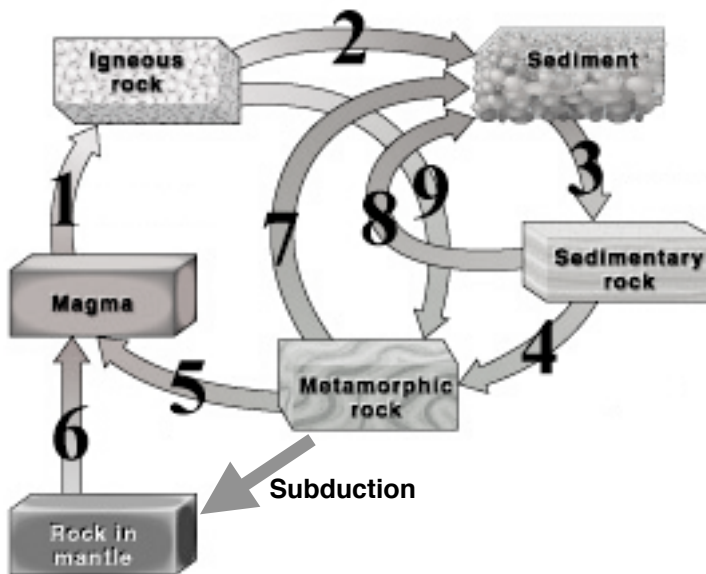


# Homework on Igneous Rocks



## Part I — The Rock Cycle (p. 21–23)

Here is another version of the rock cycle. It looks different from the one we had in class. But if you look closely, you'll see it's essentially the same.

Each number stands for a process. Write the correct process in the blanks, below.

Use these terms to fill in the blanks. Some can be used more than once:

*Crystallization*      *Weathering and Erosion*

*Lithification*      *Metamorphism*

*Partial melting of mantle rock*

*Partial melting of metamorphic rock*

- |          |   |
|----------|---|
| 1. _____ | 2. _____  |
| 3. _____ | 4. _____  |
| 5. _____ | 6. _____  |
| 7. _____ | 8. _____  |
| 9. _____ | (0.5 point each — 4.5 points for this section.) |

## Part II — Naming Igneous Rocks (p. 103–107, and SmartFigures 4.7 and 4.12)

Given the description, correctly name each of these igneous rocks. The possible answers are: *andesite, basalt, gabbro, granite, pumice, rhyolite porphyry and tuff.*

A rock composed of fragments ejected during a volcanic eruption.

\_\_\_\_\_

A rock that contains plagioclase feldspar and amphibole, but no quartz, and has an aphanitic (fine) texture.

\_\_\_\_\_

A rock with no minerals, made of frothy (very vesicular) glass

\_\_\_\_\_

A rock that contains calcium-rich plagioclase and pyroxene, and has a fine texture.

\_\_\_\_\_

A rock that contains calcium-rich plagioclase and pyroxene, and has a coarse texture.

\_\_\_\_\_

A rock that contains quartz, potassium feldspar, sodium-rich plagioclase and biotite, and has a coarse texture.

\_\_\_\_\_

A rock that contains quartz, potassium feldspar, sodium-rich plagioclase and biotite, and has two distinct grain sizes: fine, but with some phenocrysts (large crystals).

\_\_\_\_\_

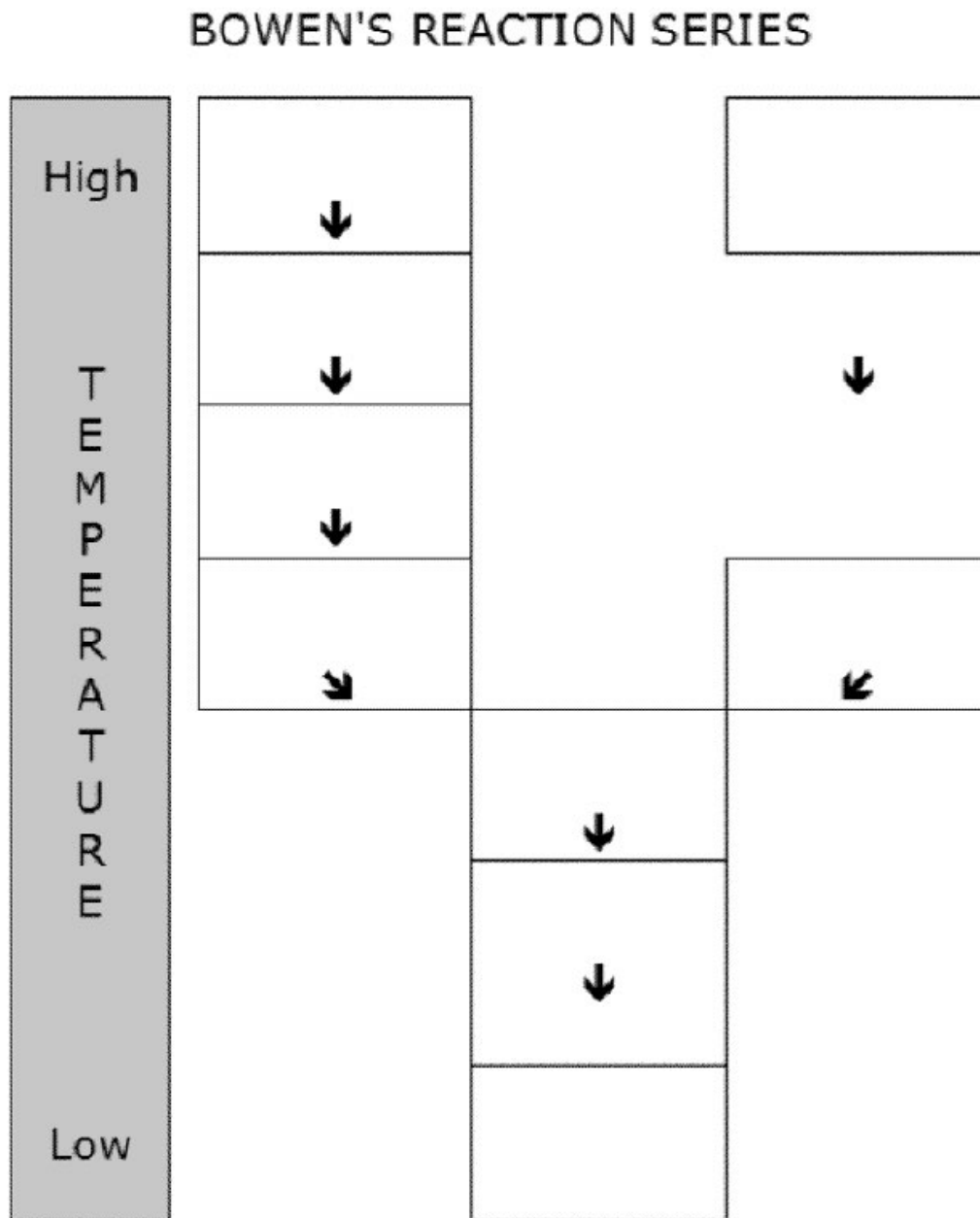
(1 point each — 7 points for this section.)

Due date: \_\_\_\_\_

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

### Part III — Bowen's Reaction Series (p. 110–111)

The diagram below shows Bowen's Reaction Series. Use your book and your notes to fill in each box. Please write small, and neatly. (0.5 point each — 4.5 points for this section.)



The minerals that go in Bowen's Reaction Series (the common igneous rock forming minerals) are listed below. Use these to fill in the blanks above, in the Bowen's Reaction Series.

*Amphibole*      *Ca-rich plagioclase*      *Muscovite*      *Biotite*      *Na-rich plagioclase*  
*Olivine*      *Potassium feldspar*      *Pyroxene*      *Quartz*

**Please note** that it's ok to abbreviate mineral names. So "sodium-rich plagioclase" is often written as "Na-rich plag." But since many minerals can be sodium (or calcium) rich, the adjective by itself is meaningless! So abbreviations are ok, but meaningless partial answers are not ok. If you're not sure, ask!

Due date: \_\_\_\_\_

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

#### Part IV — The Geothermal Gradient and the Origin of Magma (p. 108–109)

Use figure 4.17, p. 108, to answer these questions. (1 point each — 3 points for this section.)

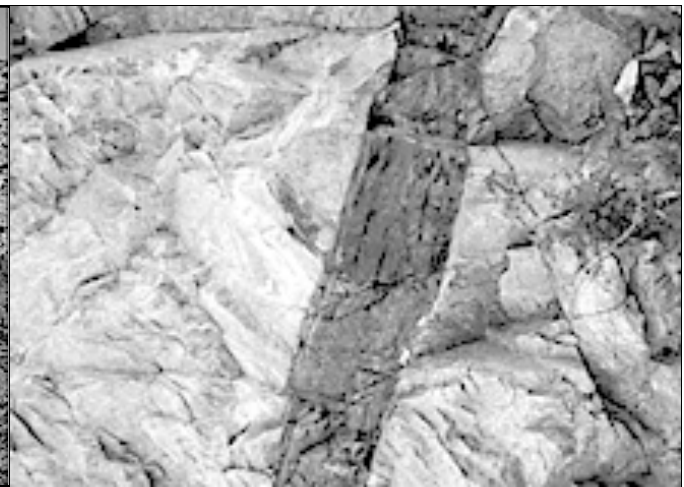
1. Is there any depth where the temperature (the geothermal gradient) is above the melting point (into the partial melting zone)? \_\_\_\_\_ (yes or no)
2. What would be the temperature of rock at a depth of 100 km? \_\_\_\_\_
3. If mantle rock at 100 km moved upwards to a depth of 50 km, would it be hot enough to partially melt at 50 km? \_\_\_\_\_ (yes or no)

#### Part V — Bodies of intrusive igneous rocks (p. 114–117, SmartFigure 4.26 & Glossary)

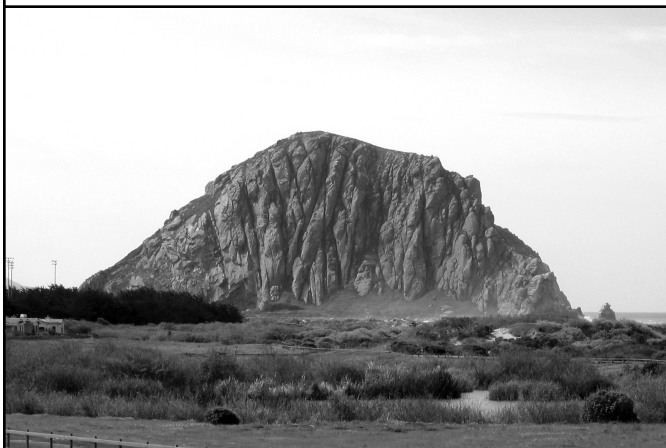
Fill in the blanks, below. The terms that might go in the blanks are: *batholith*, *dike*, *laccolith*, *sill*, *stock* and *volcanic neck*.



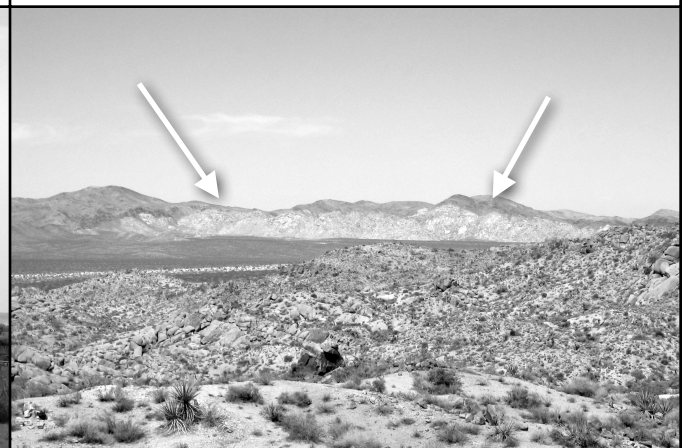
The dark layer (with the arrow) is a tabular concordant intrusion called a \_\_\_\_\_.



This dark layer is an tabular discordant intrusion called a \_\_\_\_\_.



This picture shows an erosional remnant consisting of lava that solidified in the vent of a volcano, called a \_\_\_\_\_.



This photo shows a large unconformable intrusion (the light colored rock with arrows) that extends over an area *greater* than 100 sq. km. called a \_\_\_\_\_, seen from about 10 miles away.

(1 point each — 4 points for this section)