

Geology Map Activity

name: _____

1. Look at the **big geology map in the hallway** outside the Earth Science room. Find the 5 small Montana maps in the area below the really big map of Montana. What is the purpose of the dashed line on the map titled “Physiographic Features”?* (Use sentences if there is an asterisk.)
2. Now look at the big map. Each color represents a different “rock unit” (formation). According to the big map, as you drive through Clancy the rock unit found at the surface (or beneath the soil) is labeled “Kgt”. What color is it on the big map, AND what type of rock is it made of (see poster to right of big map)?

Use the big map and the poster to its right (separate frame) to determine what type of rock (or the name of the rock unit) found at the surface (or beneath the soil) at each of the following locations:

3. The red area in south-eastern Montana
4. The area labeled “Mm” between Helena and Glacier Park
5. “Kjr” on either side of the Milk River Valley of north-central Montana
6. What is one of the rock units among the top five in surface area covered on the map? Tell what this unit is called and tell whether it is igneous, metamorphic, or sedimentary, and give their age (period when formed).
7. Find the Big Timber Stock (igneous rock Tgd) northwest of Big Timber (a.k.a. The Crazy Mountains). Notice the red lines that seem to radiate from the stock. What are these?
8. Examine the “Age and Correlation of Map Units” poster. Look at the columns on the right side of the frame. If you drill a well deep enough in Montana, you will eventually hit Madison Limestone (Madison Group, a.k.a. Madison Gp). According to the time scale, how many millions of years ago were the sediments that make up the Madison Gp deposited?
9. How many **billions** of years ago were the sediments that make up the Belt Supergroup deposited?
10. What two units (formations) would you expect to find immediately below the Madison in central Montana, AND are these units older or younger than the Madison?
11. Notice in the columns representing rock from the four general areas of the state, that there are “gaps” in the rock record. For example, there are no rocks (not even sub-surface) from the late Triassic or Early Jurassic periods. Explain why.* (Hint: Don’t blame erosion!)

12. Examine the two small Montana maps in the lower left of the same frame. What is the point of the small one on the left (title begins with "Plutons")?*
13. What are the names of the two volcanic areas north of Yellowstone Park (see small maps "Volcanic . . . "? Circle the answer that is volcanic are known as the Crazy Mountains (a.k.a. "The Crazies").
14. Based on what you have learned and what you can see on the map and poster, state 2 general differences between the western third of Montana and the eastern third of Montana.*
- a.
- b.

Go back to the classroom. Open the **Geol. Highway Map of the Northern Rocky Mtn. Region.**

15. Go to the side (BACK) that has the cross-sections (BACK). There are 5 cross-sections shown near the bottom. Describe the general location of the two that depict parts of Montana.

a. A2 – A3:

b. U – U1:

16. What is the elevation of Flathead Lake? BACK

17. Sketch (and label) the symbol for each of the following rock types: sandstone, granite, and limestone



Sandstone



granite



limestone



metamorphic

18. Which state (MT, WY, ID) has the largest percentage of its surface made of igneous rock? FRONT

19. Where is the biggest patch of Precambrian age rock at the surface in Montana? FRONT

20. What type (and time period) of brown rock beneath the sedimentary layers of eastern Montana? (Called "basement rock") FRONT and BACK

21. The purple-blue layer (labeled "M") east of the Little Rockies is Madison limestone. How many feet below Ft. Peck Reservoir would you have to drill before you hit layers of the Madison limestone? BACK

22. What is the most noticeable difference between western and eastern Montana?* FRONT-BACK
23. Look at U – U1. What is the most abundant type of rock at the surface in the Bearpaw Mountains? “Lava” is not a rock. BACK
24. Look at the Geologic History section that runs left to right across the middle of the map. Was the Mississippian Period a time of subsidence (the area was a basin), uplift, or mountain building in Montana? What type of material was being deposited? BACK
25. What three things were happening in western Montana during the late Cretaceous Period? BACK
26. Explain what the three maps that represent the early Tertiary Period tell you about what was happening throughout Montana (east and west) during that time period. BACK

The next several questions are for the **Geologic Map of Yellowstone** (*Use sentences.)

27. Unfold the map and look at the white side. What is the most common rock unit at the surface in Yellowstone National Park (YNP)? Is it volcanic (extrusive) or plutonic (intrusive)?
28. During which period was the eruption that put this lava onto the surface?
29. According to the “Relative Volumes” graphic, when were the past 3 explosive eruptions of the Yellowstone Volcano and what are their names? **Put your answer in both millions of years and years.**
30. What color and letters on the map show where you can find rock from the Lava Creek eruption of the Yellowstone volcano over 600,000 years ago? What type of rock is it?
31. Describe the location of the oldest rock shown on the map, and tell what kind of rock it is.
32. Use the scale to determine the length of the Yellowstone Caldera in miles from SW to NE.

33. Look at the series of diagrams titled "Caldera Formation". Why did the surface collapse?*

The next group of questions goes with the **Bedrock Map of the Helena Area**. (*Use sentences.)

34. Find where you live. What kind of bedrock (age and type) is under your house?

35. Why is the Helena Valley covered with diagonal lines?*

36. What kind of rock dominates the surface on the southern third of the map?

37. Find the exposure of Madison limestone (Madison Group) that is closest to HHS. Where is it?*

38. Locate Carroll College. What rock unit lies beneath the soil there?

39. What is the rock unit (name and age) represented by the forest-green patches scattered around the Boulder Batholith?

40. Find McDonald Pass (on the Continental Divide). As you are travelling from the pass back to Helena, you will see lots of granite. How many miles west of town will you begin to see sedimentary rock?

41. There are several faults shown on the map. Describe the correlation between faults and the location of the Helena Valley.* (Explain where most faults are in relationship to the valley.)

42. Which fault runs north to south just west of the Helena Valley Regulating Reservoir?