**Investigative Problem One:**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Core: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Teacher: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Rocky Top is at risk of economic demise!** Rocky Top is a city in Anderson and Campbell counties in the eastern part of Tennessee, The population was 1,781 at the 2010 census.

Rocky Top lies along Coal Creek, about 20 miles north of the nuclear engineers and supercomputers at Oak Ridge National Laboratory, but also, a world away. The creek carves out a narrow valley in the hills, trickling past forests that have swallowed up abandoned coal mines.

It passes the graves of 32 never-identified miners, killed in an explosion more than a century ago. And it passes small homes that cling to the hillsides in communities where descendants of coal miners still live.

Briceville, one of those communities, population about 500, recently lost its only store. And only a few businesses hang on in the downtown Rocky Top, home to about 1,800. There’s little anyone can do to stop the exodus of those seeking a paycheck. The poverty level is rising….

So…

Given the fact that the United States is an important producer of key minerals used to make metals and is the world’s second largest miner of gold and copper and also a significant producer of iron ore, zinc, lead, molybdenum and silver, Rocky Top is calling you to develop the mining industry once more. This could save the community. The United States has ready markets for these minerals in relatively close proximity to its huge manufacturing and construction sectors.

The demand for metals is derived from their use in the manufacture of other products and generally follows output trends in those industries. Among the largest metal consumers are the construction, motor vehicle~~s~~ and manufacturing industries, and yes, the space program industry!

Your help is needed. **Metals as asteroids appear attractive for mining to space programs** – this is an added incentive to re-establish the mining industry and bring economic growth to Rocky Top. The metals that can be mined are essential for space travel. An asteroid could be processed to provide very pure iron and nickel. Valuable by-products would include cobalt, platinum and gold!

You must provide the miners with education and information. **The elements of carbon, silicon, tin, sulfur and iron** can apparently be mined in the area of Rocky Top. The question that arises is…

*How can our miners determine if an element being mined is a metal or a non-metal? They are searching for metals, obviously.*

**Information to be gathered is below. Click here to visit the interactive periodic Table:** <http://www.ptable.com/>

* **What is a metal?**
* **What is a non-metal?**
* **What characteristics distinguish metals from non-metals?**
* **What is a metalloid?**
* **Properties of metals**
* **Properties of non-metals**
* **Appearance of the elements  *Carbon, Silicon, Tin, Sulfur and Iron***
* **Malleability of the elements *Carbon, Silicon, Tin, Sulfur and Iron***
* **Ductility of the elements of *Carbon, Silicon, Tin, Sulfur and Iron***
* **Conductivity of the elements of *Carbon, Silicon, Tin, Sulfur and Iron***
* **How can HCL be used to determine metals vs. non-metals? (Metals react with HCl and Non- metals do not react) Which elements react?**
* **How can Copper Chloride (CuCl2) be used to determine metals vs. non-metals? (Most non-metals do NOT react with acid or Copper chloride, so metals will react with copper chloride) Which elements react?**
* **Determine which elements should be mined for the space program.**

|  |  |
| --- | --- |
| **NOTES** | |
| **What is a metal?**  **Properties of a metal** | **What is a non-metal?**  **Properties of a non-metal** |
| **What is a metalloid?**  **Properties of a metalloid** | **Characteristics distinguishing metals from non-metals** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Metal and Non-metal Data** | | | | |
| **Element** | **Appearance** | **Melleability/Ductility**  **Conductivity** | **Reaction with HCL** | **Reaction with CuCl2** |
| **Carbon** |  |  |  |  |
| **Silicon** |  |  |  |  |
| **Tin** |  |  |  |  |
| **Sulfur** |  |  |  |  |
| **Iron** |  |  |  |  |

**Final Presentation of Research and Conclusions:**

1. **You will present all of your findings in some kind of visual format. This may be digital or other.**
2. **Presentation should include all of your information gathered, including all charts presented in a quality display.**
3. **Presentation should also include your final conclusions on which elements should be mined in the Rocky Top area and WHY. Make sure you include how these elements, if mined, would impact the economy. Would they be profitable and feasible in growing the economy? Why?**
4. **Presentation must include justification for #3.**
5. **Presentation must include YOU as the presenter. This could be a live presentation at another date or a videotaped presentation (around 5 minutes).**