

# Assignment #3 Metamorphic Rocks

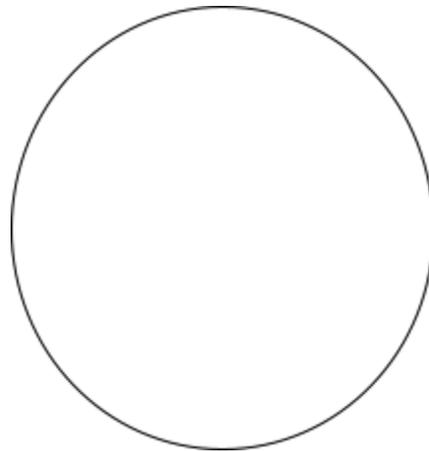
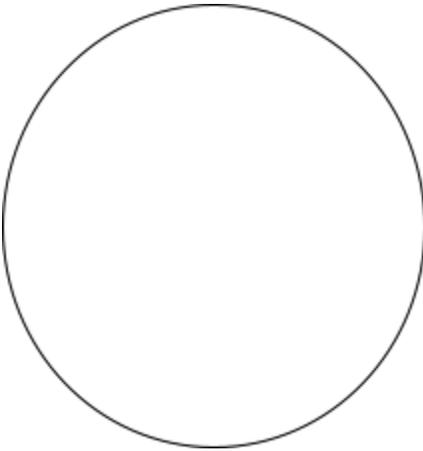
## Part A: Formation of Metamorphic rocks

Materials: Lump of clay, 15 pennies, newspaper and a knife

Procedure:

- 1) Spread some paper on your desk to work on and model the clay into a sphere.
- 2) Push the pennies into the sphere in random directions.
- 3) Sketch the orientation of the pennies in the sphere in the space below.
- 4) Flatten the lump as flat as you can make it and then cut the flattened lump to find some pennies.
- 5) Sketch the orientation of the pennies. Which direction are they facing?
- 6) Remove the pennies and store the clay in a plastic bag.
- 7) Answer the questions below.

Observations:



a) Sketch of orientation of pennies before flattening

b) Sketch of orientation of pennies after flattening

Questions:

1) What happens to the orientation of the pennies as pressure is applied to the clay? \_\_\_\_\_

2) Do you think this change in orientation is possible in real rocks? What would a rock look like that had pressure like this applied to it? \_\_\_\_\_

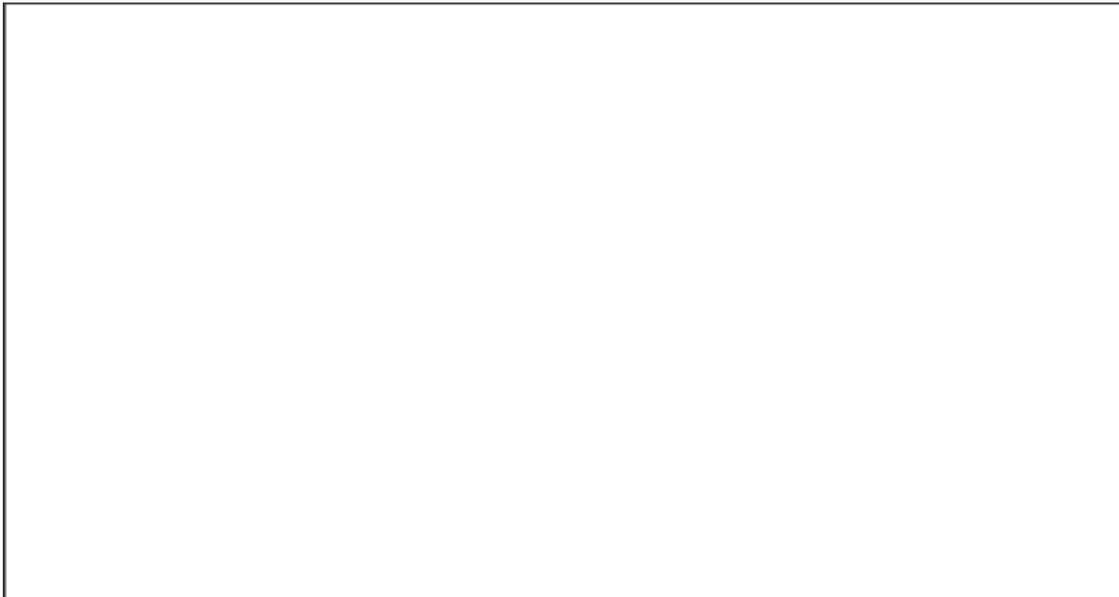
**Part B:** Observing Metamorphic rocks

- Use the Geology **lab manual** pages 36 – 38
- In your **textbook** use pages 76 - 78
- Samples 12 - 17

1) Define **metamorphism**: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

What types of rocks can be affected by metamorphism? \_\_\_\_\_

2) From the lab manual make a neat (colored) and labeled sketch of diagram on page 37 (**lab manual**).



3) How does regional metamorphism differ from contact metamorphism? See page 37 (**lab manual**) or page 76 and 78 in your **textbook**.

Regional Metamorphism: \_\_\_\_\_

Contact Metamorphism: \_\_\_\_\_

4) Give an example of a metamorphic rock that forms from regional and contact metamorphism and circle whether it's foliated or unfoliated.

- Regional Metamorphism Example: \_\_\_\_\_ Foliated / unfoliated
- Contact Metamorphism Example: \_\_\_\_\_ Foliated / unfoliated

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

5) Examine sample #17.

- Describe it: \_\_\_\_\_
- Identify it (see page 39 in the **lab manual**) \_\_\_\_\_
- The rock that was transformed (metamorphosed) to make this rock was \_\_\_\_\_
- Is this rock formed from regional or contact metamorphism? \_\_\_\_\_
- From your observations of the rock, how does sample **#17** differ from sedimentary rock sample **#9**?  
\_\_\_\_\_  
\_\_\_\_\_
- Place a few drops of HCl onto both samples (#17 and #9).
  - What happens? \_\_\_\_\_
  - What can you conclude about the mineral composition of sample #17? \_\_\_\_\_

6) Look at page 39 in the **lab manual**. Make a sketch to **show the difference** between foliated and unfoliated metamorphic rocks.

Foliated



Unfoliated



7) Examine sample #12. Does it appear foliated or unfoliated? \_\_\_\_\_

- Identify sample #12 (see page 38 in lab manual) \_\_\_\_\_
- What rock was metamorphosed to produce this rock? (See your diagram in question #2 and the chart on page 78 in your **textbook**). \_\_\_\_\_

8) Sample **#13** is called \_\_\_\_\_ if this sample was to be metamorphosed further, what would it turn into? \_\_\_\_\_

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

9) Sample #14 is called \_\_\_\_\_

- How was it formed?

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10) Use the chart on page 78 (**textbook**) to complete the following:

- a) What type of rock does sandstone metamorphose into? \_\_\_\_\_
- b) What type of rock does limestone metamorphose into? \_\_\_\_\_
- c) What type of rock does shale metamorphose into? \_\_\_\_\_

~~Answer questions #19, 20, 21, 22 on page 79 in the space below~~

**Conclusion:** Describe what you have learned about Metamorphic rocks (example: how they are formed, foliated vs unfoliated, common types)