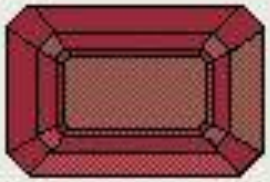
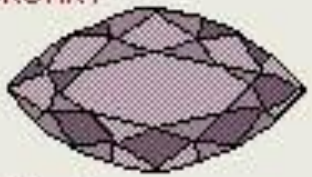
Rocks and Minerals

JANUARY



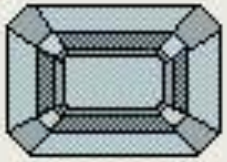
Garnet
Symbolizes: Constancy

FEBRUARY



Amethyst
Symbolizes: Sincerity

MARCH

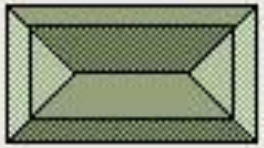


Aquamarine, bloodstone
Symbolizes: Courage

APRIL

Diamond
Symbolizes: Innocence, lasting love

MAY

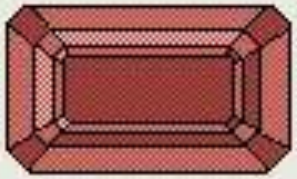


Emerald
Symbolizes: Love, success, hope

JUNE

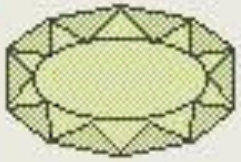
Pearl, alexandrite, moonstone
Symbolizes: Health, longevity, purity

JULY



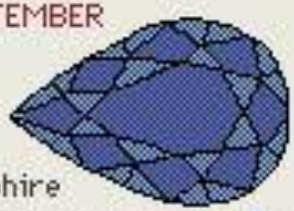
Ruby
Symbolizes: Contentment, love

AUGUST



Peridot, sardonyx, agate
Symbolizes: Married happiness

SEPTEMBER



Sapphire
Symbolizes: Clear thinking, wisdom

OCTOBER

Opal, tourmaline
Symbolizes: Hope

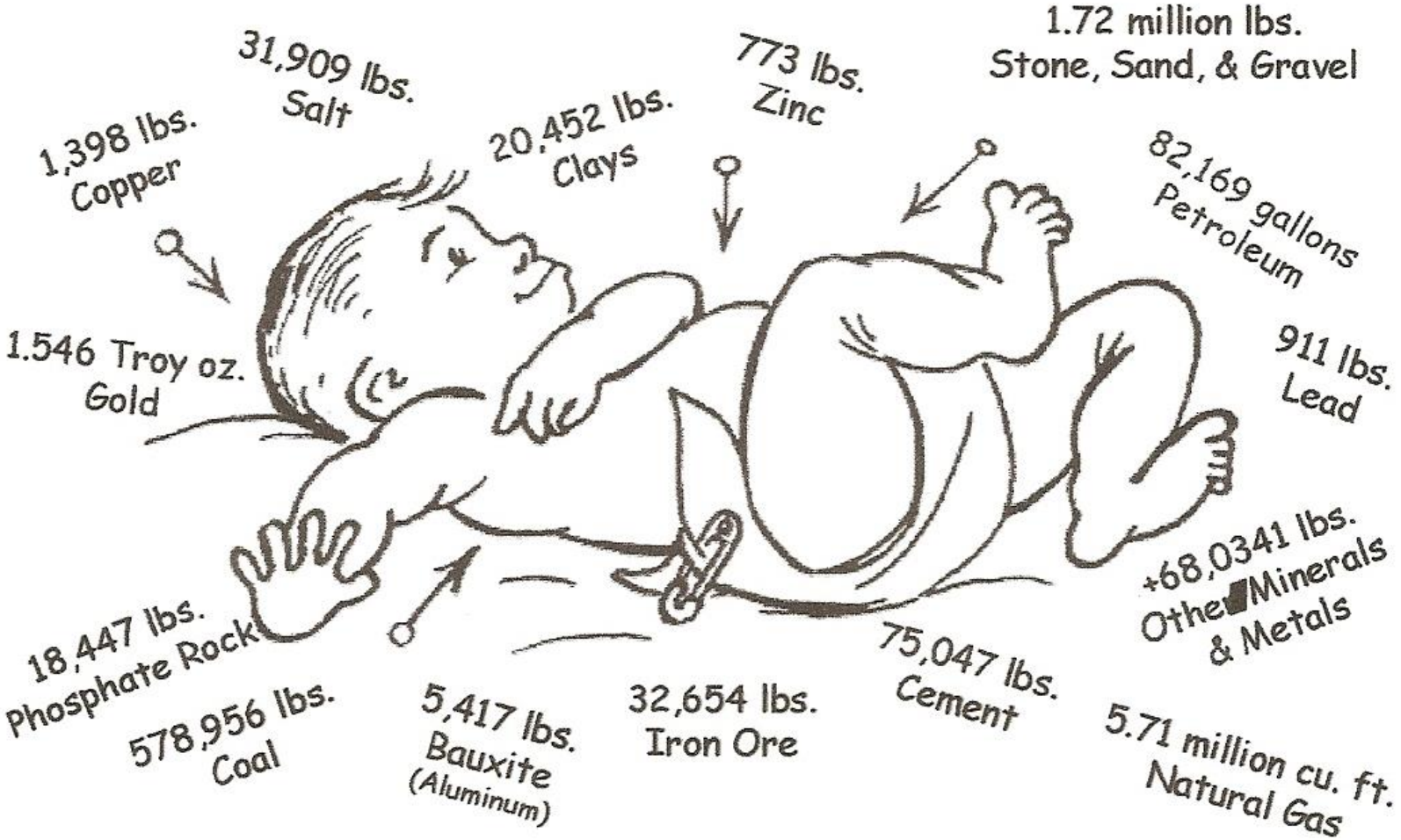
NOVEMBER

Topaz
Symbolizes: Fidelity

DECEMBER

Turquoise, zircon
Symbolizes: Prosperity, harmony

Every American Born Will Need . . .



***3.7* million pounds of minerals, metals, and fuels in their lifetime**

Minerals

5 Characteristics:

Naturally Occurring	Formed from elements or compounds
Inorganic	Definite chemical make up and regular atomic structure
Found as a solid in nature	

A. Minerals are classified according to their **physical** and **chemical** properties.

These are

1) **Luster**
2) **Hardness**
3) **Cleavage**
4) **Color**
5) **Composition**

Physical Properties:

1) Color · - Easiest to recognize

The worst property for mineral ID because,

Example: quartz · Comes in many different colors

calcite and halite – Can be transparent along with many others

2) Streak ·

Test:

Different samples of Quartz

Physical Properties:

1) Color · *The worst property for mineral ID*

- Easiest to recognize

Example: quartz · Comes in many different colors

calcite and halite – Can be transparent along with many others

2) Streak · The color of a minerals powder

Test: Rub a mineral across a piece of ceramic tile

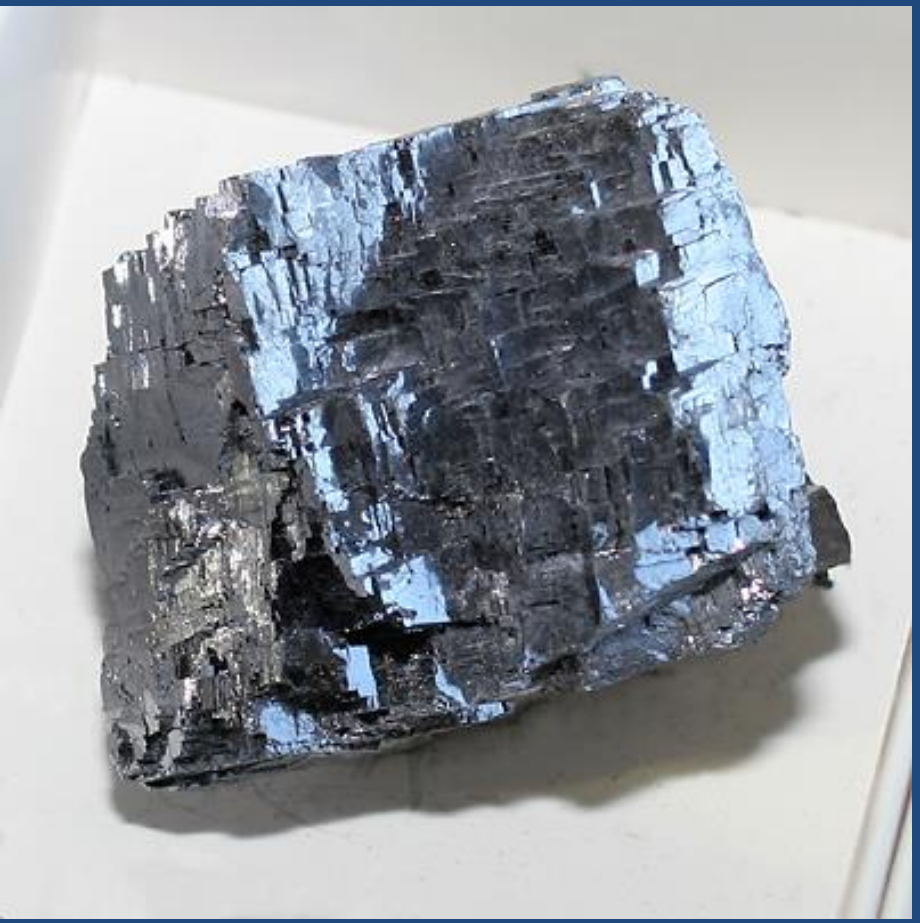
Streak

3) Luster · The way a mineral reflects light

Metallic · Looks like a metal

Non-Metallic · Does not look like a metal

Metallic



Non-Metallic

4) Hardness · A minerals ability to scratch or be scratched

Test: See if mineral scratches a glass plate

If it scratches glass = its harder than glass

Moh's hardness scale ·

10 minerals placed in order of hardness

Higher numbers scratch lower numbers

Moh's hardness scale:

1. Talc
2. Gypsum
3. Calcite
4. Flourite
5. Apatite
6. Feldspar
7. Quartz
8. Topaz
9. Corundum
10. Diamond

5.5 – approximate hardness of a glass plate

5) Cleavage · The ability of a mineral to break along smooth flat surfaces

Test: Look at a mineral carefully and check if light is reflecting off flat surfaces

6) Fracture ·

Cleavage

5) Cleavage · The ability of a mineral to break along smooth flat surfaces

Test: Look at a mineral carefully and check if light is reflecting off flat surfaces

6) Fracture · When a mineral breaks into pieces with uneven surfaces

Fracture

7) Composition

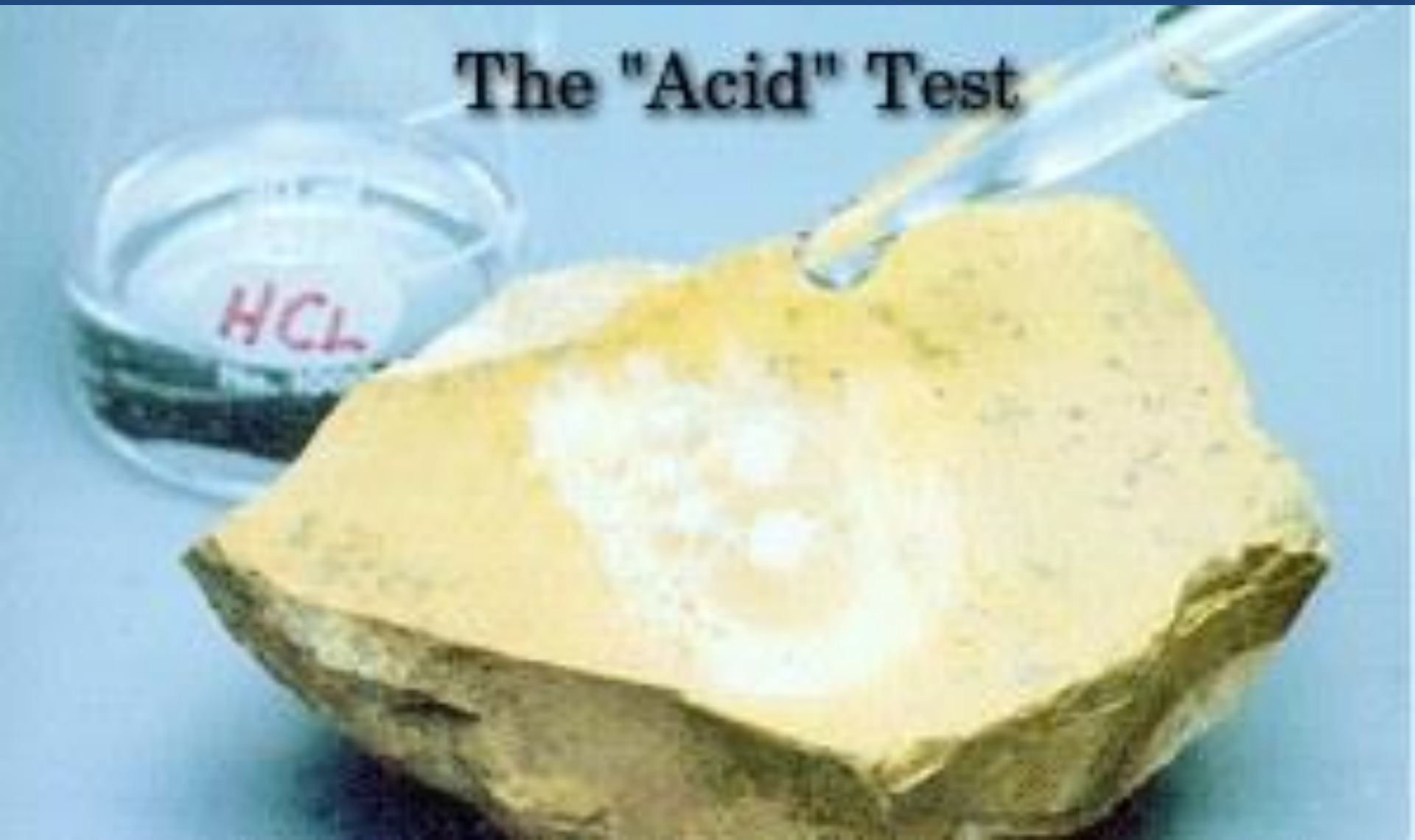
Elements that make up a mineral

Quartz composition = SiO_2

8) Special Properties · Unique properties some minerals have

Examples · Halite = tastes salty

Calcite= bubbles with HCl (hydrochloric acid)

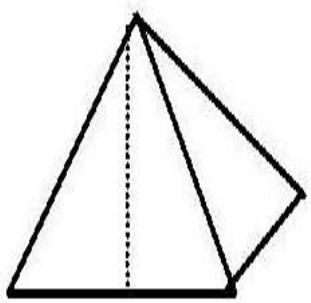

The "Acid" Test
HCl

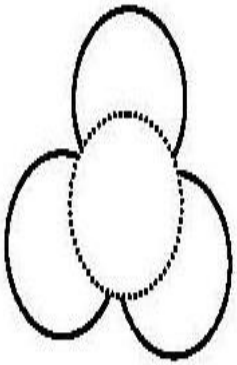
B. Minerals are grouped according to their **Physical and Chemical properties**

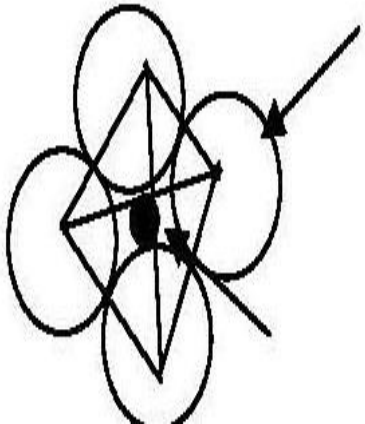
1. The elements **silicon** and **oxygen** combine to form tetrahedral units.

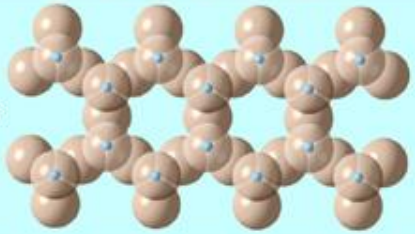
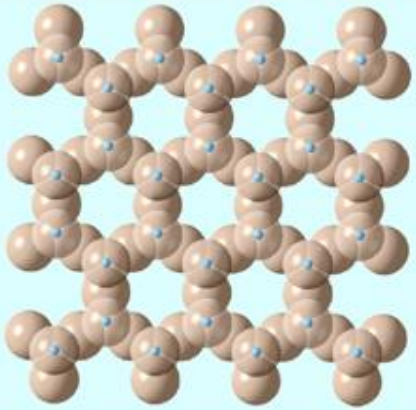
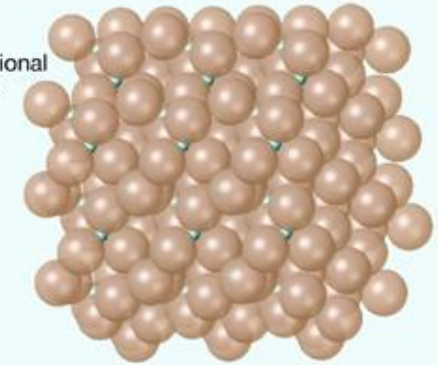
Together, the mass of these two elements are most abundant in the Earth's crust.

Silicates · any mineral composed of silicon and oxygen





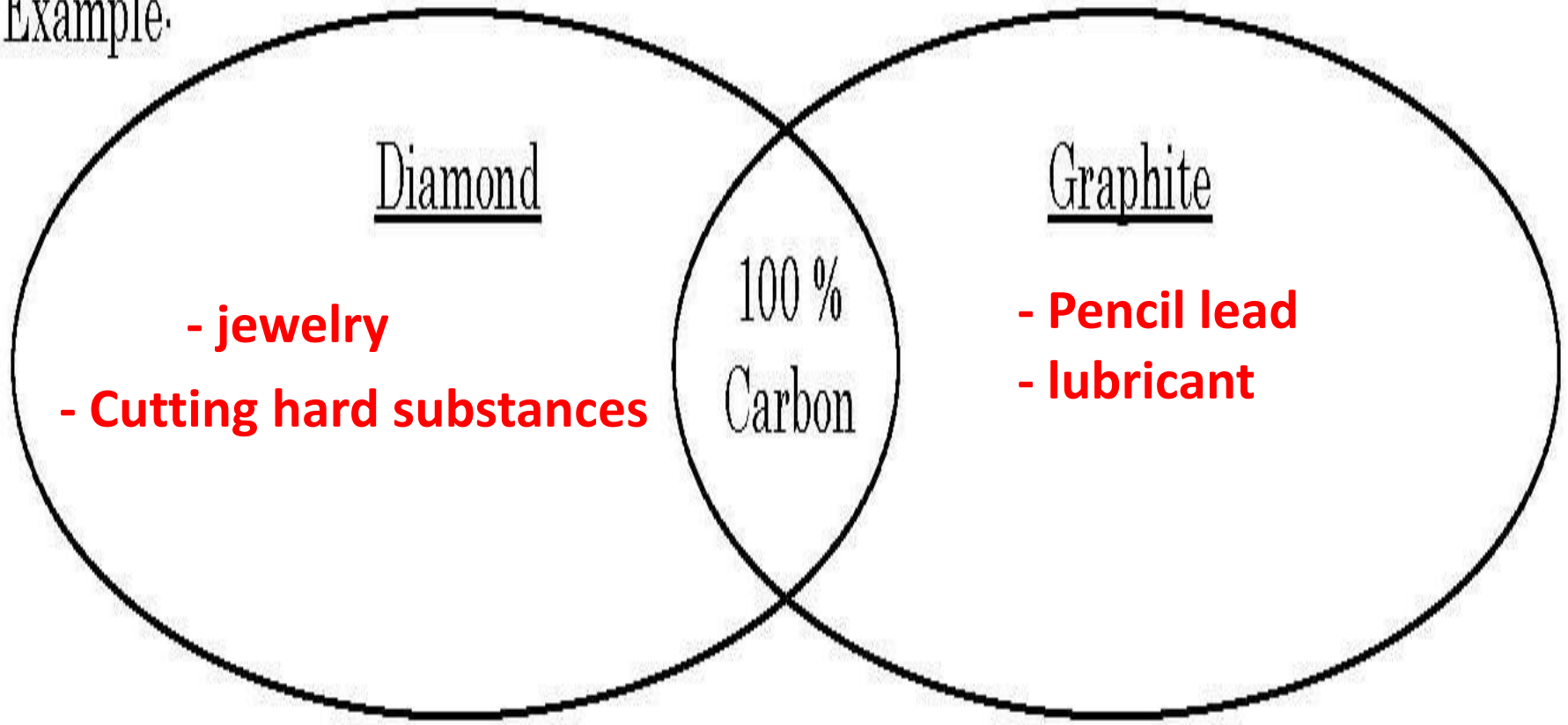


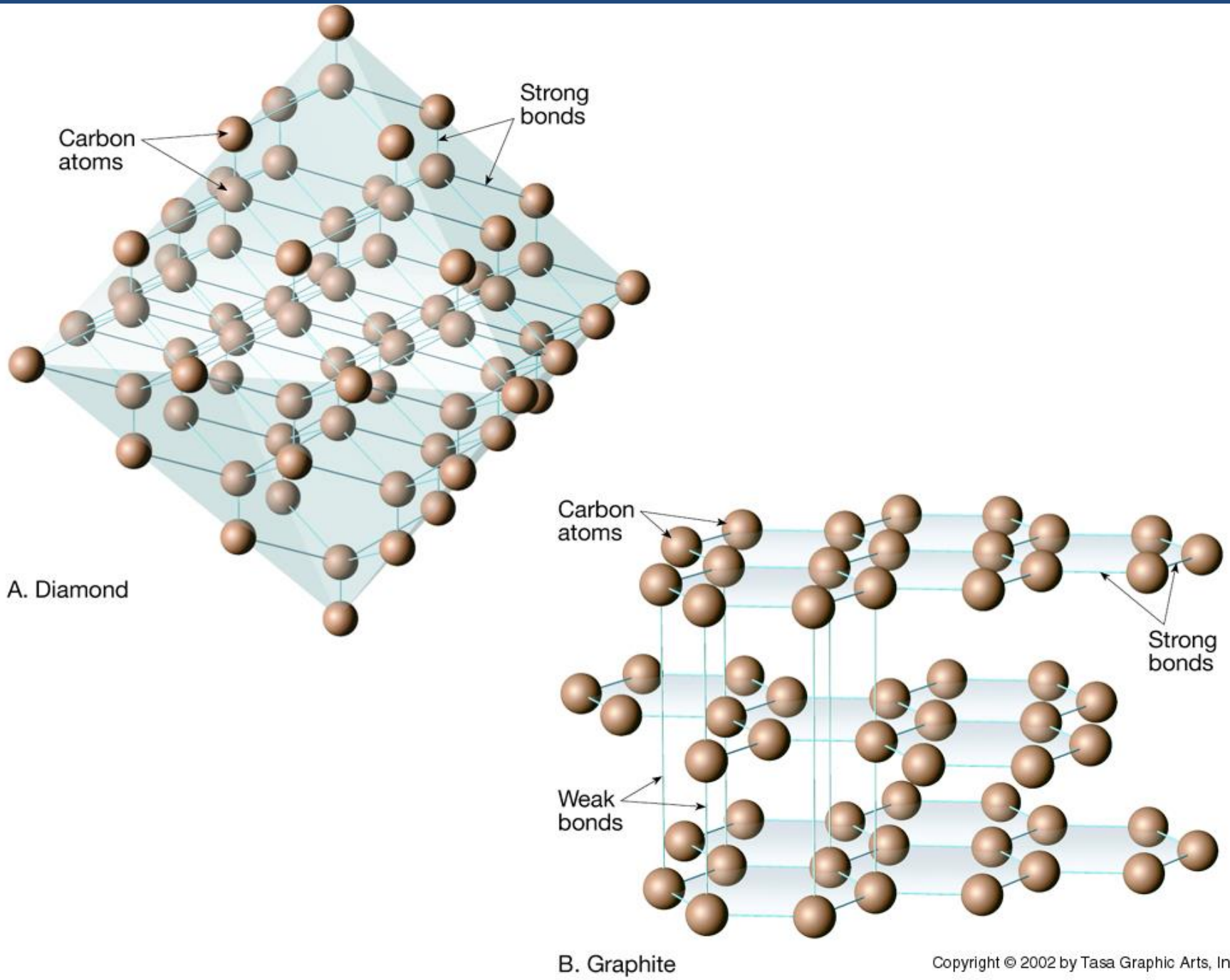
Mineral		Idealized Formula	Cleavage	Silicate Structure
Olivine		$(Mg, Fe)_2SiO_4$	None	Single tetrahedron 
Pyroxene group (Augite)		$(Mg,Fe)SiO_3$	Two planes at right angles	Single chains 
Amphibole group (Hornblende)		$Ca_2(Fe,Mg)_5Si_8O_{22}(OH)_2$	Two planes at 60° and 120°	Double chains 
Micas	Biotite	$K(Mg,Fe)_3AlSi_3O_{10}(OH)_2$	One plane	Sheets 
	Muscovite	$KAl_2(AlSi_3O_{10})(OH)_2$		
Feld-spars	Orthoclase	$KAlSi_3O_8$	Two planes at 90°	Three-dimensional networks 
	Plagioclase	$(Ca,Na)AlSi_3O_8$		
Quartz		SiO_2	None	

2. The physical properties of minerals depend upon the _____

Internal arrangement of atoms

Example:





3. Of the thousands of known minerals, only a few are found almost **Everywhere**

4. If you know how to identify about a **Dozen** of the most common minerals you will be able to identify minerals in most rocks you are likely to find.

5. Nearly all rocks are composed of one or more **Minerals**

6. Minerals are the **Building blocks** of most rocks.

Some exceptions include: **coal** and **limestone**

Complete pages 6-7 in notes packet

Watch You Tube Videos 3.1, ESRT 16

Three Classifications of Rocks are:

igneous

sedimentary

metamorphic

How are rocks identified?

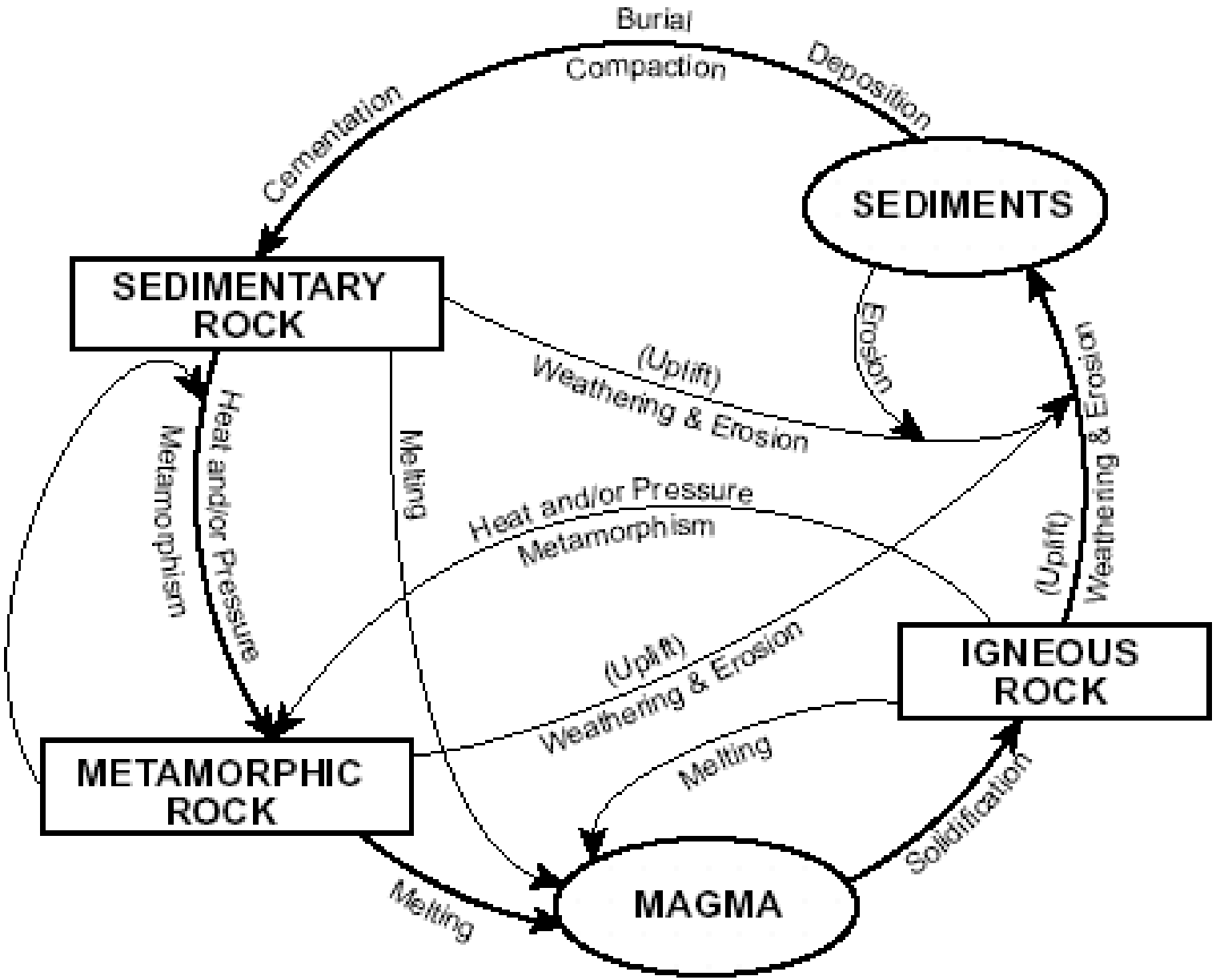
By their…

1) Composition

2) Texture

Texture is not how the rock feels but the size, shape and arrangement of the materials the rock is composed of.

Rock Cycle in Earth's Crust



Sedimentary Rocks

Key Concept #1: Most sedimentary rocks are made of pieces (clasts) of other rocks.

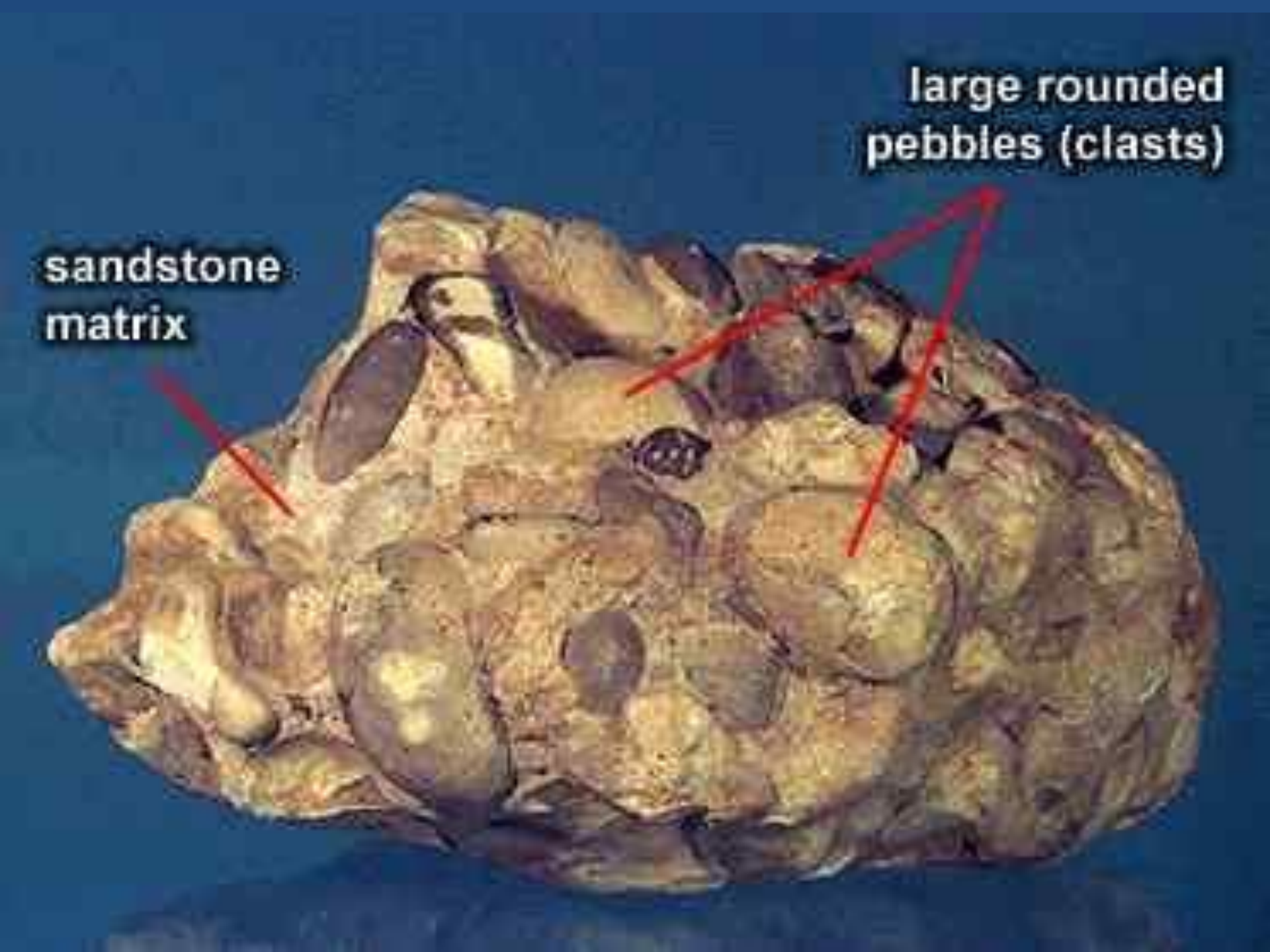
Key Concept #2: Name two processes that form sedimentary rocks.

a. _____

_____

b. _____

_____


large rounded
pebbles (clasts)
sandstone
matrix

Sedimentary Rocks

Key Concept #1: Most sedimentary rocks are made of pieces (clasts) of other rocks.

Key Concept #2: Name two processes that form sedimentary rocks.

a. Cementation and Compactions of rock sediments

b. Chemical precipitates from a solution

Key Concept #3: In what type of environment are most sedimentary rocks formed?

watery

Key Concept #4: Key Identifying Features of Sedimentary Rocks

a. Strata

- Clear layering of sediments
- Found in rock outcrops

b Clasts

c. Fossils

Key Concept #4: Key Identifying Features of Sedimentary Rocks

a. Strata

- Clear layering of sediments
- Found in rock outcrops

b Clasts

- Pieces of other rocks

c. Fossils


2003 06 16

Key Concept #4: Key Identifying Features of Sedimentary Rocks

a. Strata

- Clear layering of sediments
- Found in rock outcrops

b Clasts

- Pieces of other rocks

c. Fossils

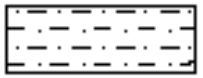
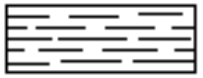
- The remains of once living organisms

http://www.eram.k12.ny.us/education/sctemp/47599442ab8e5070f121df9cd8bba399/1255982708/sedimentary.swf

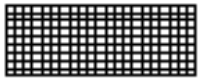
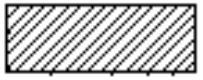
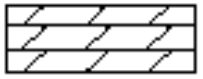
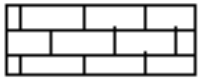
Animated sedimentary rocks esrt

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	

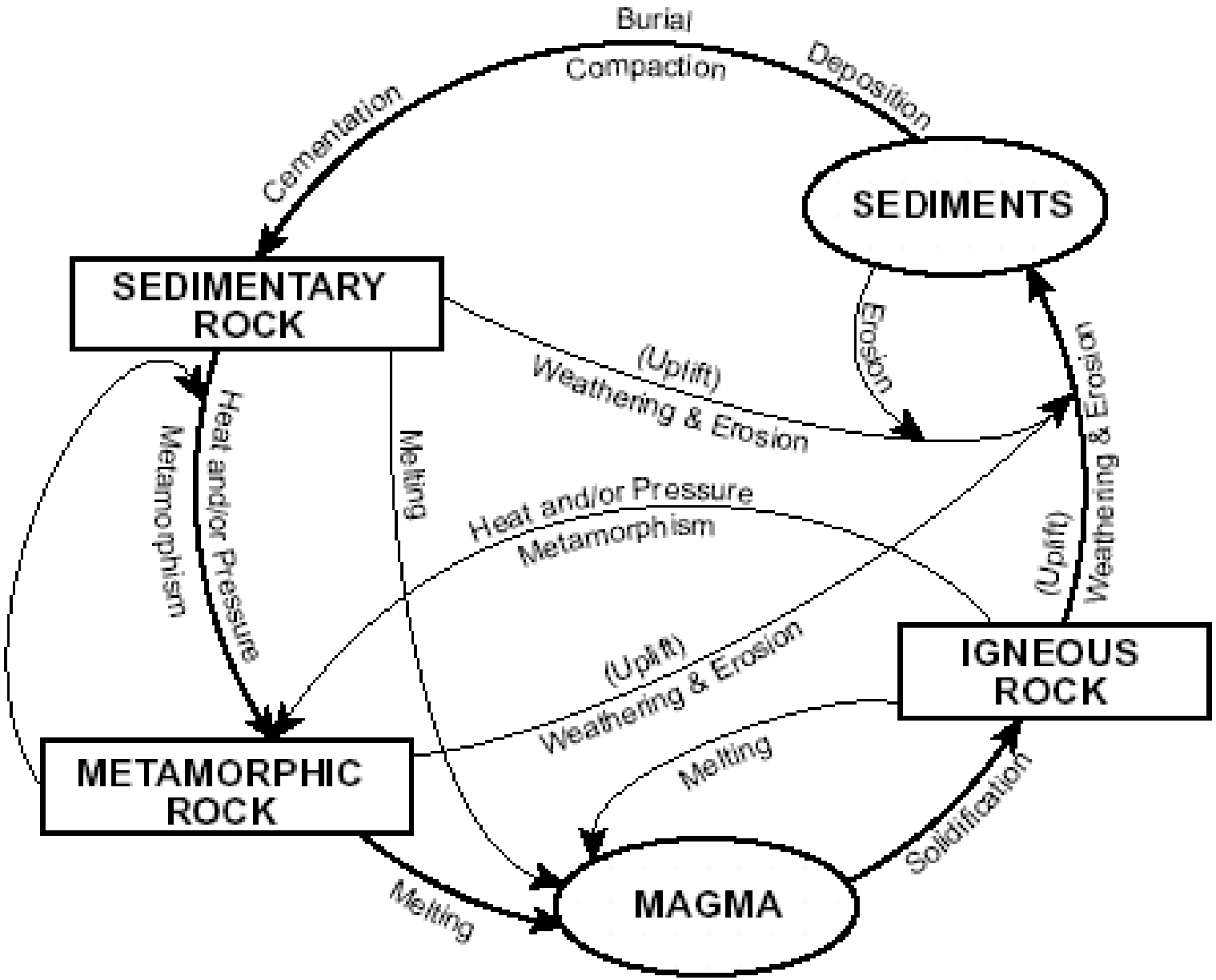
CHEMICALLY AND/OR ORGANICALLY FORMED SEDIMENTARY ROCKS

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	

Complete pages 8-10 in notes packet
Watch You Tube Videos 3.2, ESRT 7a, ESRT 6a

Igneous Rocks

Rock Cycle in Earth's Crust



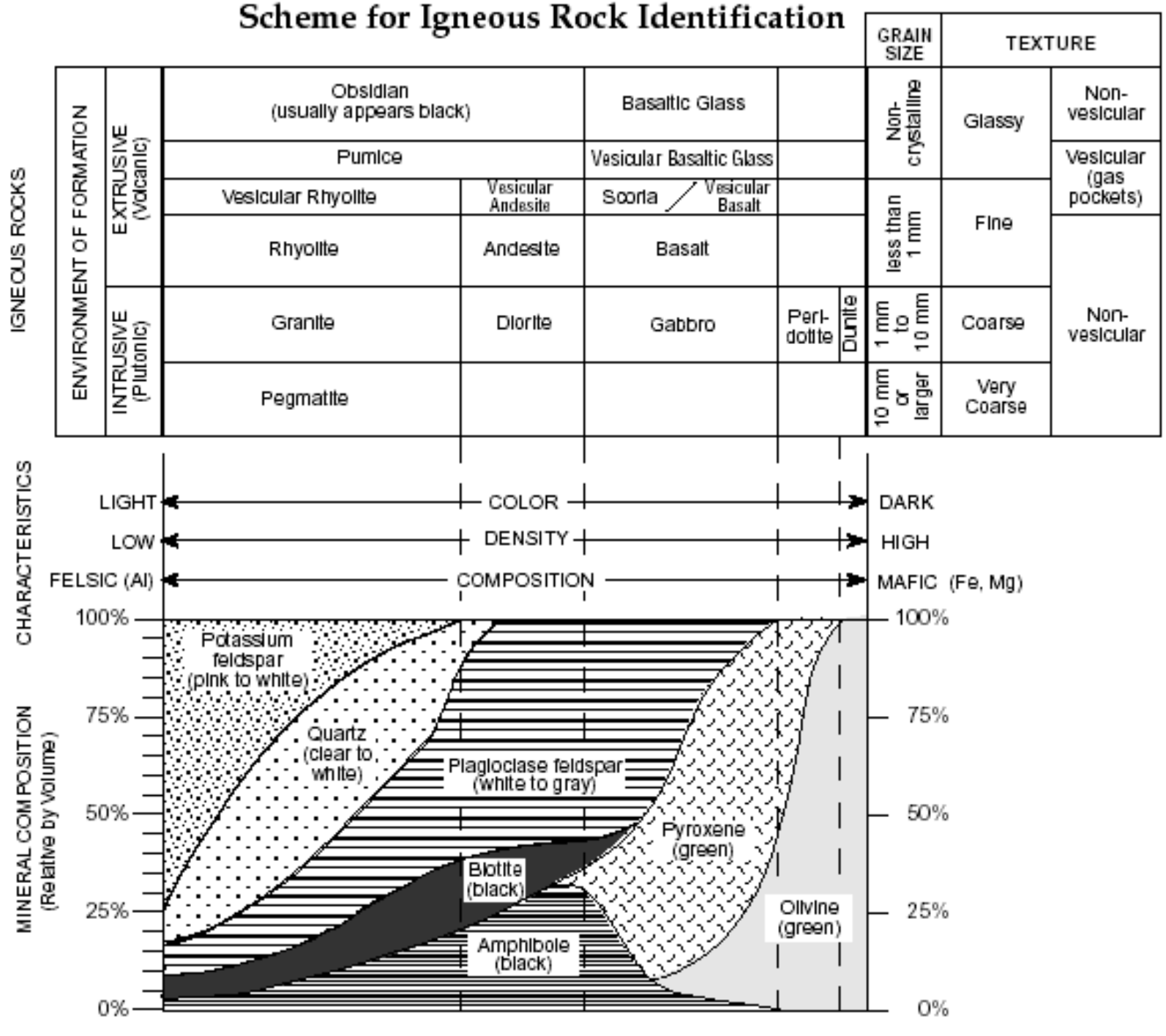
Igneous Rocks

Forms from the solidification of molten material (magma)

Earth Science Reference Tables, page 6

Intrusive	Environment of Formation	Extrusive
Plutonic (inside the earth)	Also known as	
Slow to very slow	Rate of cooling	
Large	Size of crystals	
Coarse to very coarse	Texture	

Scheme for Igneous Rock Identification



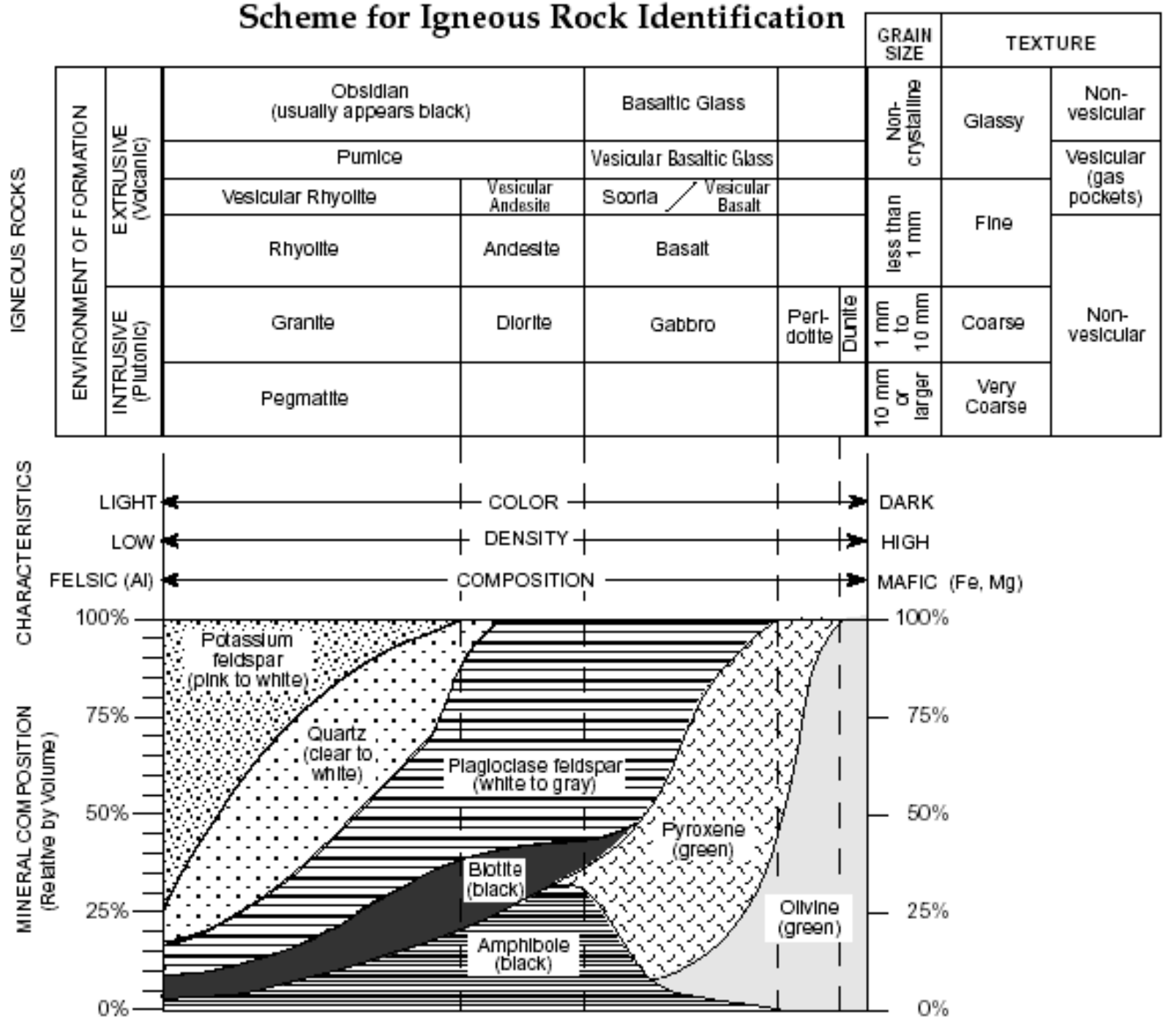
Intrusive Igneous Rocks

Big crystals

Earth Science Reference Tables, page 6

Intrusive	Environment of Formation	Extrusive
Plutonic (inside the earth)	Also known as	Volcanic (on the surface)
Slow to very slow	Rate of cooling	Fast to very fast
Large	Size of crystals	Small to non-crystalline
Coarse to very coarse	Texture	Glassy to fine

Scheme for Igneous Rock Identification



Extrusive Igneous Rocks

Small crystals, or glassy texture

Another identification clue for Igneous Rocks

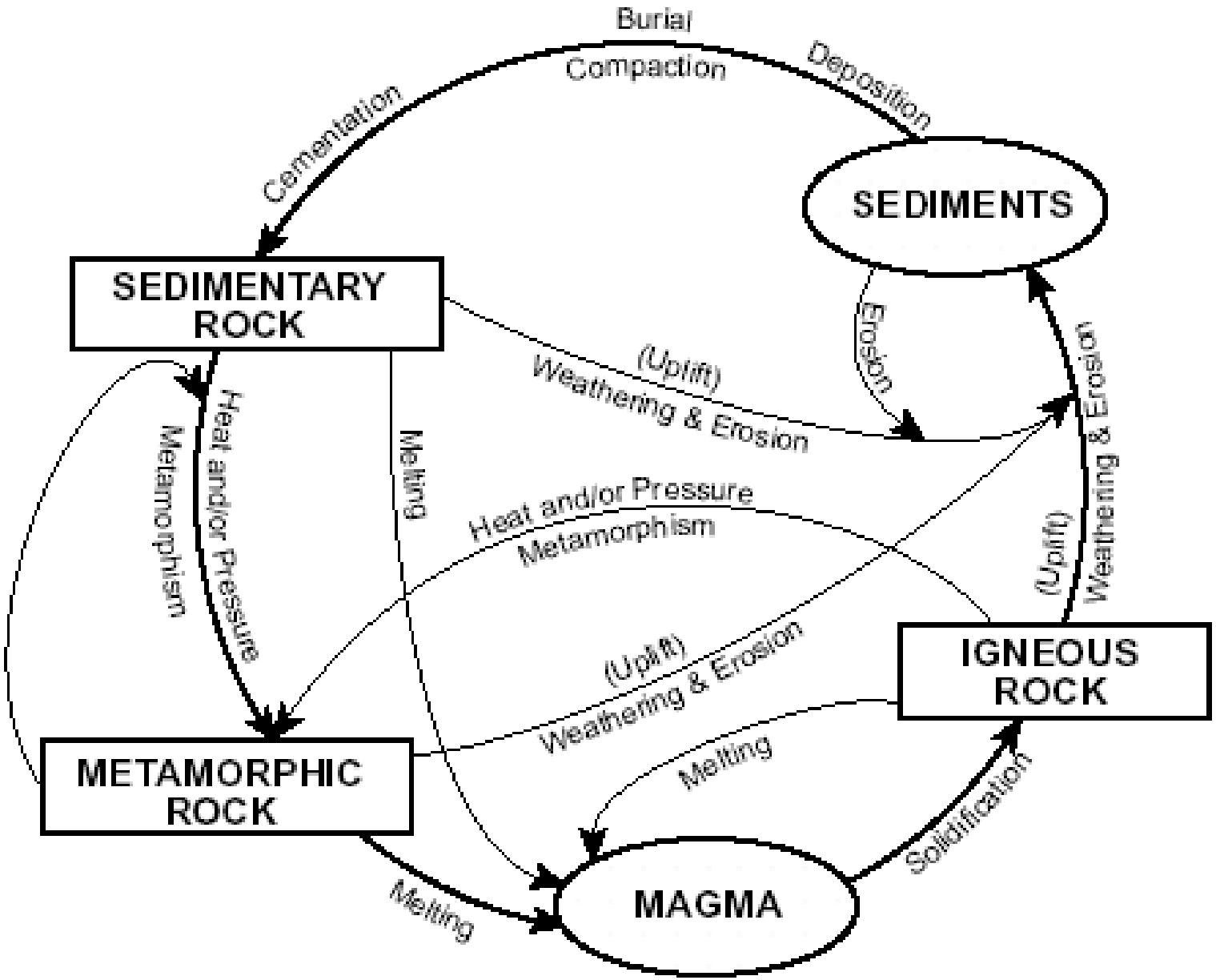
Vesicular Texture (it has gas pockets)

Complete pages 11-13 in notes packet

Watch You Tube Videos 3.3, ESRT 6b

Metamorphic Rocks

Rock Cycle in Earth's Crust



Key Concept #1: How are metamorphic rocks formed?

By extreme heat and/or pressure

Mountain forming events

Key Concept #2: Melting **DOES NOT** occur.

If melting does occur, it is classified as a(n) **Igneous** rock.

Key Concept #3: What is the difference between Regional and Contact Metamorphism?

REGIONAL:

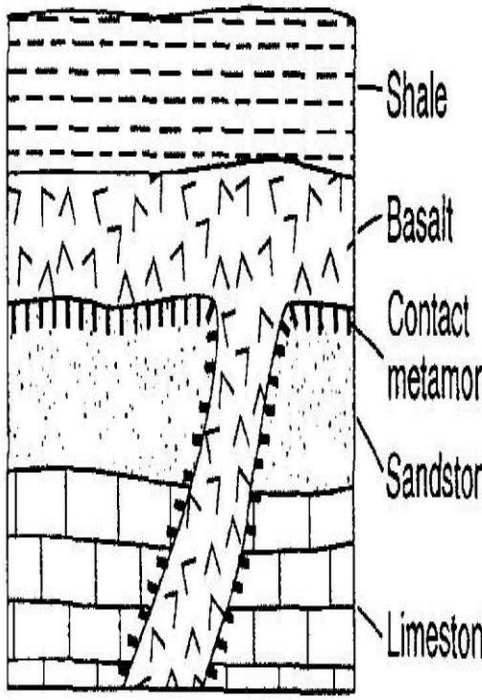
- Large areas of rock that undergoes intense heat and pressure.

- Mountain Building Events

CONTACT:

- Molten rock comes in contact with surrounding rocks and heat alters it.

* Does not melt the rock



Key Concept #4: Key Identifying Features of Metamorphic Rocks

a. Foliation: Minerals are aligned

Banding, type of foliation with bands of white and black minerals

b. Distorted Structure:

Key Concept #4: Key Identifying Features of Metamorphic Rocks

a. Foliation: **Minerals are aligned**

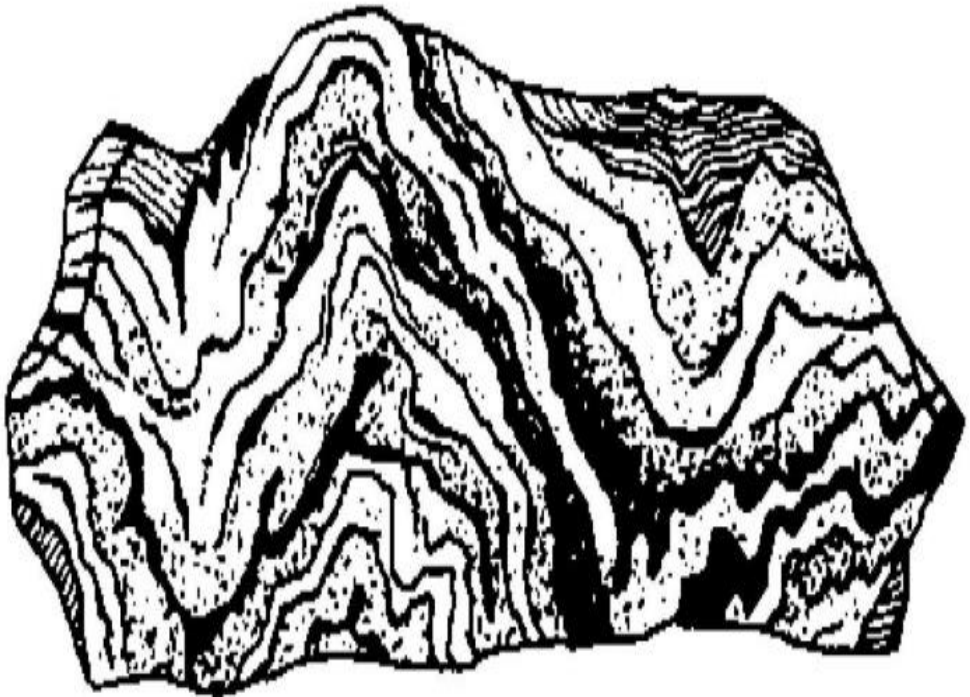
Banding, type of foliation with bands of white and black minerals

b. Distorted Structure: **Folded Layers**

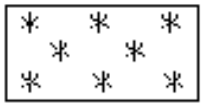
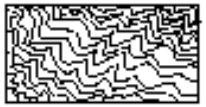

East Wall
South Wall
The Whaleback Anticline
North
Anticline

c. Key Identifier Minerals:

- ☐ Garnet — Dark Red Color
- ☐ Mica — Shiny, flaky mineral



Scheme for Metamorphic Rock Identification

TEXTURE		GRAIN SIZE	COMPOSITION	TYPE OF METAMORPHISM	COMMENTS	ROCK NAME	MAP SYMBOL
FOLIATED	MINERAL ALIGNMENT	Fine	MICA, QUARTZ, FELDSPAR, AMPHIBOLE, GARNET, PYROXENE	Regional (Heat and pressure increase with depth)	Low-grade metamorphism of shale	Slate	
		Fine to medium			Foliation surfaces shiny from microscopic mica crystals	Phyllite	
					Platy mica crystals visible from metamorphism of clay or feldspars	Schist	
	BAND-ING	Medium to coarse			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	

Complete page 15 in notes packet
Watch You Tube Videos 3.4, ESRT 7b