

Name: \_\_\_\_\_

## Geologic Map Exercise

Geologic maps are specialized maps that show geological features such as rock units, bedding planes, faults, folds, rock ages and foliations. Go to the following website: <http://tinyurl.com/WeirGM>. Take 5 minutes to explore the map. Make sure you use a mouse and the scroll wheel to help you easily zoom in and out of the map. Left click, hold and drag the mouse will help you pan through the map. The colors on the map are representations of rock groups that are exposed at the surface of the Earth. Notice that if you click on any color, an explanation will appear that will describe the rock features and their formations. You can also click the "View the Legend" link to see what each color on the map represents. On the left hand side of the map is the image found to the right: Clicking on it will bring up another legend that will explain more about the map.



1. Find Snowflake on the map. Which rock types are found in and around Snowflake?
2. In what type of environment was the rock around Snowflake formed?
3. Now head south toward Show Low. (Pink) Which rock types would you expect to find there?
4. What type of environment does this indicate?
5. About how old are the rocks here?
6. Follow US 60. You will first run into a green layer on the map as you leave Show Low. What types of rock does this area contain?
7. What type of environment would these rocks be formed in?
8. About how old are these rocks?
9. As you travel further south west, you will cross a black solid line. What does this solid line represent?
10. That solid bold line also crosses a very light blue colored area on the map. What type of rocks would you find here?
11. What type of ancient environment would have deposited those rocks?
12. Travel further south west and you will enter a larger darker blue area. What types of exposed rocks are found here?

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13. What environments were occurring between 280 and 310 million years ago?

14. Travel further southwest and you will come across a light tan area. The description of this area mentions "Consolidated Conglomerate." What was a conglomerate and what does consolidated mean?

15. What type of environment would have formed this area?

16. Continue on US 60 southwest and you will begin to travel through the Salt River Canyon. The salt river canyon cuts through two purple layers on the map. If you look at the legend you will see that it mentions that the canyon contains "sills" which are "intrusions." What are sills and why would they use the word intrusions?

17. What are you noticing about the rock ages as you move over the areas between Snowflake and the Salt River Canyon?

18. Continue along the road southwest and you will come to a brown layer on the map. The legend mentions that this area is made out of "Porphyritic Felsitic Granite." You have seen these words before. Where would this area have formed in relation to the surface of the Earth? How do you know?

19. In the legend it also mentions the word "Pluton." What is a pluton?

20. Continue along US 60 until you get to a reddish pink color, southwest of Miami and Globe. What type of rock and minerals would you find here?

21. How does this type of rock help with Arizona's economy?

22. Zoom out on the map. Look toward the southwest as a general area. You will notice that a large percentage of the bottom of AZ is light brown to beige in color. What does this area represent in terms of its formation?

23. You should already know that the elevation of Phoenix is lower than Snowflake. Why are the rocks so much younger than Snowflake and even Globe?

## Answer Key

- 1. Find Snowflake on the map. Which rock types are found in and around Snowflake?**
  - a. Red sandstone, mudstone, gypsum beds
- 2. In what type of environment was the rock around Snowflake formed?**
  - a. Low relief coastal plain
- 3. Now head south toward Show Low. (Pink) Which rock types would you expect to find there?**
  - a. Basaltic, cinders, andesite, dacite, rhyolite,
- 4. What type of environment does this indicate?**
  - a. Volcanic
- 5. About how old are the rocks here?**
  - a. 0-4 million years
- 6. Follow US 60. You will first run into a green layer on the map as you leave Show Low. What types of rock does this area contain?**
  - a. Dark sandstone, gray shale,
- 7. What type of environment would these rocks be formed in?**
  - a. Beach, river delta, shallow sea
- 8. About how old are these rocks?**
  - a. 88-97 million years ago
- 9. As you travel further south west, you will cross a black solid line. What does this solid line represent?**
  - a. Faults
- 10. That solid bold line also crosses a very light blue colored area on the map. What type of rocks would you find here?**
  - a. Cherty limestone, sandstone,
- 11. What type of ancient environment would have deposited those rocks?**
  - a. Shallow sea, near shore dunes and beach settings
- 12. Travel further south west and you will enter a larger darker blue area. What types of exposed rocks are found here?**
  - a. Sandstone, shale, limestone
- 13. What environments were occurring between 280 and 310 million years ago?**
  - a. Shallow sea, coastal plain, changing sea level

14. Travel further southwest and you will come across a light tan area. The description of this area mentions "Consolidated Conglomerate." What was a conglomerate and what does consolidated mean?
- Consolidated are rocks made up of rounded gravel sized grains cemented in a mass. Consolidated means about the same sorting and sizing.
15. What type of environment would have formed this area?
- Streams,
16. Continue on US 60 southwest and you will begin to travel through the Salt River Canyon. The salt river canyon cuts through two purple layers on the map. If you look at the legend you will see that it mentions that the canyon contains "sills" which are "intrusions." What are sills and why would they use the word intrusions?
- Sills are intrusive igneous rock that runs parallel to the rock layers. Intrusions are when igneous rock penetrates into the surrounding rock.
17. What are you noticing about the rock ages as you move over the areas between Snowflake and the Salt River Canyon?
- Ages get older as you travel lower with elevation.
18. Continue along the road southwest and you will come to a brown layer on the map. The legend mentions that this area is made out of "Porphyritic Biotite Granite." You have seen these words before. Where would this area have formed in relation to the surface of the Earth? How do you know?
- Intrusive, very deep, porphyritic means large grains embedded in a mass.
  - Large crystals tell you that it took a long time to cool and that you have intrusive igneous rock
19. In the legend it also mentions the word "Pluton." What is a pluton?
- A large body of intrusive igneous rock
20. Continue along US 60 until you get to a reddish pink color, southwest of Miami and Globe. What type of rock and minerals would you find here?
- Porphyritic granite, biotite, hornblende, copper
21. How does this type of rock help with Arizona's economy?
- Copper is the largest mineral mined in AZ
22. Zoom out on the map. Look toward the southwest as a general area. You will notice that a large percentage of the bottom of AZ is light brown to beige in color. What does this area represent in terms of its formation?
- This area is largely made out of eroded material coming off the mountains. Alluvial plains, sediment, alluvial fans
23. You should already know that the elevation of Phoenix is lower than Snowflake. Why are the rocks so much younger than Snowflake and even Globe?
- All of the beige colored areas are made from eroded material and have been collecting after falling off of the older mountains.

## **Teacher Reflections, Suggestions and Procedure**

- I let students work in partners for this assignment around one computer, but this can easily be done individually as well. I found the groups of three were too large and the third wheel go distracted.
- By the time students are done with this assignment they get an idea of what a geologic map is and how to use it.
- I find that students gain a pretty good idea of how awesome the rock formations are as they drive through roads. I picked US 60 because that is a common road for my students.
- The assignment is very easy for students to follow and self explanatory for the most part. They should be able to complete the assignment in a 55 minute period with time left over to discuss some the the cool features found in this part of AZ. I also get to show them the edge of the Colorado Plateau