Name _____
Chapter 9 Minerals of the Earth's Crust

Vocabulary: Number and define each term below in a complete sentence on a separate sheet of paper. (Illustrate those with a *)

Crystal*	Cleavage*	density*	Double Refraction*
Fluorescence	Hardness	Inorganic*	Luster*
Mineral	Mineralogist	Mohs Hardness Scale	Nonsilicate mineral
Phosphorescence	Refraction*	Rock-Forming Mineral	Silicate Mineral
Streak	Silicon-oxygen Tetrahedra		

8.1 What is a Mineral?

A. Definition of a mineral:

1. _____- not made of living things or the remains of living things
2. _____- formed in the Earth; not synthesized by humans
3. _____- has a definite shape and volume
4. _____- is a single element or compound; can write a chemical formula to describe it
5. _____- orderly internal arrangement of atoms

B. Types of Minerals

1. How many mineral have been identified, how many are common?
   -Over _____ minerals have been identified, but fewer than ____ are common and are called rock-forming minerals
2. Silicate Minerals
   -Contain atoms of _____and _____, make up 96% of the Earth's crust
   -Two examples of silicates: Feldspar and _____ make up 50% of the crust
3. What are _____ minerals classified into?
   -Carbonates, Halides, Native Elements, Oxides, Sulfate, and Sulfides
   -Ex: see page 158, table 9.1

C. Crystalline Structure

1. How do crystals form?
   -Crystals form when liquid rock (magma or lava) cools, depending on the conditions that existed determines the _____
   -The longer it has to form, the larger the crystal
   a. Slow cooling forms large or _____ crystals
   b. Fast cooling forms small or _____ crystals
   c. Very fast cooling forms no crystals or a _____ texture
2. What is similar about all silicate minerals based on their crystal structure?
   -Their crystalline structure is made up of the same building blocks consisting of four _____ arranged in a pyramid with one _____ atom in the center—called a _____
3. What are the four types of silicon-oxygen tetrahedras?
   -Single chain_____

-Double chain- _____
-Sheets- _____
-Network silicates- _____

9.2 Identifying Minerals

A. Minerals have certain physical properties that can be used to identify them

1. Color- only good for a few minerals, because so many are different colors
   Ex. _____ is always green, _____ is always blue, Quartz comes in many colors, _____ is always yellow
   -Not a reliable test!- _____ looks just like gold (called fools gold)
2. Luster- describe the way a mineral reflects light from its surface,
   -luster is usually described as _____ (iron, gold, silver, pyrite) or _____ (doesn't reflect much light, not 'shiny')
   -Quartz's luster would be described as _____
   -Micas have a _____ luster
   -Diamonds have a _____ luster
   -Minerals that lack any shine are considered _____
3. Streak- the color of _____ off a mineral, the streak may differ from the actual color of a mineral making it an excellent tool in identifying some minerals
   -ex. _____ can be gray, green or black but always reddish-brown streak, metallic minerals generally have a dark streak
4. Cleavage and Fracture- describes the way a mineral _____ surfaces. If a mineral doesn't break along a smooth surface then it is known to fracture,
   -a rough surface is called _____
   -a broken surface that looks like wood is called _____
   -curved surfaces on a fractured mineral are called _____
   -example halite always breaks in _____ and mica along one surface.
   -tetrahedral sheets such as mica break into _____
5. Hardness- the ability of a mineral to resist being scratched, a very useful tool.
   - _____ developed a scale of hardness for minerals; the lowest value was assigned to the softest mineral while the hardest mineral has a value of 10 (_____)

-Mohs Hardness Scale

Mineral	Hardness
Talc	1
Gypsum	2
Calcite	3
Fluorite	4
Apatite	5
Feldspars	6
Quartz	7
Topaz	8
Corundum	9
Diamond	10

-The hardness of a mineral is largely determined by the strength of the _____ that make up its internal structure

-Both a diamond and graphite are made up exclusively of _____, diamond has a hardness of 10 due to the carbon atom forming a strong crystal structure with four other carbon atoms, graphite is arranged in layers that held together by weak forces

6. Crystal Shape- the way atoms or molecules come together determines the mineral's crystal shape. There are six basic shapes: _____ _____ (see page 166)
7. Density- is the amount of matter in a given space, the density of a mineral is always the same, galena will always be more dense than a piece of quartz the same size
   -Formula: _____, measured in grams per cubic centimeter

B. Special Properties of Minerals

1. Magnetism- certain minerals, especially magnetite, have magnetic properties that easily make them identifiable
2. Fluorescence - Calcite usually is white but under fluorescence light it appears red by absorbing _____
3. Phosphorescence –when a mineral continues to glow after being exposed to _____
4. Double Refraction- when light rays are bent while going through transparent material refraction occurs
   -Calcite produces double refraction making a _____
5. _____-some minerals have unstable nuclei due causing them to release particles and energy- ex. Uranium and Radium

5. Chemical Reactions- _____ reacts with HCl (Hydrochloric Acid)