

Geological Map

PURPOSE: To be able to understand, visualize, and analyze geologic maps

Geologic maps show the distribution of the various igneous, sedimentary, and metamorphic rocks at Earth's surface in plan view. The contacts between different geologic formations and the various structures that occur in the rocks are typically superimposed upon the contour lines of topography in the map area.

Geologic cross sections often appear with geologic maps. They are diagrams illustrating the distribution of geologic units in the vertical dimension along a line through the map area. They may also show the topographic profile of the land surface. .

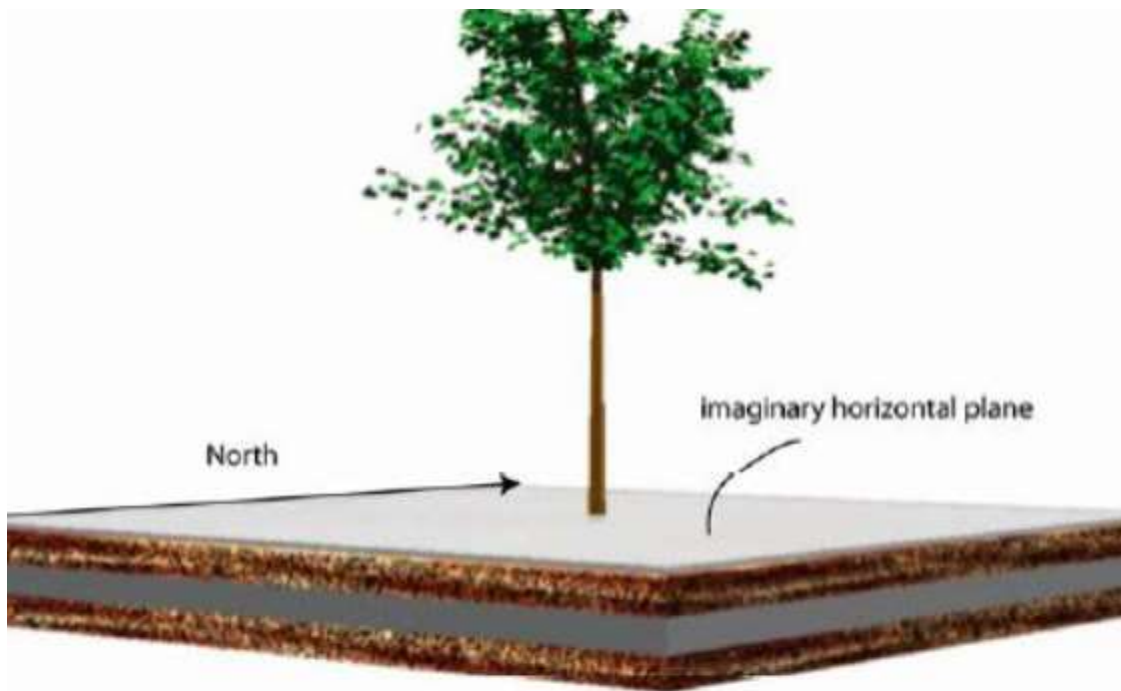
Geologic column is also diagram illustrating the vertical distribution of geologic units based on their true thickness in the map area.

Legend or **Key** is also found accompanying geologic maps. The formations are presented and described in chronological sequence, with the oldest unit at the bottom and the youngest unit at the top.

Contacts are the boundaries between different rock types or formations. Contact lines on a map separate and mark the boundary between two adjacent geologic formations. Contacts are curvilinear features in 3-D that are represented as lines on a map where they intersect the topographic surface.

Outcrops are those places where a geologic formation is exposed at the Earth's surface. Three factors control the width of a formation's outcrop on a geologic map: 1) the formation's thickness; 2) the slope of the land in the area of an outcrop; and 3) the dip angle of the beds in the formation.


Horizontal beds (Formations) are beds originally deposited as a series of horizontal layers one on top of another. If contour lines AND contact lines parallel one another on map, the beds are nearly horizontal (approximately a 0° dip).



Three layers stacked one on top of the other. Based on the Principle of Superposition layer 1 is the youngest and layer 3 is the oldest. Based on the Principle of Original Horizontality the three layers have been deformed as the angle between the imaginary horizontal plane and the ground surface increases.

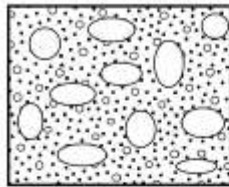
Strike and Dip Symbols

Strike and dip are a way of representing the three-dimensional orientation of a planar surface on a two-dimensional map. The strike is the compass direction of a horizontal line on the plane. All the horizontal lines on a plane are parallel, so they all have the same characteristic compass direction. The dip is the angle at which the plane slopes downhill from the horizontal, at its maximum slope, which is at right angles (90°) from strike.

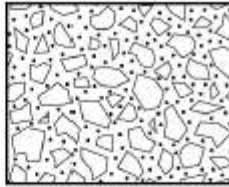
Map Symbol	Definition	Explanation of symbol
	horizontal beds	<ul style="list-style-type: none"> because the bed is horizontal it strikes in all directions because the bed is horizontal, the dip is 0%

[Lithologic patterns are usually reserved for use on stratigraphic columns, sections, or charts]

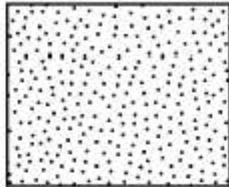
Rock lithologic patterns



conglomerate



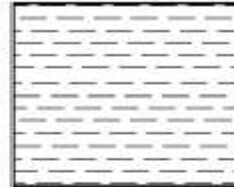
Breccia



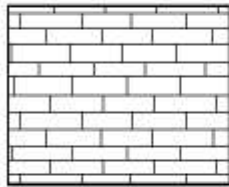
sandstone



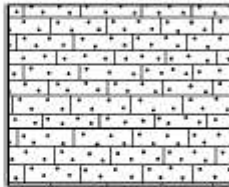
siltstone



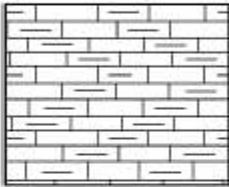
Clay or shale



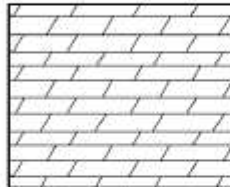
Limestone



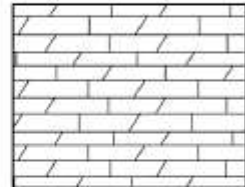
Sandy limestone



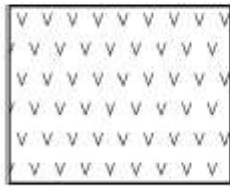
Argillaceous or shaly limestone



Dolostone or dolomite



Dolomitic limestone



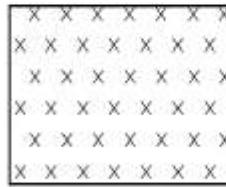
Gypsum or anhydrite



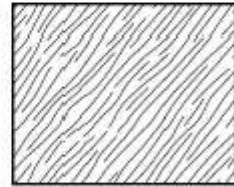
Coal



Soil

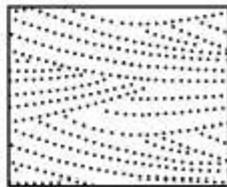


Igneous rock

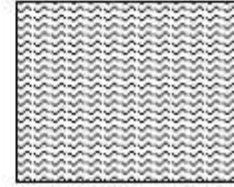


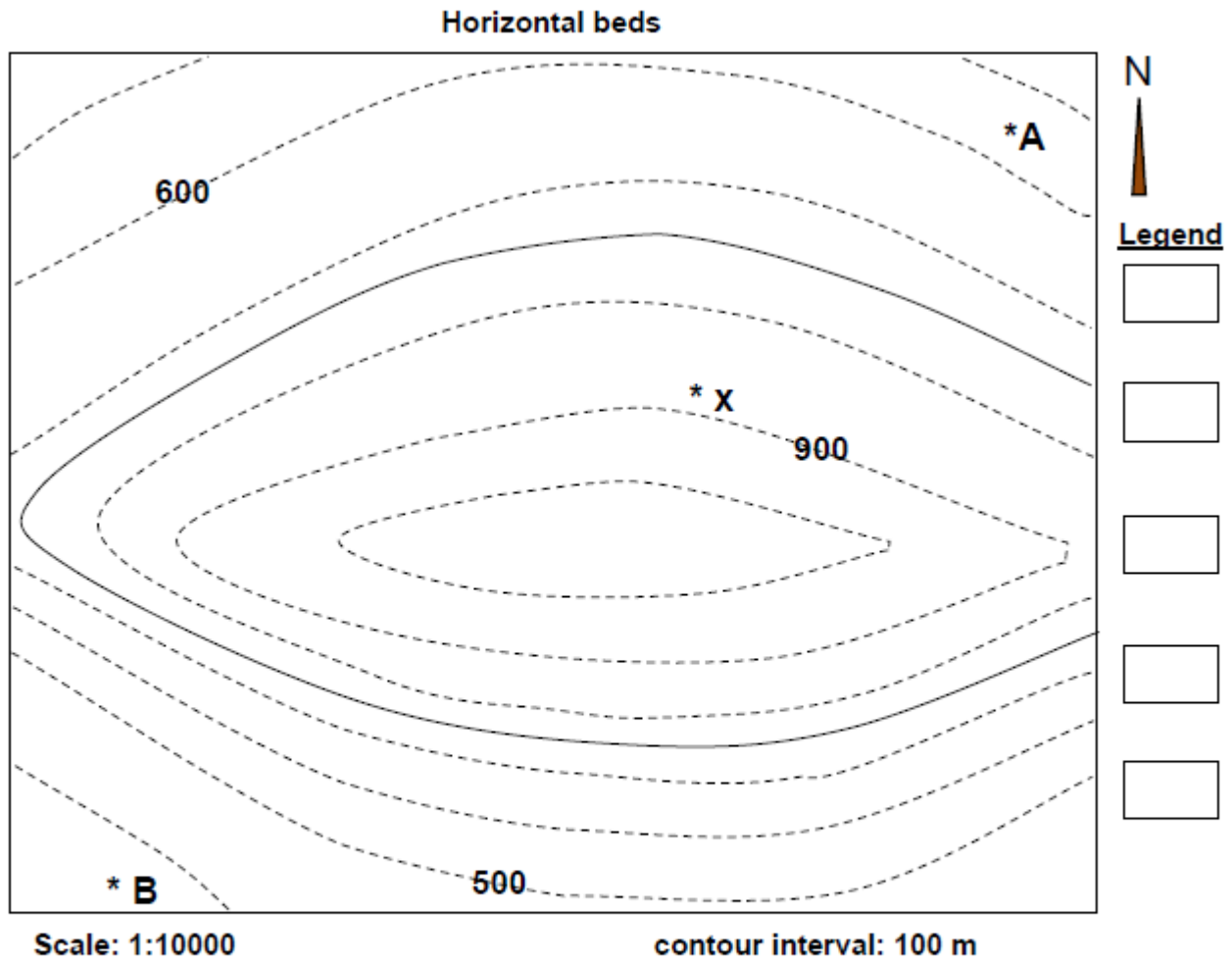
Schist

Crossbedded sandstone



Marl stone





In this map, the lower boundary of conglomerate crops out at the elevation of 900 m, and this conglomerate forms the top of the main feature in the area. The solid line represents the contact between lower boundary of sandstone bed (with thickness of 150 m) and upper boundary of siltstone bed (with thickness of 100 m). Point A represents the contact between shale bed, which is covered by the siltstone bed, and upper boundary of limestone bed, which is covered the remained area on the map. The beds are horizontal.

Requirements

1. Complete the map by drawing the outcrops of the beds.
2. Fill the legend by suitable lithologic symbols of the beds and write the name of them.
3. On the grid, construct the geologic cross-section along line B-A, and then determine the orientation of the profile line.
4. On the grid, construct the geologic column of the beds.
5. What is the elevation of point X .
6. Describe the main topographic feature on the map, and then discuss the location of each bed on it.