Name _____ Date _____

Industrial Minerals, Ores, and Gems

There are over 4700 known minerals. We obtain most of the materials used in everyday life from minerals, including metals, chemicals used in manufacturing, food additives, etc. *Ores are minerals that have a high concentration of a certain element, typically a metal. Examples are cinnabar (HgS), an ore of mercury, sphalerite (ZnS), an ore of zinc, or cassiterite (SnO_2), an ore of tin* (Mineral).

Part A: The table lists several ores of metals and their chemical formulas. Identify the metal that each mineral ore is a source of by looking at the formula. You can use your ESRT to find the symbol for each element. Write the name of the metal in the appropriate column. Then classify each ore mineral in its appropriate mineral family (carbonate, oxide, or sulfide). Carbonates all contain CO_3. Oxides consist of a metal with oxygen and sulfides consist of a metal combined with sulfur.

Ore	**Formula**	**Name of Metal**	**Mineral Family (carbonate, oxide, or sulfide)**
Magnesite	$MgCO_3$		
Bauxite	Al_2O_3		
Sphalerite	ZnS		
Hematite	FeO_3		
Zincite	ZnO		
Cinnabar	HgS		
Chalcopyrite	FeS_2		
Galena	PbS		
Uraninite	UO_2		
Siderite	$FeCO_3$		
Limonite	Fe_2O_3		

Cassiterite	SnO_2		
Magnetite	Fe_3O_4		
Smithsonite	$ZnCO_3$		
Cuprite	Cu_2O		
Stibnite	Sb_2S_3		

1. What is an ore mineral? _____
   _____

2. Based on the table, list the common mineral ores of the following metals

   Iron _____

   Zinc _____

   Copper _____

   Lead _____

   Aluminum _____

3. State how these metals are used by modern society. For example, iron is used to make steel, which is used in construction, cars, utensils, etc.

   Zinc_____

   Copper_____

   Lead_____

   Aluminum_____

4. What is similar about magnetite and hematite? What makes them different minerals?

   _____

Part B: *Gems are minerals with an ornamental value, and are distinguished from non-gems by their beauty, durability, and usually, rarity. There are about 20 mineral species that qualify as gem minerals, which constitute about 35 of the most common gemstones. Gem minerals are often present in several varieties, and so one mineral can account for several different gemstones; for example, ruby and sapphire are both corundum,* Al_2O_3 (Mineral).

Read the article "Gemstones" on pages 56-57 and answer the questions below.

5. What is a gemstone? What are characteristics of a gemstone?

_____

_____

6. What makes a gemstone valuable?

_____

_____

7. What is the difference between a precious stone and a semiprecious stone?

_____

_____

8. Why do some gems, such as diamonds, sapphires, and rubies command the highest prices?

_____

_____

9. Research your birthstone. Include the following: mineral name vs gemstone name (sometimes they are different), composition, physical properties, where it is found, and relative value. Include a picture and at least one other interesting fact about it. (For example, you can include info about the most famous specimen or mineral lore or mythology).

Attach as a separate page.

Part C: Industrial Minerals

Commercially valuable minerals and rocks are referred to as industrial minerals. For example, muscovite, a white mica, can be used for windows (sometimes referred to as isinglass), as a filler, or as an insulator (Mineral).

Research how the each mineral is used. You may use your ESRT, text or internet sources.

Quartz _____

Gypsum _____

Talc _____

Halite _____

Sulfur _____

Feldspar _____

Calcite _____

Garnet _____

Mineral. *Wikipedia*. 12 November 2012. Viewed 27 November 2012. http://en.wikipedia.org/wiki/Mineral

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