

Lab 1: Reading different kinds of maps used in geology

Note: On all labs, you may work in small groups. You may turn in one lab for all of the group members; make sure that everyone who should get credit is listed! For exams, you may use the labs as a reference, but you may not share labs during the exam — please keep a copy of the answers for your own use.

Raised relief map of Mt. Rainier

These maps make the idea of elevations and **contours** more tangible — follow any of the *brown-line* contours; they should form a level path.

1. a. On a map such as this, how can you tell where the glaciers are?

- b. In which direction do the glaciers flow on this map? This is sort of a trick question.

- c. In what sort of geographic feature do the glaciers lie? Hint: Look *downstream*.

- d. So if the glaciers disappeared, what would be left behind (geographically) on the mountain?

2. What is the **vertical exaggeration** on this map? Does this mean that the mountains are **taller** than they ought to be for the scale of the map, or **shorter**?

Crater Lake, Oregon topographic map (1956)

Topographic maps (or “topo sheets”) show a representation of an area, and use contour lines to depict elevations, but there is much more information than just elevations, as you’ll see...

3. What is the scale of this map? Meaning, one inch equals _____ inches, which equals how many miles?

4. What is the longest distance across the lake? Hint: You *could* use a ruler, but that's not the easiest way to do it.

5. What would Crater Lake's lake bottom area look like, if the lake were drained completely? Would the bottom be flat? Would it have mountains?

6. What evidence is there on the map of Crater Lake's **volcanic** origin?

Mt. St. Helens (1981) topographic map

7. Who produced this map? Of all the topo maps you are using in this lab, this has the most recent date. How come (specifically, why aren't we using the 1950s era map)?

8. What is the longest distance across the **caldera**? Hint: is the scale of this map the same as the previous map? So how does this caldera's size compare to Crater Lake's size?

9. If the north side of Mt. St. Helens had not collapsed, what could have happened to the caldera? Hint: See previous map.

10. Apart from the obvious 1980 event, how do you know that Mt. St. Helens has a volcanic origin? Hint: You may wish to look at a larger map in the southwest corner of the room.

11. Why didn't the Mt. St. Helens eruption of 1980 affect the upper Cowlitz River valley (where State Route 12 runs)? Hint: look at the Mt. Rainier raised relief map.

12. What is the *highest elevation* on the map? What is the *lowest* elevation on the map? Include **units**. Hint: the highest elevation is typically the peak that the map is named after, but how do you figure out the lowest elevation?

13. What is the **latitude** and **longitude** of the Mt. St. Helens crater? Include **units** and **compass directions**.

14. What is the slope of the inner wall of the **caldera**? What is the slope of the **southern flank** of the mountain? Which is *steeper*? Report slopes as a **percent slope** (calculate this by picking two contour lines on the slope, then find the difference in elevation between the two lines, divide by the lateral distance between the two lines and multiply the result by 100).

Glacier Peak (1950) topographic map

Unlike Crater Lake and Mt. St. Helens, Glacier Peak still seems to have a peak.

15. What features indicate the possible volcanic origin of Glacier Peak? Hint: look west and northeast of the peak.

16. Look at the White Chuck Glacier, on the southern flank of the peak. Note there is a lake at the south end of the glacier. Is this the low side or the high side of the glacier?

b. Why doesn't the water in the lake simply run downhill?

c. If the glacier were to completely melt, would there still be a lake there? Hint: look up "tarn".

d. So how does that depression (which fills in with water to be a lake) form in the first place? Hint: not a volcanic eruption.

Geologic Map of Washington

Geological maps have a different emphasis than topographical maps. Though the topography might lurk in the background of a geological map, it may be hard to figure out exactly where you are on a geological map!

17. Note the column headed "Geologic Units" to the right of the map. By what **two** characteristics are the geologic units divided into different colors?

18. Locate north Seattle. Write the **two-letter** designation of the local geologic unit. What is the apparent dominant **geologic force** that has shaped this area (hint: read the unit description and guess what the second letter of the designation stands for)?

19. Note the large portion of the colored areas on the map that have a "Q" as the first letter of that geologic unit. Give a **reason** that there is so much "Q" area.

20. Note the "Explanation" of symbols at the bottom of the map. A "**contact**" is a line along which two geologic units meet. A "**fault**" is a breakage in the rocks along which movement has occurred.

Are all the faults shown on the map **active**? Explain your answer; **sketch** a portion of the map that illustrates your answer. Hint: Do some of the faults seem to terminate abruptly when the color of the geologic unit changes? What does this indicate about the "brokenness" of the color without the fault and what does this imply about the fault?