Prereading (30 points)

1. Where on the periodic table would you find metals?
2. Where on the periodic table would you find nonmetals?
3. How do you think they might be different?

**Directions.** Read and annotate the article on the properties of metals, nonmetals and metalloids. (20 points). Answer side questions during reading. (20 points)

**Introduction**

Elements in different groups are lumped together in one of three classes, depending on their properties. The classes are metals, nonmetals, and metalloids. Knowing the class of an element lets you predict many of its properties.

**Metals**

Metals are elements that are good conductors of electricity. They are the largest of the three classes of elements. In fact, most elements are metals. Examples include sodium (Na), silver (Ag), and zinc (Zn).

Metals have relatively high melting points, so almost all are solids at room temperature. The only exception is mercury (Hg), which is a liquid. Most metals are also good conductors of heat. That’s why they are used for cooking pots and stovetops. Metals have other characteristic properties as well. Most are shiny, ductile, and malleable.

**Nonmetals**

Nonmetals are elements that do not conduct electricity. They are the second largest class of elements. They are all the elements on the right side of the table that are color-coded green. Examples of nonmetals include helium (He), carbon (C), and oxygen (O). Nonmetals generally have properties that are the opposite of those of metals. They also tend to vary more in their

properties than metals do. For example, nonmetals have relatively low boiling points, so many of them are gases at room temperature. But several nonmetals are solids, including carbon and phosphorus (P). One nonmetal, bromine (Br), is a liquid at room temperature.

Generally, nonmetals are also poor conductors of heat. In fact, they may be used for insulation. For example, the down filling in a down jacket is mostly air, which consists mainly of nitrogen (N) and oxygen (O). These nonmetal gases are poor conductors of heat, so they keep body heat in and cold air out. Solid nonmetals are dull rather than shiny. They are also brittle rather than ductile or malleable.

**Metalloids**

Metalloids are elements that fall between metals and nonmetals in the periodic table. Just seven elements are metalloids, so they are the smallest class of elements

 Examples of metalloids include boron (B), silicon (Si), and germanium (Ge).Why is understanding the properties of metals, nonmetals, and metalloids important?

List three properties of a metal.

List properties of a nonmetal.

How many metalloids are there on the periodic table?

Metalloids have some properties of metals and some properties of nonmetals. For example, many metalloids can conduct electricity but only at certain temperatures. These metalloids are called semiconductors. Silicon is an example. It is used in

computer chips. It is also the most common metalloid on Earth. It is shiny like a metal but brittle like a nonmetal.

From left to right across the periodic table, each element has one more proton than the element to its left. Because atoms are always electrically neutral, for each added proton, one electron is also added. Electrons are added first to the lowest energy level possible until that level is full. Only then are electrons added to the next higher energy level.

How are metalloids different than metals or nonmetals?

Post Reading questions (30 points)

1. How would you compare a metal to a nonmetal?
2. State one way a metalloid is like a metal and one way it is like a nonmetal.
3. A mystery element has properties that include dull, gray solid that is a poor conductor of electricity. How would you classify this element, as a metal, nonmetal or metalloid? Explain your answer.