

Student Name(s):

Grade:

Physical Geology 101 Laboratory Topographic Map Lab II

Introduction & Purpose:

Topographic maps are much scaled down two-dimensional paper models of the Earth's three-dimensional land surface. The characteristic that makes topographic maps unique are contour lines, which are map symbols that express surface relief – ground elevation changes across a given tract of land. Each contour line represents a continuous set of surface point locations that have equal elevation. The topographic (“topo” for short) map is an ingenious invention that helps humans navigate across the Earth's surface, and analyze the Earth's surface morphology, and geology.

Learning how to create and read topographic maps can be difficult, especially for those people who are not graphically and/or three-dimensionally minded. However, if the basic concepts of contour lines, map scale, and coordinate positioning systems are properly understood, then the ability to read topographic maps will come much easier. The purpose of this lab is to learn how to read, interpret, utilize, and create topographic maps and topographic map profiles.

The major objectives of this laboratory exercise are as follows:

- Be able to interpret all the necessary map information, including map scale, declination, contour interval, map symbols, and map coordinates.
- Be able to locate and identify features on a map, including the use of map coordinates, identifying geographic features, and reading and assigning compass bearings.
- Be able to construct a simple topographic profile.
- Be able to use a compass for orienteering purposes.

PART I. ANALYSIS OF THE YOSEMITE VALLEY TOPOGRAPHIC MAP

Instructions: Complete the following map analysis activities for the Yosemite Topographic Map supplied by your instructor.

Section A: Topographic Fundamentals and Features

Map Origin Information

- What's the name of this map? _____
- What year was this map first published? _____
- What organization created this map? _____
- How was topographic contouring of this map generated? _____
- What type of map projection was used to create this map? _____

Map Scale

- What is the ratio scale of this map? _____
- What is the verbal scale of map? One inch of map distance equals _____ inches of real ground distance.
- Roughly how many square miles of real ground does this map cover? _____

Magnetic Declination

- What is magnitude and direction of the magnetic declination? _____
- Name the topographic map that continues to the NE of this map? _____

Map Features and Symbols

11. What's the difference between the *solid* green pattern and *small dotted* green pattern on this map? _____

12. What's the difference between black dashed single lines and black dashed double lines?

13. What's the difference between black dashed double lines and black solid double lines?

14. What type of symbols represents buildings on the map? _____

Section B: Location, Bearing, and Distance

Map Coordinate Systems

15. What are the black longitude and latitude tick mark intervals along the edge of map? _____

16. Which UTM zone is this map area located in? _____

17. What are the blue UTM tick mark intervals along the edge of the map? _____ meters apart

Establishing Location

18. What are the **longitude and latitude** for each of these two opposite corners of this map?

	NW Corner	SE Corner
Longitude:	_____	_____
Latitude:	_____	_____

19. What are the **UTM coordinates** for each of the two opposite corners of this map?

	NW Corner	SE Corner
Easting:	_____	_____
Northing:	_____	_____

20. Interpolate the best approximate longitude and latitude for these locations:

	Half Dome	El Capitan
Longitude:	_____	_____
Latitude:	_____	_____

21. Interpolate the best approximate longitude and latitude for these locations:

	Clouds Rest	Mt Star King
Easting:	_____	_____
Northing:	_____	_____

Establishing Bearing and Distance

22. Calculate the bearing and distance from Half Dome to Clouds Rest.

Quadrant bearing: _____

Azimuth bearing: _____

Distance (miles): _____

23. Calculate the bearing and distance from Glacier Point to Bridalveil Falls.

Quadrant bearing: _____

Azimuth bearing: _____

Distance (miles): _____

Section C: Contours and Surface Relief

Elevation Contours

24. What is the contour interval of the map? _____

25. What is the contour interval between the dark/thicker contour lines? _____

26. What is the base level datum ("zero" elevation used to establish all contour and point elevations on this map? _____

27. What is the highest measured elevation (benchmark) on this map? _____

28. What is the lowest measured elevation (benchmark) on this map? _____

29. What is the total relief of this area? _____

Contours Patterns

30. Very tightly-spaced contour lines represent what type of geographic features?

Answer: _____

31. Very broadly-spaced contour lines represent what type of geographic features?

Answer: _____

32. Sets of contour lines that form "V"-shaped patterns pointing to lower elevations represent what sort of general geographic feature? (hint: either stream valleys or ridge lines)

Answer: _____

33. Sets of contour lines that form "V"-shaped patterns that *point to higher elevations* represent what sort of geographic feature? (hint: either stream valleys or ridge lines)

Answer: _____

Geographic Features

34. Which direction does the Merced River Flow through Yosemite? East or West? Explain.

Answer: _____

35. What special name is used in Yosemite Valley for high promontories that form flat-topped "bull's-eye" patterns? (hint: rhymes with "home") _____

Section D: Topographic Profiles of Yosemite Valley

Directions: Follow the steps on page 187 to create a topographic profile (see Figure 9.22). Note that the vertical exaggeration of a topographic profile is defined as the difference between the vertical (elevation) scale and the horizontal (lateral ground distance) scale.

36. Construction of the Tanaya Creek Profile A-A'

Instructions: Construct a topographic profile of the eastern end of Yosemite Valley across

Tanaya Creek from the top of Mt. Watkins (A) to the top of Clouds Rest (A').

- a. Review the instructions for creating profiles in your lab manual (Part 9B 0pg. 189)
- b. Use only the dark/bold contour lines
- c. Do not vertically exaggerate (your vertical scale is the same as your horizontal)

37. Construction of the El Capitan Meadow Profile B-B'

Instructions: Construct a topographic profile of the central portion of Yosemite Valley across The Merced River from the top of KP Pinnacle on El Capitan (B) to the top of Cathedral Rocks (B'). Review points a-b-c above used for Tanaya Creek profile.

38. Comparison between the Tanaya Creek and the El Capitan Meadow Profiles

Describe the general shape of each of the profiles across Yosemite Valley. ("V" or "U"?)

Tanaya Creek Profile A-A' - _____

El Capitan Meadow Profile B-B' - _____

39. Compare the two profiles described above in terms of "V" shaped versus "U" shaped. Explain which type of erosional agent you think is primarily responsible for the shaping of each of these two sections of Yosemite Valley? Choose between flowing water (rivers) and ice (glaciers). Briefly explain your choice. Hint: Check the back of the map for info.

Part III. Topographic Map II Laboratory Reflection

Directions: Write a 120 word minimum reflection of the lab activity, explaining its purpose, the methods used, the results obtained, and a brief personal reflection of what you enjoyed and learned about doing this lab (3 points possible). Answer the following 3-point question reflection set on a separate sheet of paper:

- 1) *What was the purpose of this lab? What did you actually discover and learn during this lab?*
- 2) *What did you enjoy most about this lab? Also, what was challenging or thought-provoking?*
- 3) *What are your constructive comments about the design and execution of this lab? What's good? What's bad? Offer suggestions for making the lab better.*