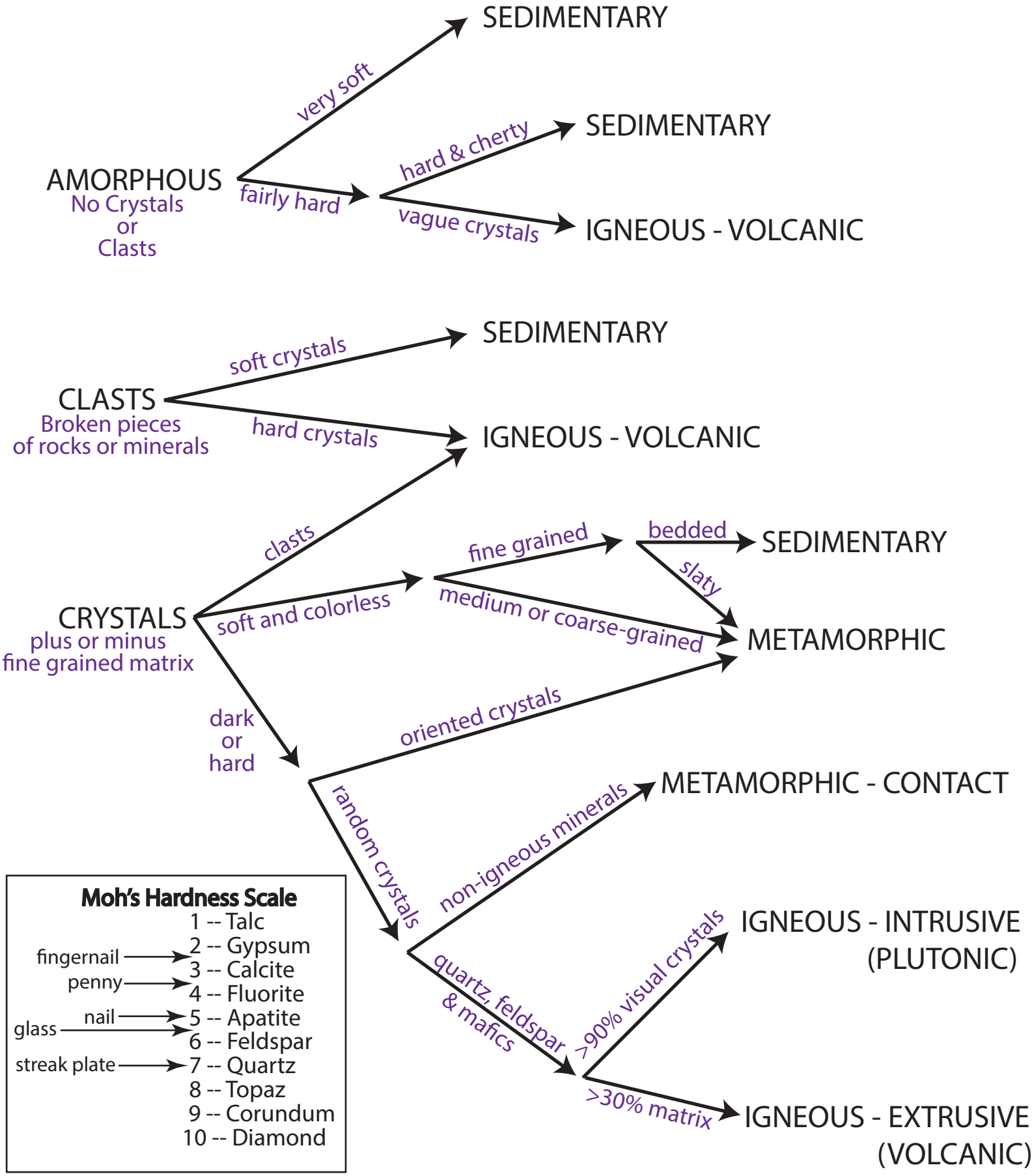
Rock Type Identification Flow Chart



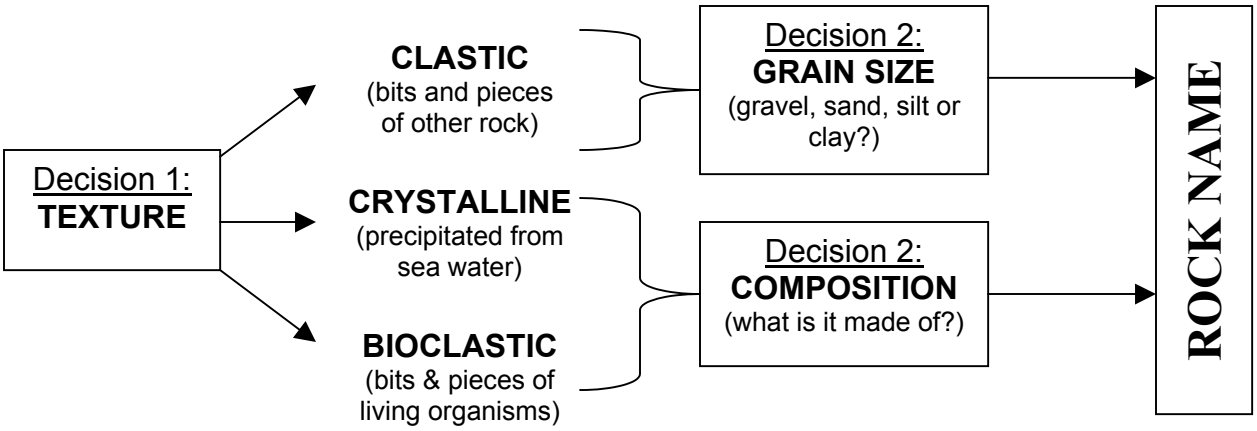
REGENTS EARTH SCIENCE
Sedimentary Rock ID Lab

Name: _____

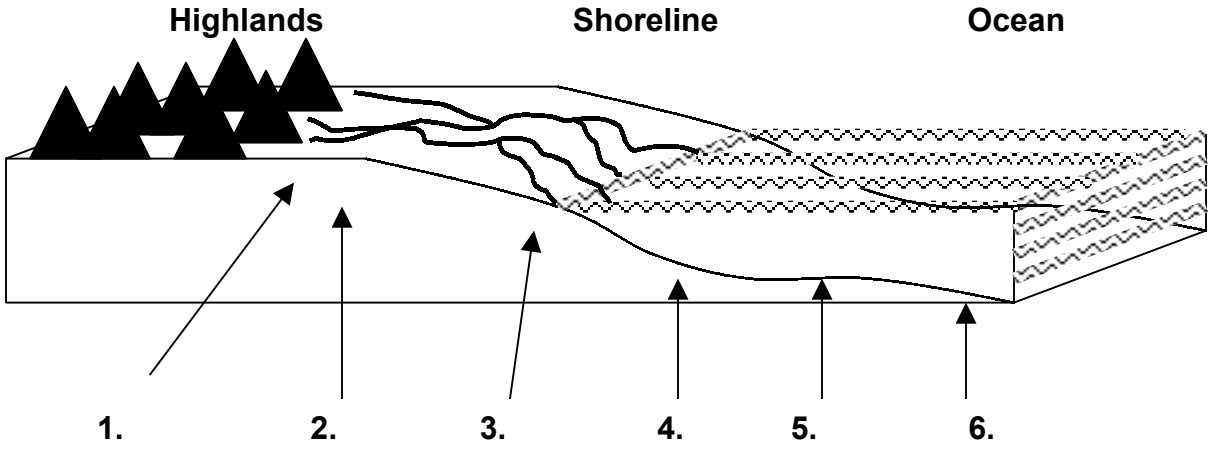
As you now know, rocks are composed of minerals or a combination of minerals. Rocks are categorized into types based on the way in which they form. Sedimentary rocks form as weathered, eroded and deposited materials are compacted and cemented together beneath the weight of overlying sediments. Sedimentary rocks are classified into three major categories based on their composition- **CLASTIC,** or fragmental (derived from weathering and erosion of land materials), **CRYSTALLINE** (form from precipitation of dissolved salts in sea water) and **BIOCLASTIC** (fragments of living organisms). The clastic sedimentary rocks are identified and named by ***grain size***, while the others are identified by ***composition***. These characteristics, in turn, signify a particular ***environment of formation***. As you know from our study of igneous rocks, **if you know the rock, you know the past environment!** Using your senses and the **Scheme for Sedimentary Rock Identification**, you will be able to first classify and identify the rocks and their environments of formation.

PROCEDURE

First, take some time to familiarize yourself with the ***flow*** of the identification chart. The chart is read by deciding on the **texture** first. The outline below may be helpful as a guide:



The **texture** and **composition** of sedimentary rocks are determined by *the environment in which they form*. As you already know, sediments sort out by size, both vertically and horizontally. Horizontal sorting is a major player in **where** sedimentary rocks form.



Scheme for Sedimentary Rock Identification

INORGANIC LAND-DERIVED SEDIMENTARY ROCKS					
TEXTURE	GRAIN SIZE	COMPOSITION	COMMENTS	ROCK NAME	MAP SYMBOL
Clastic (fragmental)	Pebbles, cobbles, and/or boulders embedded in sand, silt, and/or clay	Mostly quartz, feldspar, and clay minerals; may contain fragments of other rocks and minerals	Rounded fragments	Conglomerate	
			Angular fragments	Breccia	
	Sand (0.2 to 0.006 cm)		Fine to coarse	Sandstone	
	Silt (0.006 to 0.0004 cm)		Very fine grain	Siltstone	
	Clay (less than 0.0004 cm)		Compact; may split easily	Shale	
CHEMICALLY AND/OR ORGANICALLY FORMED SEDIMENTARY ROCKS					
TEXTURE	GRAIN SIZE	COMPOSITION	COMMENTS	ROCK NAME	MAP SYMBOL
Crystalline	Varied	Halite	Crystals from chemical precipitates and evaporites	Rock Salt	
	Varied	Gypsum		Rock Gypsum	
	Varied	Dolomite		Dolostone	
Bioclastic	Microscopic to coarse	Calcite	Cemented shell fragments or precipitates of biologic origin	Limestone	
	Varied	Carbon	From plant remains	Coal	

ROCK	TEXTURE (CLASITC, CRYSTALLINE, BIOCLASTIC)	GRAIN SIZE (Gravel, Sand, Silt, Clay)	ROCK NAME	OTHER CHARACT-ERISTICS	ENVIRONMENT
1.	clastic				beach, river, or sand dunes
2.					river deposit
3.	clastic	clay	shale		low energy basin
4.	bioclastic			fossils!	
5.	bioclastic			do you see plant material?	swamp

REGENTS EARTH SCIENCE
Igneous Rock Identification

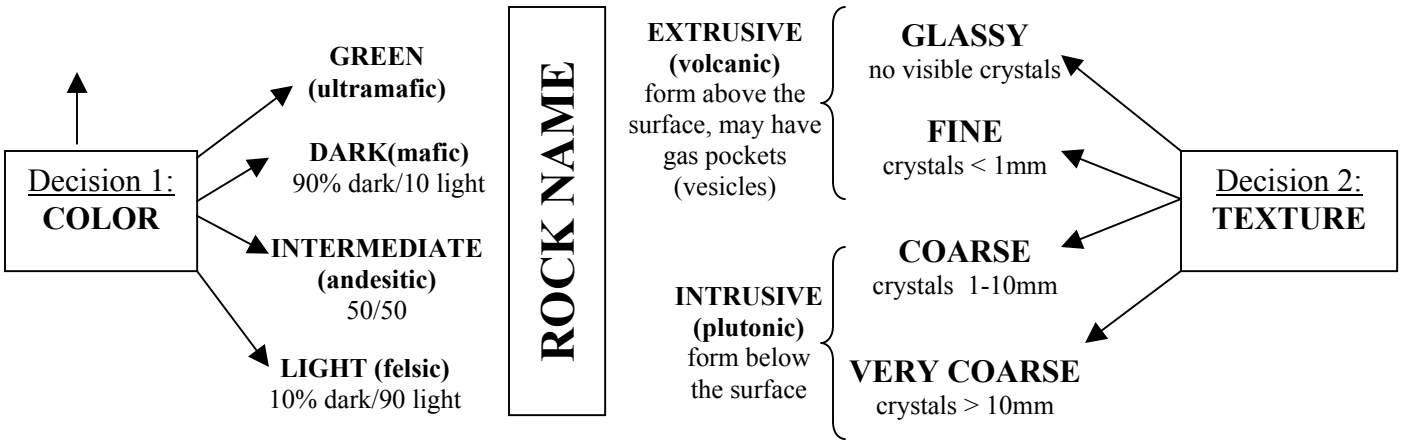
Name: _____

As you now know, rocks are composed of minerals or a combination of minerals. Rocks are categorized into types based on the way in which they form. Igneous rocks form as molten, mineral-rich material cools (or, you might say, "freezes") as it rises toward earth's surface. Igneous rocks are classified based on two main characteristics- ***mineral composition*** and ***mineral grain size (texture)***. These characteristics, in turn, signify a particular ***environment of formation***. Herein lies the key: **if you know the rock, you know the past environment!** Remember, rocks form the sentences and paragraphs of earth's language. Using your senses and the **Scheme for Igneous Rock Identification** found in your reference tables, you will be able to first classify then identify the environment of formation of a variety of different igneous rocks.

PROCEDURE

First, take some time to familiarize yourself with the ***flow*** of the identification chart. The chart is read by "plotting" two major physical characteristics- **color** and **texture**. The outline below may be helpful as a guide:

Although color is a poor Indicator for minerals, igneous rocks are typically composed of a combination of 7 major minerals with specific coloration. As a result, color turns out to be very useful for identifying composition.



Environments of Formation

The **composition** and **density** of igneous rocks determine *where* they are formed on the earth. As you already know, **plutonic** rocks form below the surface (big crystals), while **volcanic** rocks form at or above the surface (fine or glassy texture).

Low Density/Light Color ⟷ High Density/Dark Color
Felsic ⟷ Mafic/Ultra Mafic

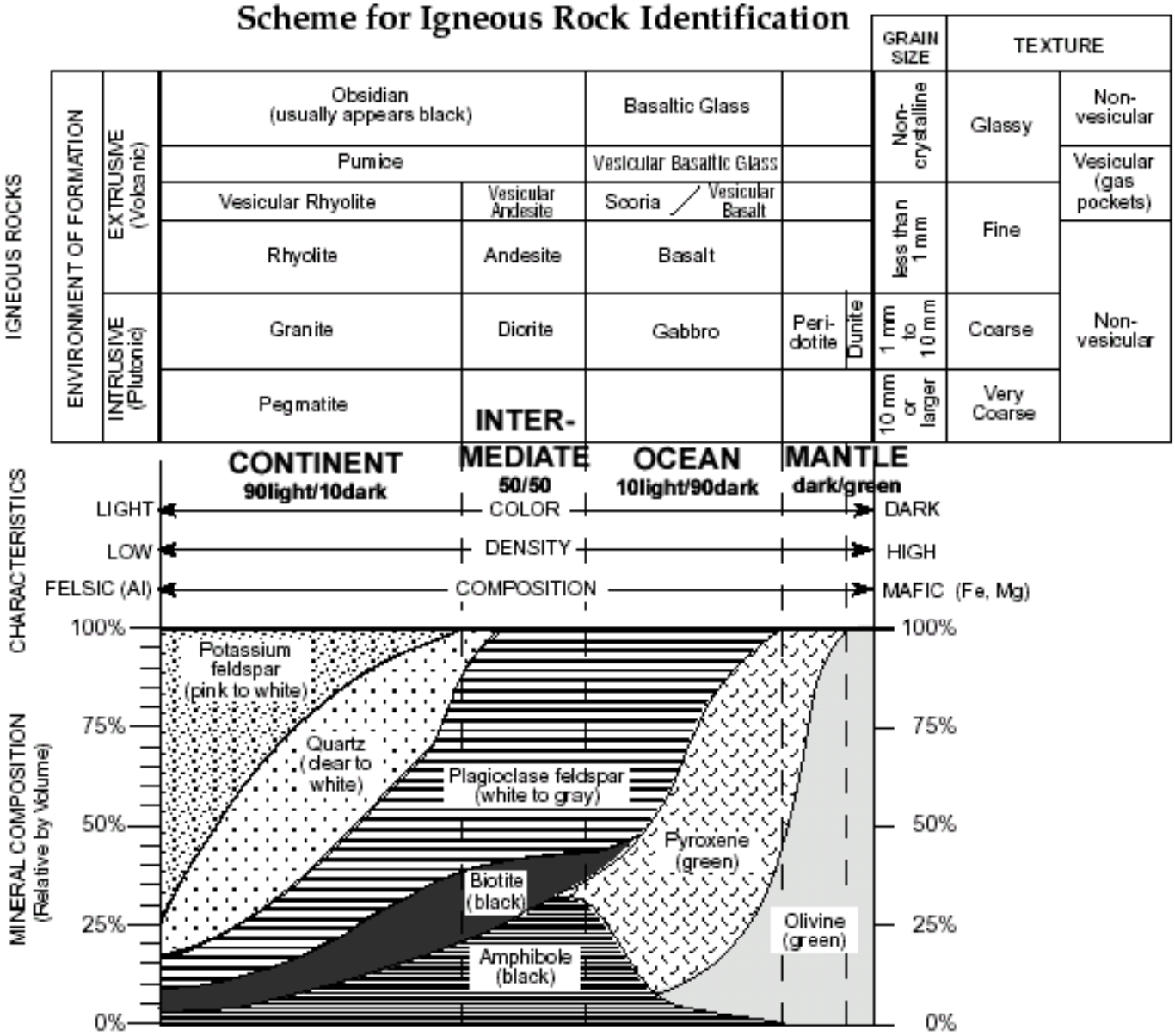
CONTINENTAL
Rocks form at the surface or beneath the surface of the Land (continent).

INTERMEDIATE
Rocks form where ocean crust and continent crust meet or collide (Andes Mtns)

OCEANIC
Rocks form in the ocean or beneath the ocean crust.

MANTLE
Rocks form in the mantle

Scheme for Igneous Rock Identification



ROCK	COLOR (Dark w/green, Dark, Intermediate, Light)	TEXTURE (Glassy, Fine, Coarse, Very Coarse, Vesicular)	ROCK NAME	(plutonic) INTRUSIVE or EXTRUSIVE (volcanic)	ENVIRONMENT (Mantle, Ocean, Intermediate, Continental)
6.		vesicular			ocean/mantle
7.			gabbro		mantle
8.	intermediate	medium-coarse	diorite	intrusive	intermediate
9.	intermediate			extrusive	intermediate
10.		medium-coarse			Continental
11.				extrusive	Continental

REGENTS EARTH SCIENCE
Metamorphic Rock ID Lab

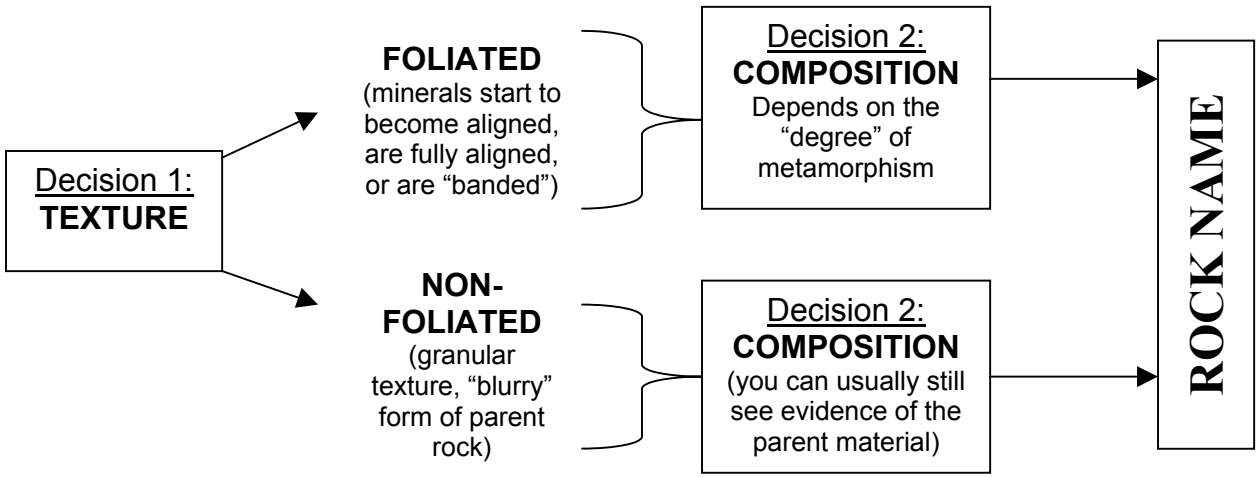
Name: _____

And last but not least, **METAMORPHIC ROCKS**! By now, you must realize that rocks are categorized into types based on the way in which they form. ***Metamorphic*** rocks form just that way- by **changing (*meta=*** *to change**)*** **form (*morph=*** *form*). These rocks start out as igneous or sedimentary rocks (or metamorphic) and are altered or rearranged by a combination of **heat** and **pressure**. Simply put, metamorphism occurs when a previously existing rock, the ***parent rock***, is buried in the earth under layers of other rock. The deeper the rock is buried the hotter it gets, and the higher the pressure becomes. Eventually, the rock must adjust to the conditions of this *new* environment. You might think of the rock as being *baked*, *squeezed*, or both, and in the process becomes a metamorphic rock.

Metamorphic rocks are classified in a similar manner to the other rock types- start with ***texture***. Once you have decided whether layering is present or not, you must evaluate the **composition**. Remember, **if you know the rock, you know the past environment!** Using your senses and the **Scheme for Metamorphic Rock Identification**, you will be able to first classify and identify the rocks and their environments of formation.

PROCEDURE

First, take some time to familiarize yourself with the ***flow*** of the identification chart. The chart is read by deciding on the **texture** first. The outline below may be helpful as a guide:



The **texture** and **composition** of igneous rocks are determined by their *degree of metamorphism*. Depending on the influence of heat/pressure, metamorphic rocks may form as:

1. New mineral compositions, some typical of igneous rocks and some unique to metamorphic rocks.

2. New textures unique to metamorphic rocks.

Scheme for Metamorphic Rock Identification

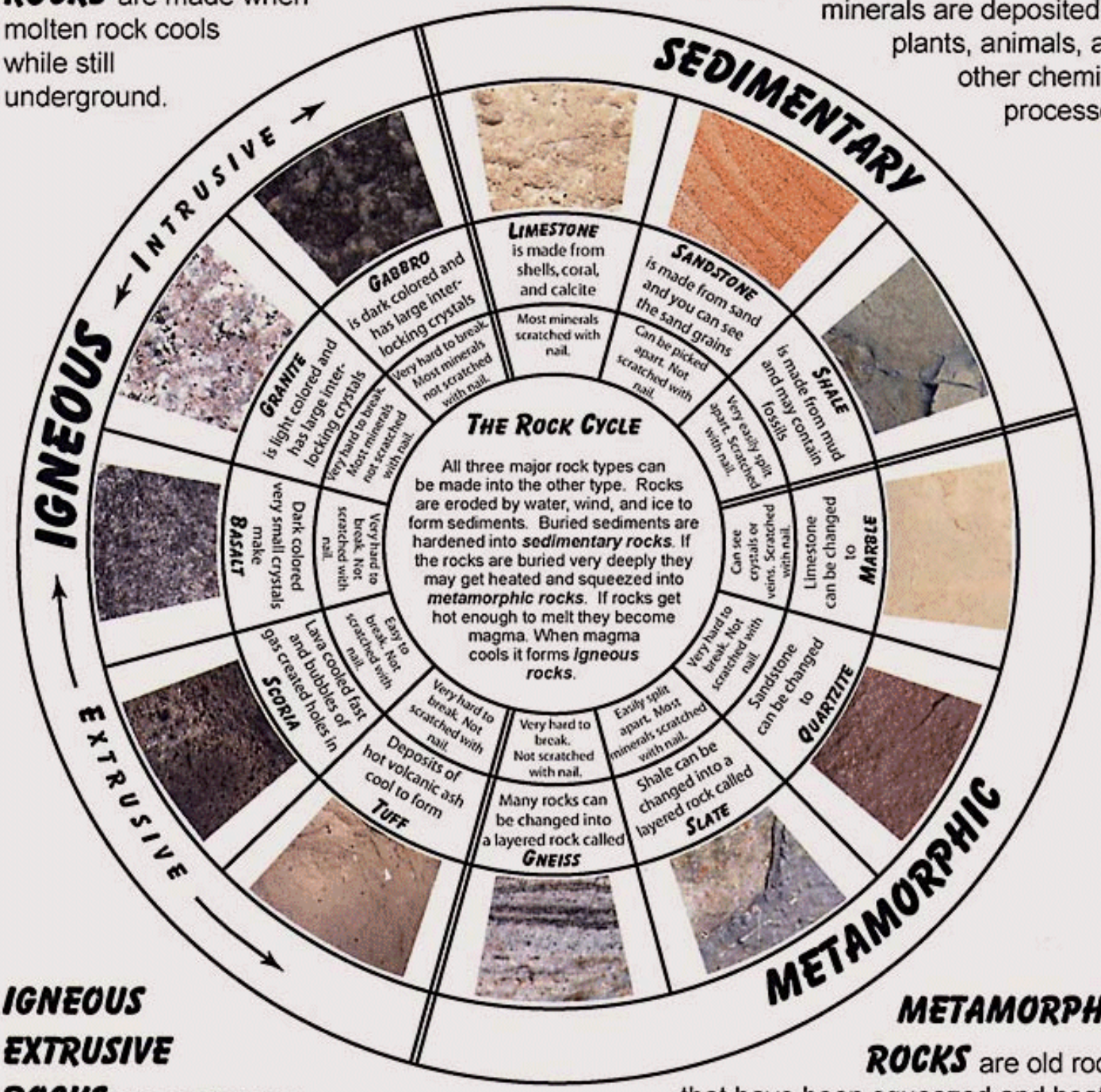
TEXTURE		GRAIN SIZE	COMPOSITION	TYPE OF METAMORPHISM	COMMENTS	ROCK NAME	MAP SYMBOL
FOLIATED	MINERAL ALIGNMENT	Fine	MICA	Regional	Low-grade metamorphism of shale	Slate	
		Fine to medium	MICA, QUARTZ, FELDSPAR, AMPHIBOLE, GARNET	(Heat and pressure increase with depth) ↓	Foliation surfaces shiny from microscopic mica crystals	Phyllite	
					Platy mica crystals visible from metamorphism of clay or feldspars	Schist	
	BAND-ING	Medium to coarse	MICA, QUARTZ, FELDSPAR, AMPHIBOLE, GARNET, PYROXENE		High-grade metamorphism; some mica changed to feldspar; segregated by mineral type into bands	Gneiss	
NONFOLIATED		Fine	Variable	Contact (Heat)	Various rocks changed by heat from nearby magma/lava	Hornfels	
		Fine to coarse	Quartz	Regional or Contact	Metamorphism of quartz sandstone	Quartzite	
			Calcite and/or dolomite		Metamorphism of limestone or dolostone	Marble	
		Coarse	Various minerals in particles and matrix		Pebbles may be distorted or stretched	Metaconglomerate	

ROCK	TEXTURE (FOLIATED or NON-FOLIATED)	COMPOSITION (minerals)	ROCK NAME	PROTOLITH (parent rock)	ENVIRONMENT contact (heat) or regional, (heat+pressure)
12.	non-foliated	does it fizz?			contact because no foliation
13.		does it fizz?		sandstone	contact because no foliation
14.				shale	regional
15.	banded (compositional layering)	quartz, _____, _____, amphibole	gneiss	shale or other sedimentary rock	regional
16.	foliated			shale	regional

HOW TO IDENTIFY ROCKS

IGNEOUS INTRUSIVE ROCKS are made when molten rock cools while still underground.

SEDIMENTARY ROCKS are made when pieces of rocks settle from the water or when minerals are deposited by plants, animals, and other chemical processes.



IGNEOUS EXTRUSIVE ROCKS are made when molten rock flows on the land surface or is thrown into the air and then is cooled into rock.

METAMORPHIC ROCKS are old rocks that have been squeezed and heated but not melted. What new rock is made depends on what the original rock was and on the amount of heat and pressure.

Source: Bill Langer, U.S. Geological Survey.

http://www.bedrockquarry.com/images/identify-rocks.jpg