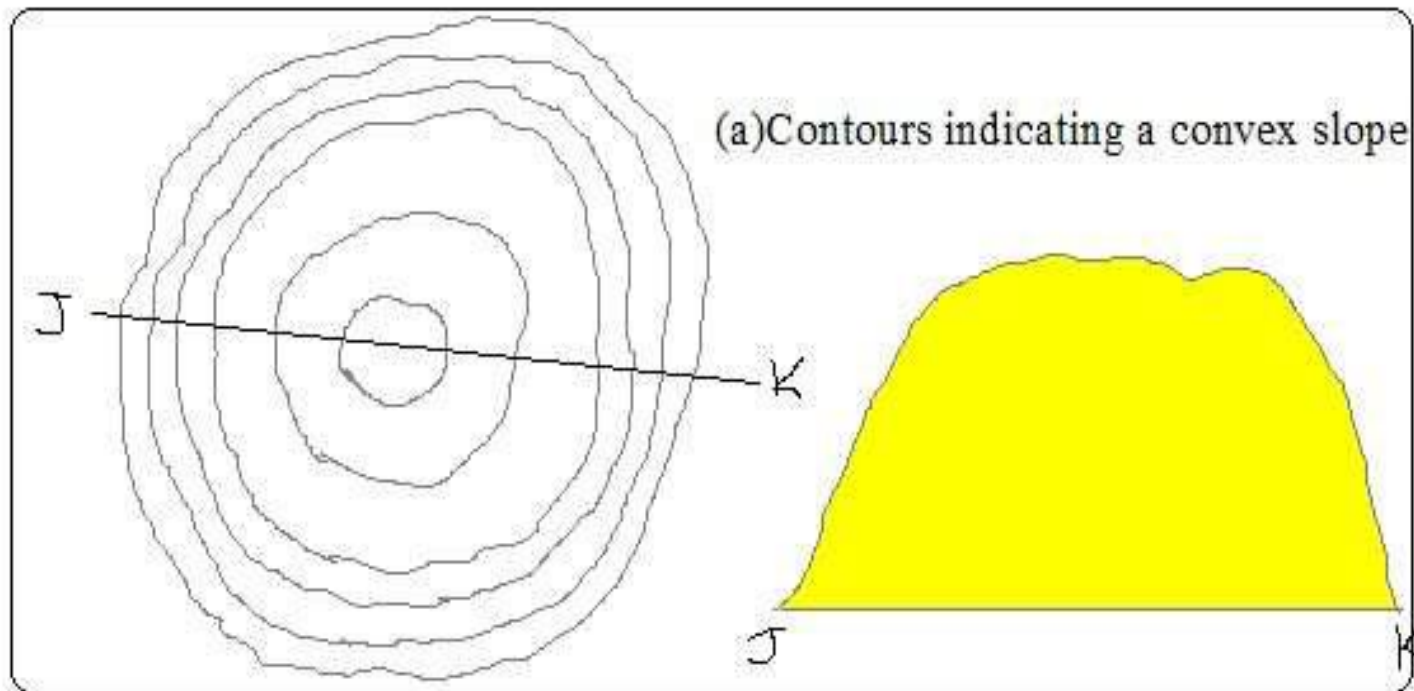
Convex Slope



Convex Slope

Convex slopes

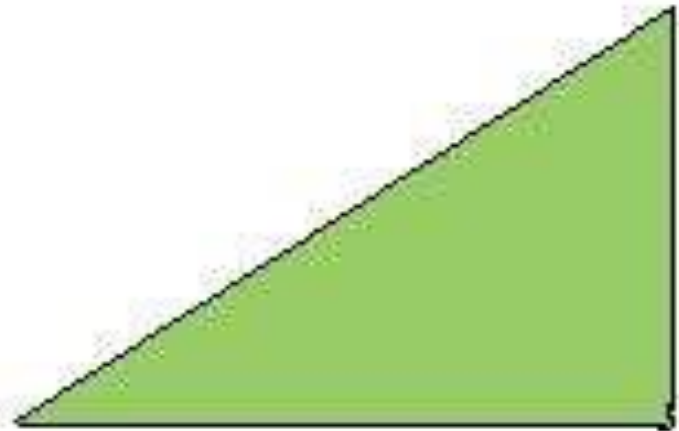
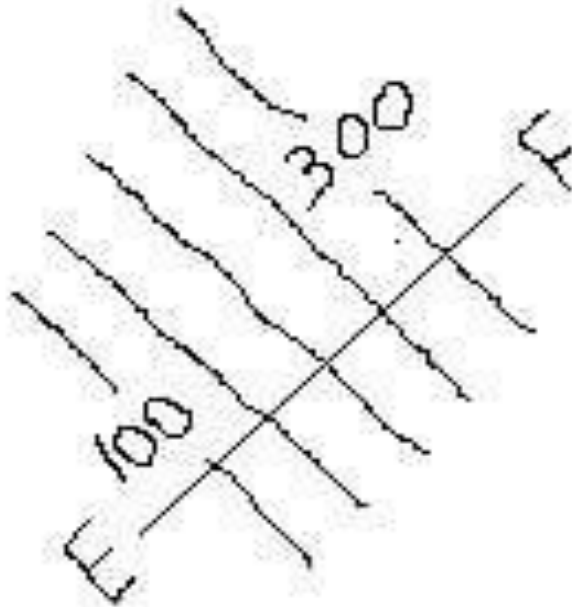
Indicated by contours which are close together at the bottom and widely spaced together at the top



5. Even slopes

- ✓ Shown by contours, which are evenly spaced

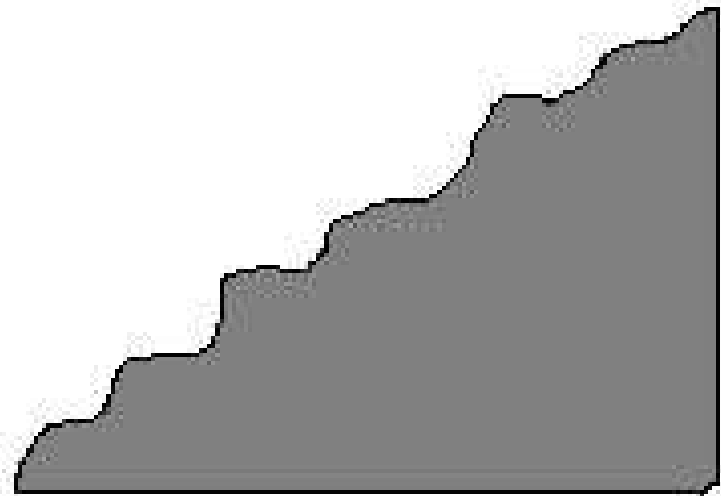
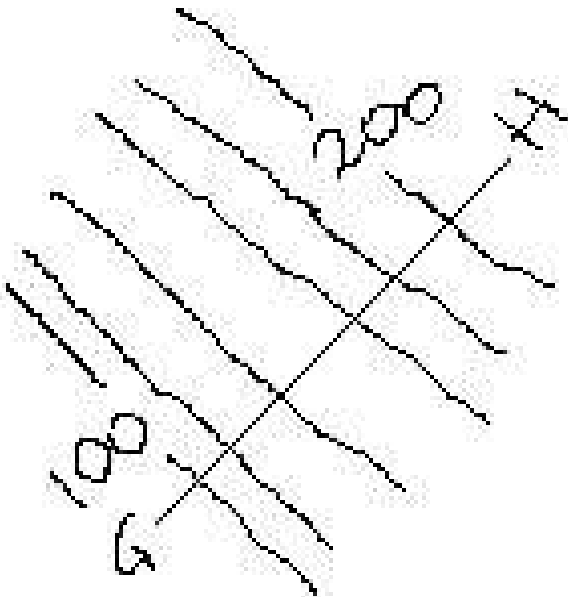
(a) Contours indicating a regular slope



6. Uneven Slopes

- ✓ Indicated by unevenly spaced contours

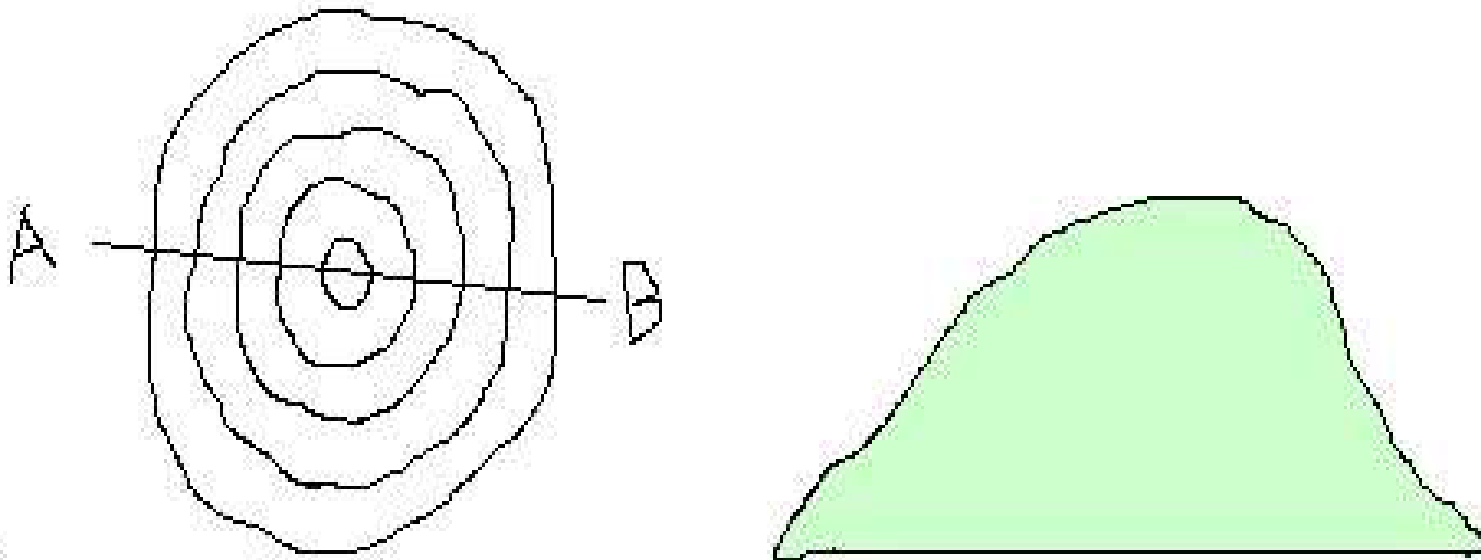
Contours indicating an irregular slope



Conical hills

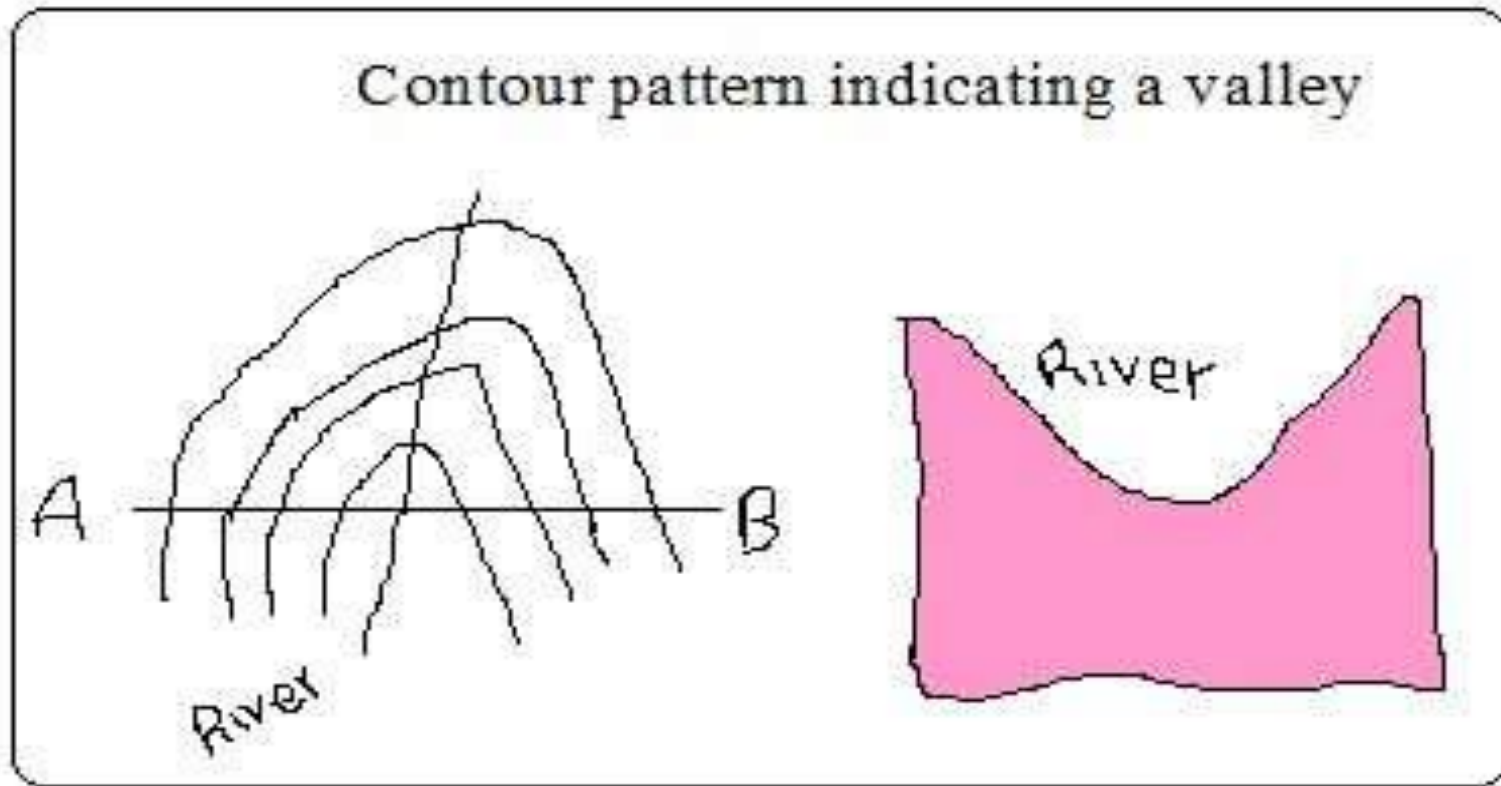
- ✓ Hills are uplands which rise above relatively lower ground
- ✓ Conical hills are small rounded hills

Contour pattern indicating a conical hill



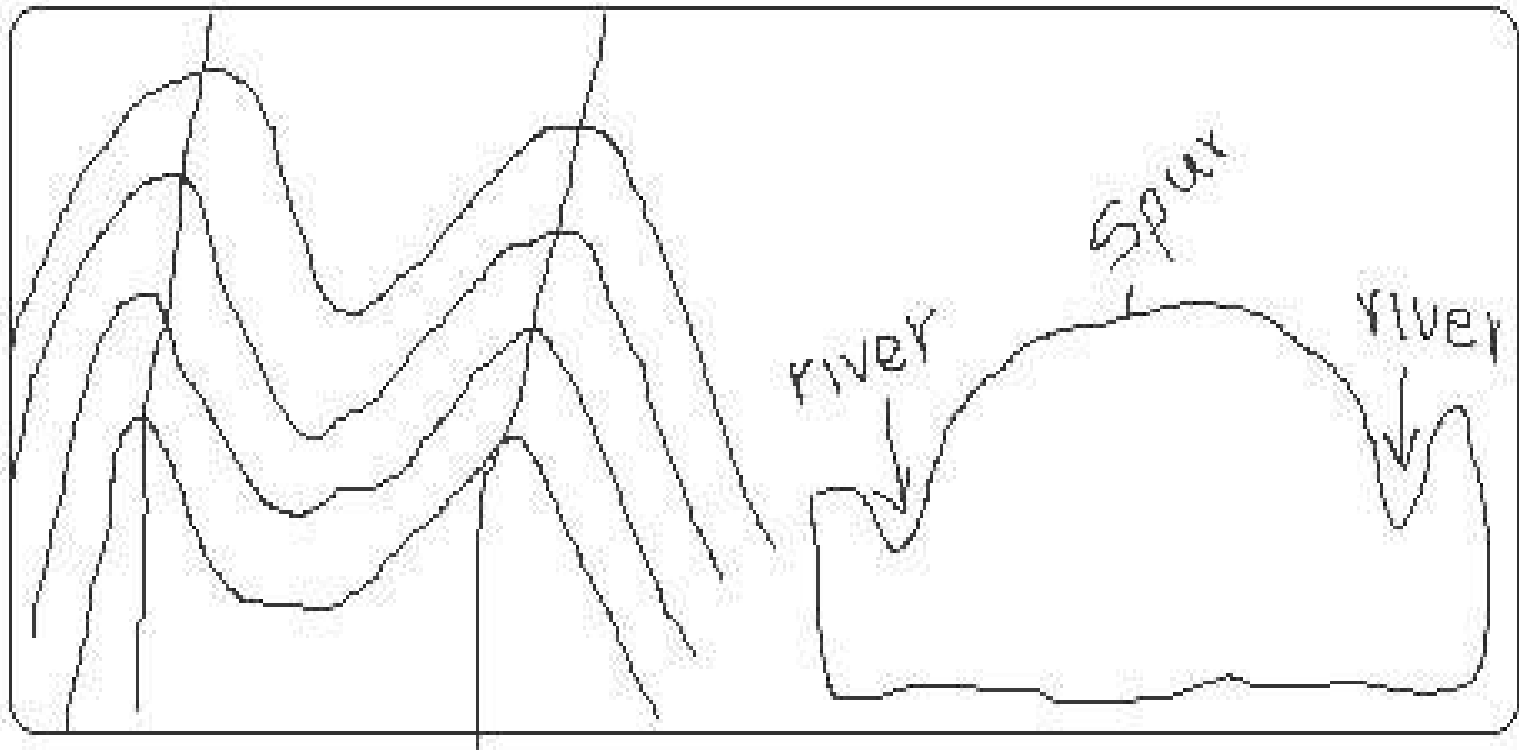
A Valley

- ✓ A low area between higher grounds.
- ✓ Indicated by U-shaped contours pointing towards a



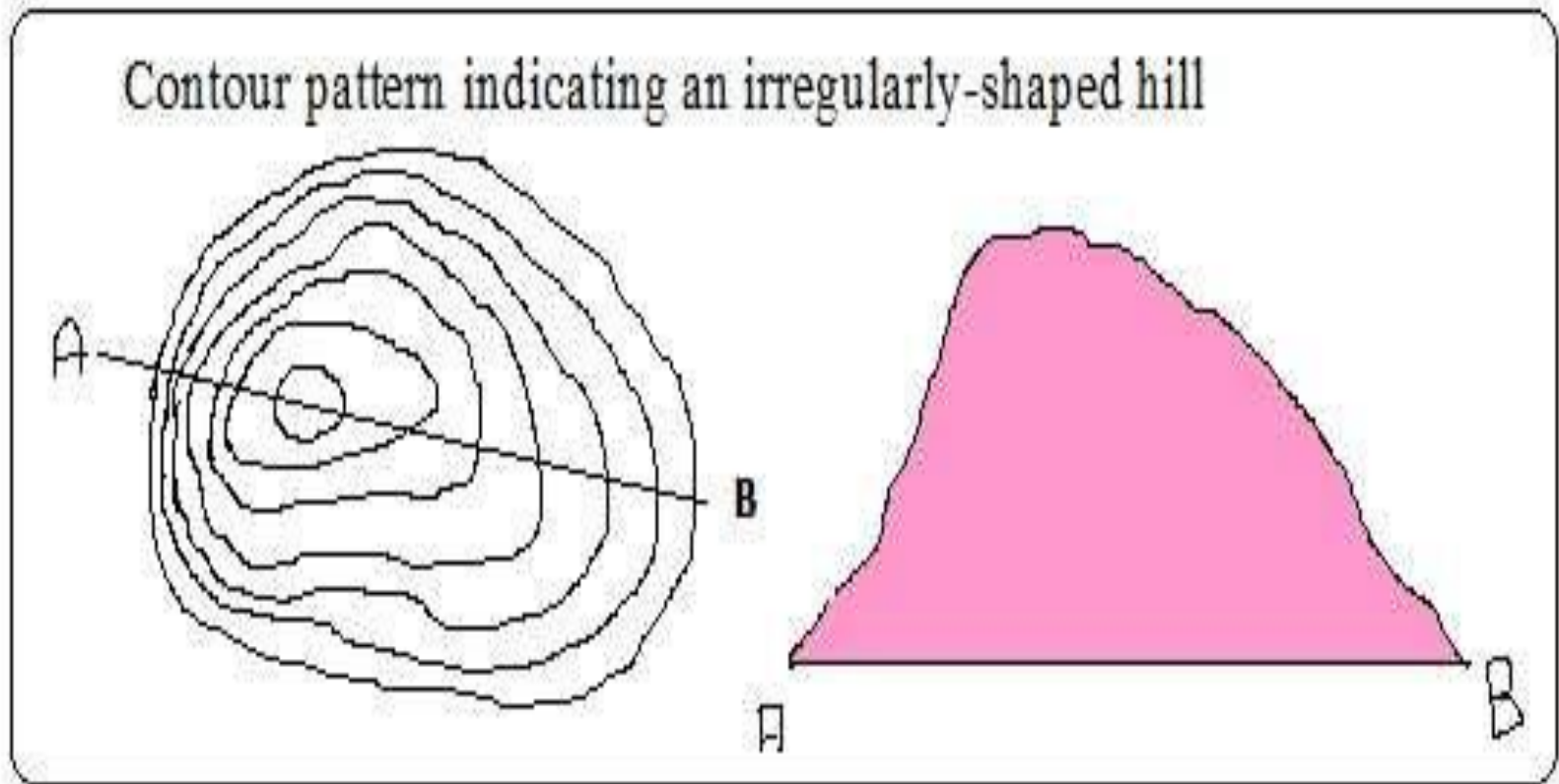
A Spur

- ✓ Land which is projected from high to low ground.
- ✓ Indicated by U-shaped contours bulging towards lower ground



Irregular Shaped Hills

- ✓ A hill with some sides with uneven gentle and others with uneven steep slopes



Other methods representing relief

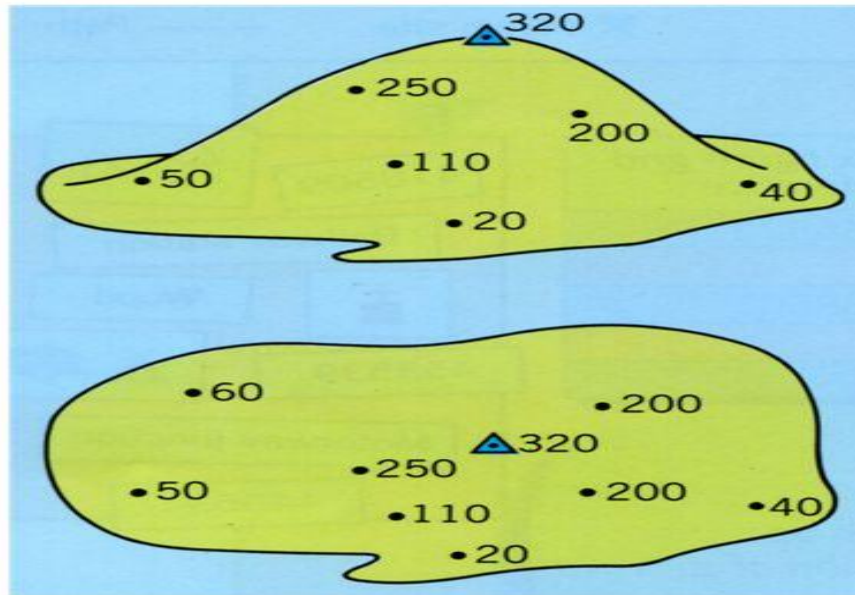
Relief is the variation in elevation of the earth's surface.

There are other several methods showing the relief representation. And they are :

1. **Spot heights.**
2. **Color layer system.**
3. **Hill shading.**
4. **Hachures.**

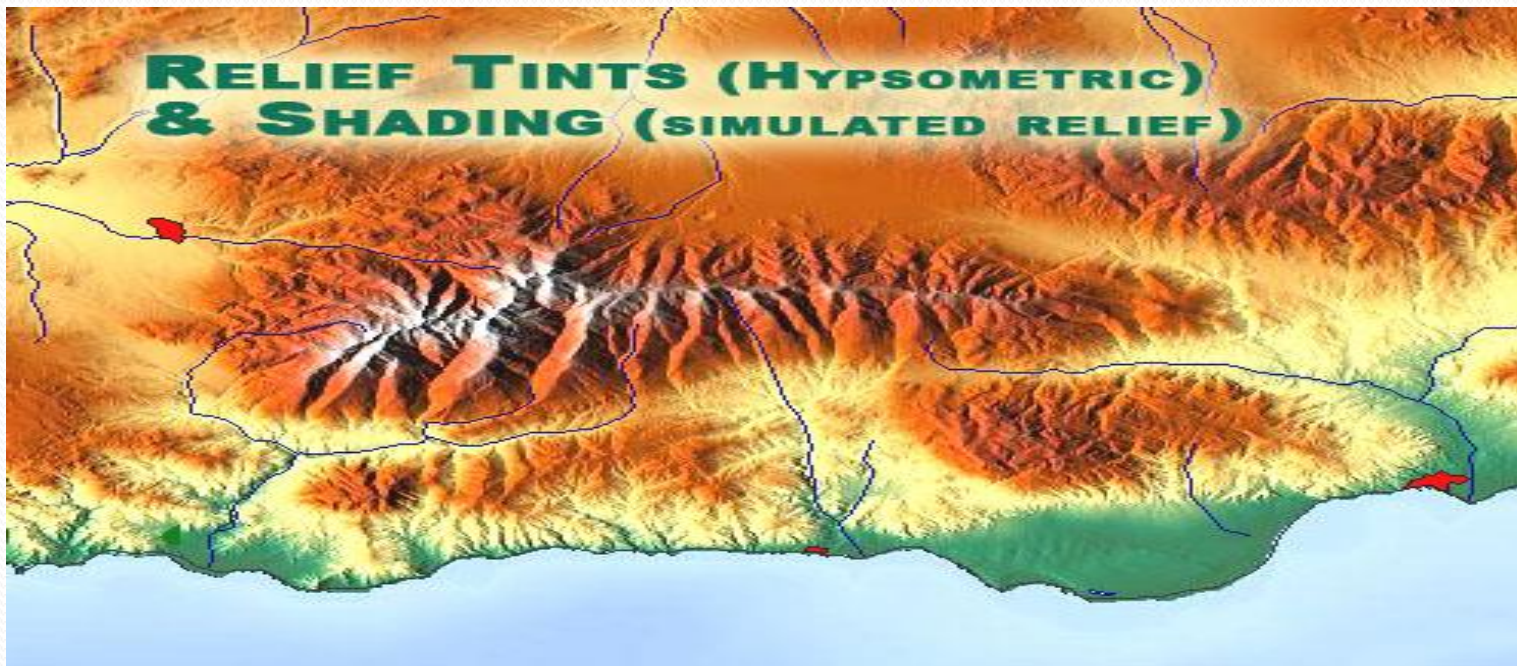
1. Spot height

- **A spot height shows exact heights by a black dot with a number next to it. The number is the height above sea level in meters.**
- **Spot heights are depicted using a dot (or triangle).**



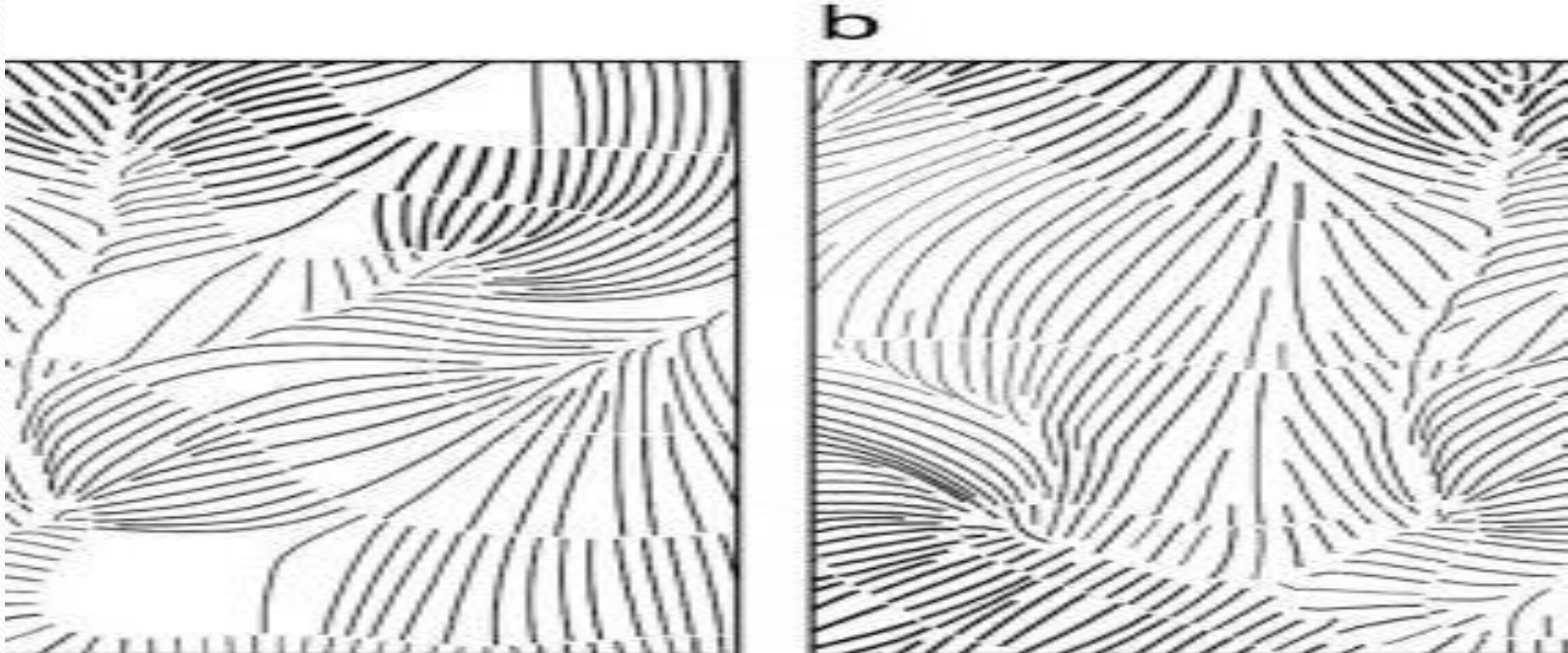
2. Layer tinting(Coloring)

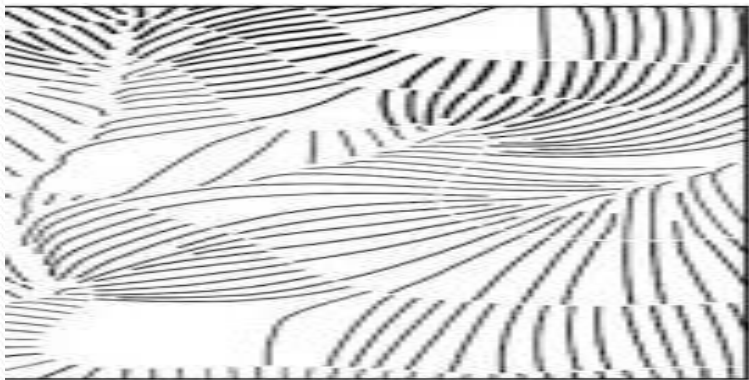
- **Layer tinting uses different colours (or shades) to represent different heights.**
- **When using layer tinting, green is often used for low land, yellow for higher land and brown for the highest land.**



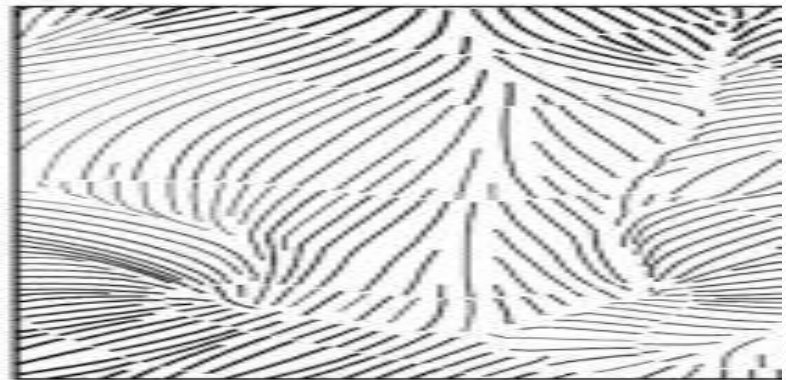
4: Hachures

- **Hachures are strokes (short line segments or curves) drawn in the direction of the steepest slope.**
- **Steeper slopes are represented by **thicker, shorter strokes**, while **gentler slopes are represented by thinner, longer and farther apart stroke****





b



Gradient

Gradient refers to the degree of slope or the steepness of the slope between any two given points. It can be expressed as a ratio of the vertical rise to the horizontal distance between the two points.

Gradient = *vertical interval(VI)*
horizontal equivalent(HE)

Example :

Calculate the gradient of line AB. let's us assume that the distance is 8cm. 1:50.000

Solution

- **Solution:**
- If the scale of the map is 1:50,000, then 1cm represents 50,000cm on the actual ground.
- Therefore, the 8cm we have obtained is $8 \times 50,000 = 400,000\text{cm}$. This is equivalent to 4000m.
- Difference is height between the two points using the contours from the picture is $(1000 - 200\text{m} = 800\text{m})$

$$\begin{aligned}\text{Gradient} &= \text{VI/HE} \\ &= 800\text{m}/4000\text{m} \\ &= 1/5\end{aligned}$$

