Practice No.1 Petroleum Geology

Dr Waleed Younis Alubide
University of Mosul
College: Petroleum & Mining Engineering
Dept.: Petroleum & Refining
Class: 1rst Year
Subject: Geology for Petroleum Engineering

Topographic Map:

What are topographic maps and why are they important?

A topographic map is one type of map used by geologists and engineers . Topographic maps are also a basic tool for hikers, planners who make decisions on zoning and construction permits, government agencies involved in land use planning and hazard assessments, and civil engineers. The topographic maps drawn and published by the U. S. Geological Survey portray the grids that are used on deeds to identify the location of real estate, so homeowners and property owners often find it useful to refer to topographic maps of their area.

Topographic maps show the three-dimensional shape of the land. Most topographic maps make use of contour lines to depict elevations above sea level. The contour lines reveal the shape of the land in the vertical direction, allowing the 3-dimensional shape of the land to be portrayed on a 2-dimensional map. When you know how to read contour lines, you can look at a topographic map and visualize the mountains, plains, ridges, or valleys that it portrays.

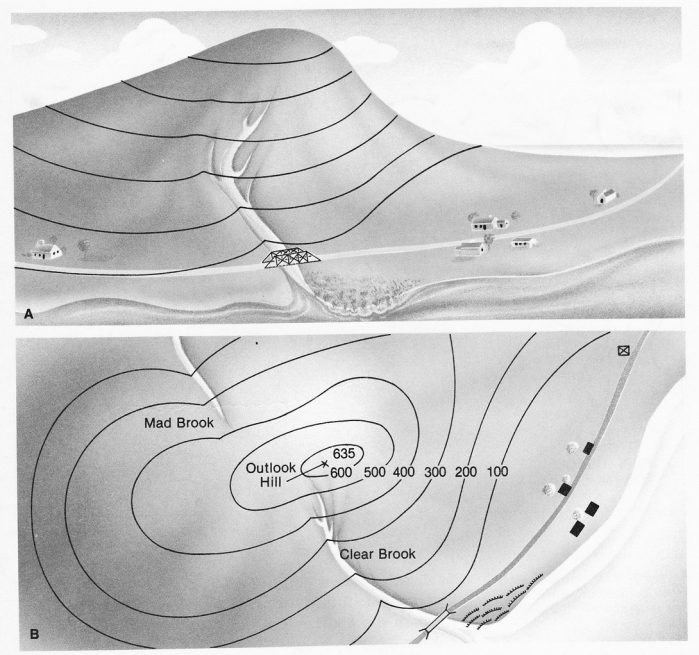
Topographic maps are important in geology because they portray the surface of the earth in detail. This view of the surface shows patterns that provide information about the geology beneath the surface.

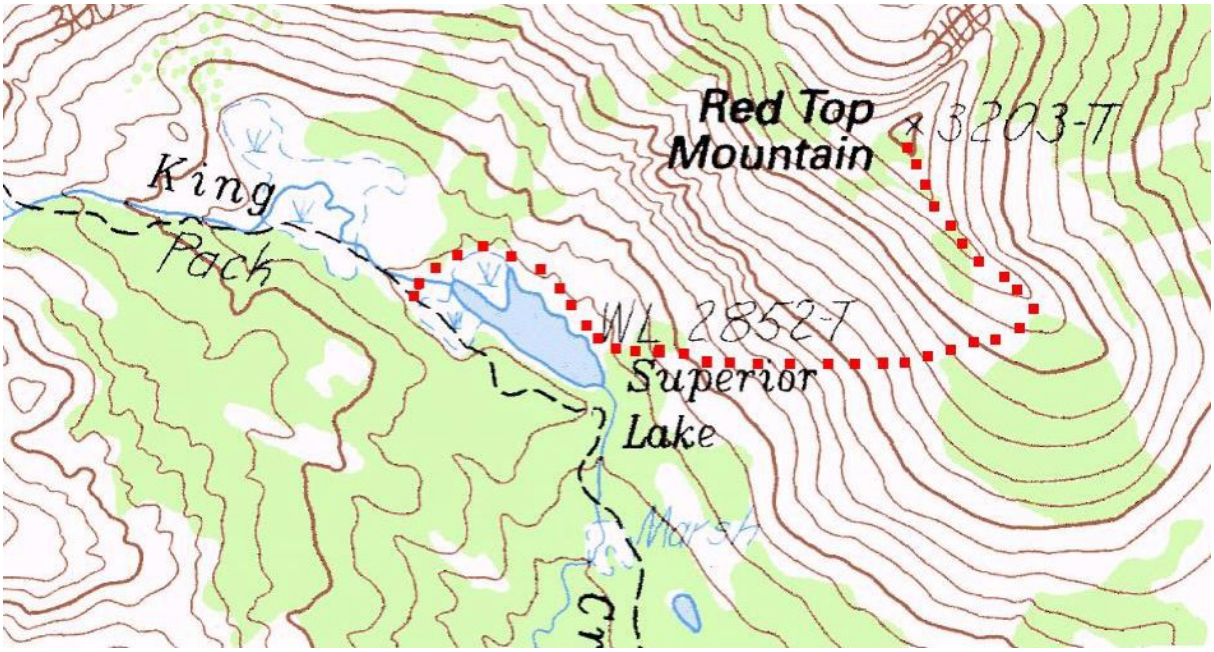
The landforms of the earth result from surface processes such as erosion or sedimentation combined with internal geological processes such as magma rising to create a volcano or a ridge of bedrock being pushed up along a fault. By studying the shape of the earth's surface through topographic maps, geologists can understand the nature of surface processes in a given area, including zones of erosion, zones subjected to landslides, and zones of sediment accumulation. They can also find clues to the underlying geologic structure and geologic history of the area.

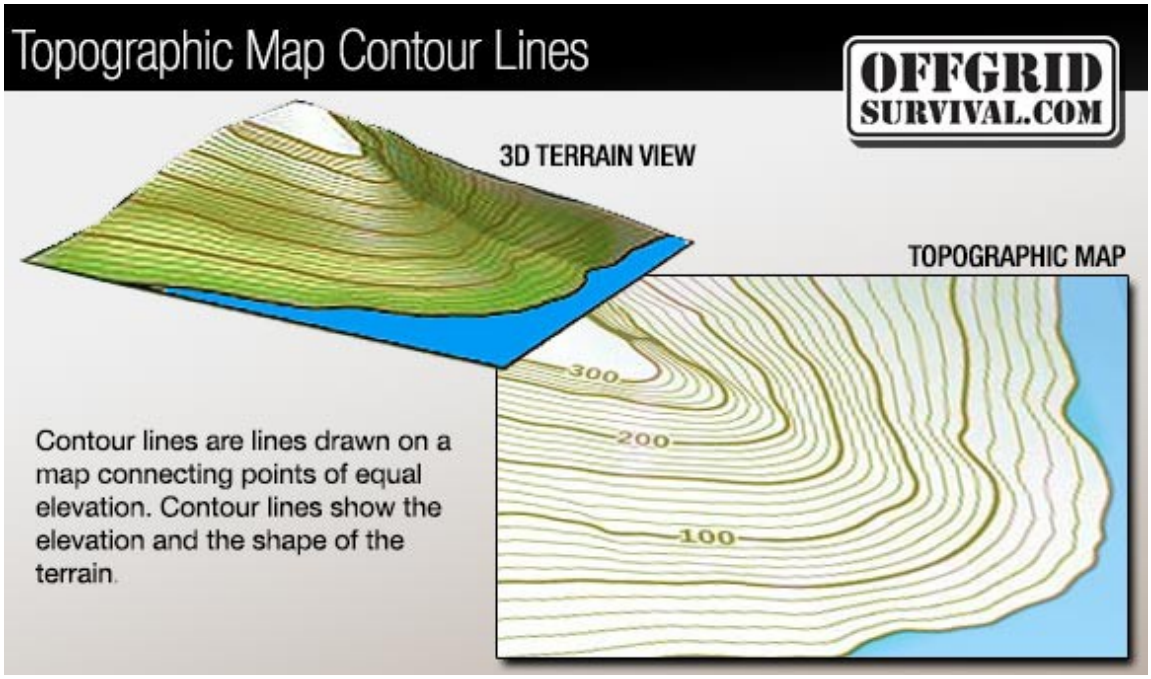
In addition to a topographic map, a complete understanding of the underlying geologic structure and history of an area requires completion of a geologic map and cross-sections. A topographic map provides the frame of reference upon which the geologic map is constructed.

Reading a Topographic Map

Reading a topographic map requires familiarity with how it portrays the three-dimensional shape of the land, so that in looking at a topographic map you can visualize the shape of the land. To read a topographic map, you need to understand the rules of contour lines.







Contour interval :the vertical spacing between adjacent contour lines.

Some Rules for Contour Lines

1. On a topographic map, a contour line is a line of constant elevation. For example, every point on a 200-foot contour line represents a point on earth that is 200 feet above sea level.

2. Contour lines never intersect. (A point on the surface of the earth cannot be at two different elevations).

3. A constant specified vertical distance called the contour interval separates each contour line from adjacent contour lines. A commonly used contour interval is 40 feet. On a map with a 40-foot contour interval, the elevation difference between two contour lines that are next to each other is 40 feet, regardless of the physical distance between the two lines on the map.

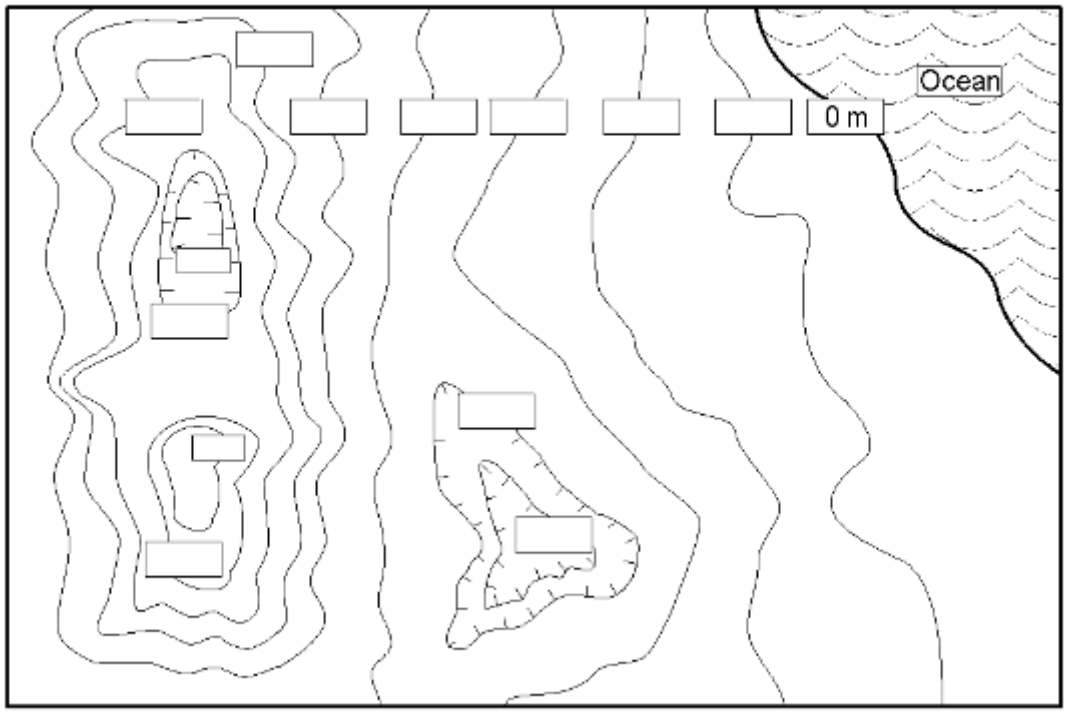
4. Points lying between contour lines must be interpolated to find the elevation. For example, a point lying midway between the contours 5440 and 5480 would be 5460 feet above sea level. (Assuming that the contour line elevations are given in feet and the contour interval is 40 feet.)

5. Contour lines curve up stream when they cross a valley (and down hill as they cross ridges).

6. Where contours are close together, the topography is steep; where they are far apart, the slopes are gentle.

Part 1

Label the elevation of the contours on the map below. Watch out for depressions with repeated contours! (13 pts)



Contour Interval = 20 m

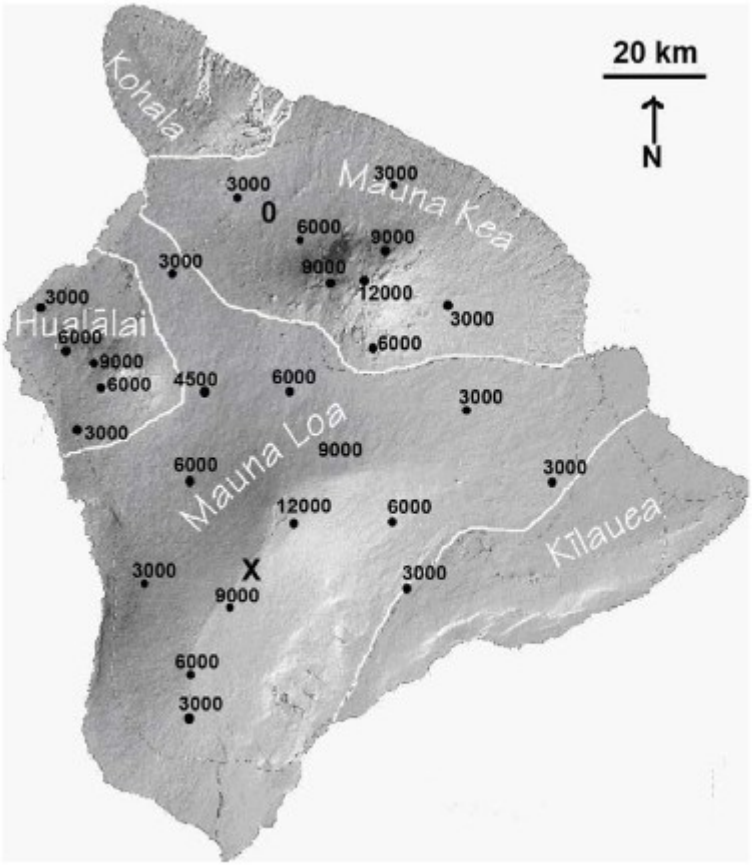
Part 2

The shaded relief map to the right provides elevation measurements across Mount Mauna Loa, an active Hawaiian volcanic island. Using a 3000 m contour interval, draw and label the contour lines across the island. Sea level elevation = 0 m. Don't forget about the rule of V's! (2 pts)

Estimate the elevation of location X by interpolating between the contour lines.

X = _____m (2 pts)

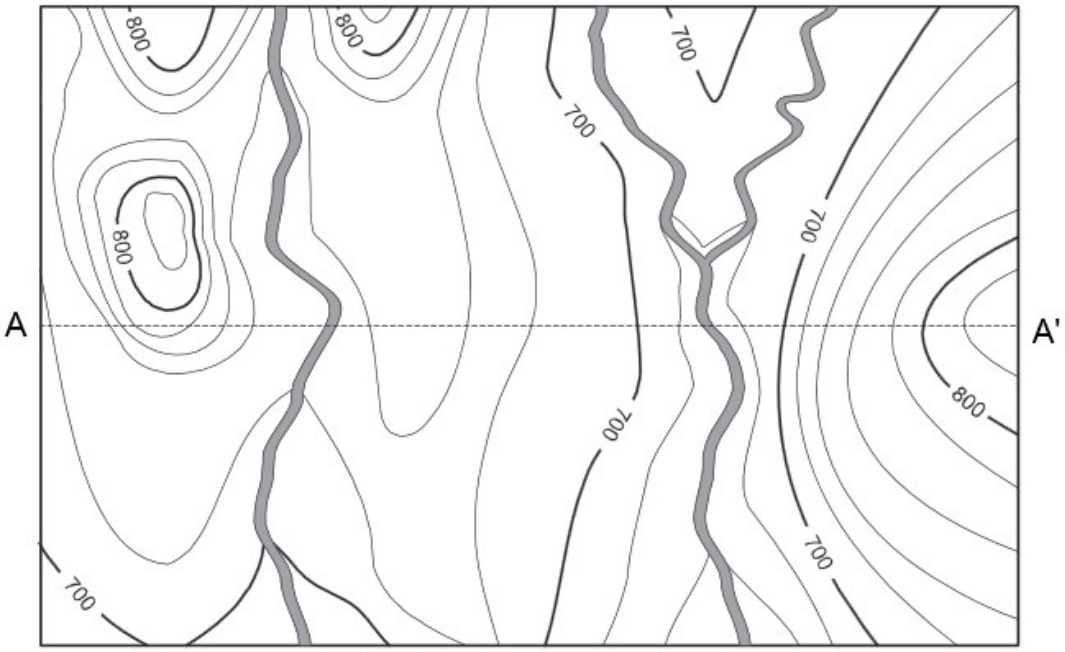
(Shaded relief model and elevations across Mauna Loa from Temple University www.temple.edu/geology)



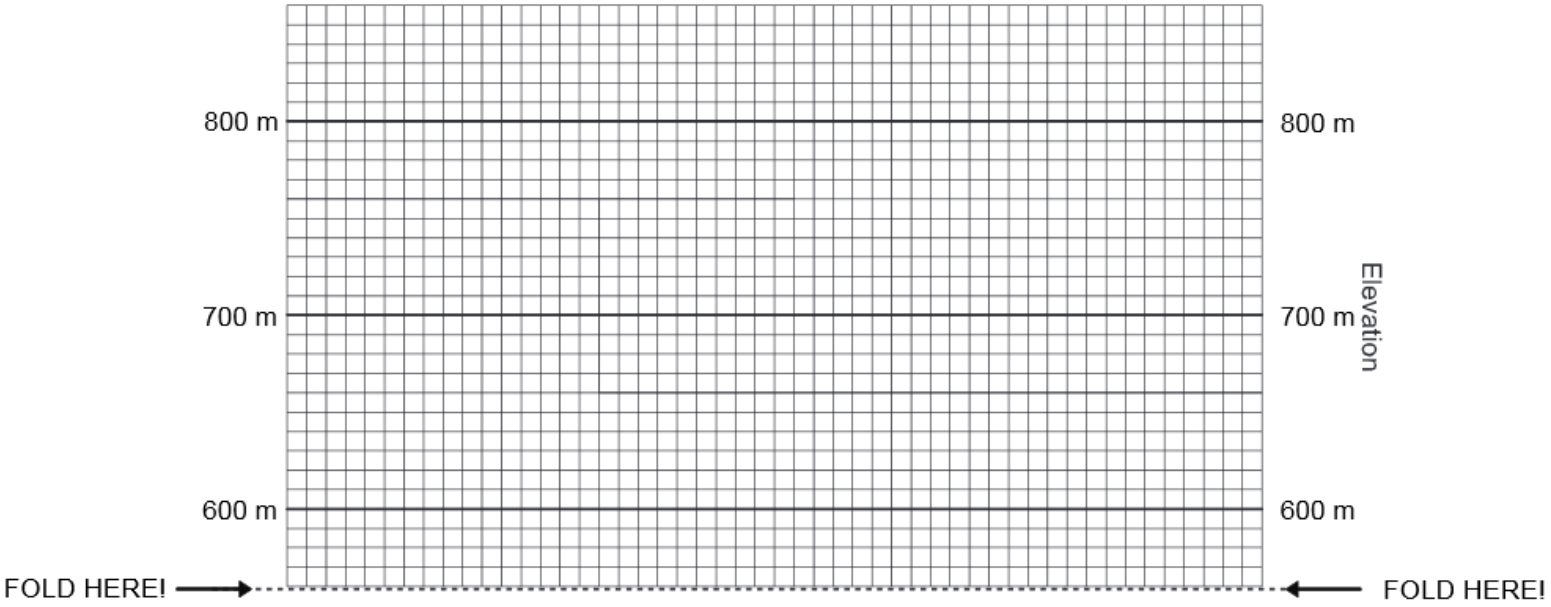
Part 3

Topographic Map:

Using the topographic map below, construct a topographic profile from A to A'. Fold your paper along the dotted line below the grap and line the crease up with the A to A'
profile line. Grey shaded areas are rivers.



On the profile you just created:
a. What is the horizontal scale in meters/inch? _____m/inch
b. What is the vertical scale in meters/inch? _____m/inch
c. What is the vertical exaggeration?



On the profile you just created:

a. What is the horizontal scale in meters/inch? _____m/inch

b. What is the vertical scale in meters/inch? _____m/inch

c. What is the vertical exaggeration?