**5E Template- Science**

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| **Name: Beth Gall** | **Date: 7/12/11** |
| **Content Area: Earth Science** | **Grade Level(s): 9th**  | **Topic(s): Minerals** |

**CTA Session Reference** – Something to Put in your Earth Science Teaching Toolbox – Ginny Greenlaw

**Standards (SOL)**

*ES.1c and ES.4a*

**Objectives (UKD’s)**

*The student will investigate and understand how to identify minerals based on physical and chemical properties.*

*Key concepts include hardness, color, streak, luster, cleavage and fracture.*

**Materials & Resources**

*set of mineral samples – to include at least quartz, talc, feldspar, gypsum, fluorite, calcite*

*streak plate, steel nail, penny, glass plate, a fingernail☺*

**Safety Considerations**

*Caution students to use special care when using the glass plate. They are to keep the plate in the center of the table and tell them to NOT hold the glass plate in their hand when testing for hardness. The plate needs to be kept flat on the table.*

**Engage – Time Estimate – 5 minutes**

*Ask students to describe what they think HARDNESS means as it relates to a mineral. Accept all reasonable descriptions. Ask them what tools they might* *need to test for hardness. Many may suggest a hammer.* *Ask them how they would test the hardness of a diamond without destroying it.*

**Explore – Time Estimate – 10-15 minutes**

*Key terms: hardness, Mohs Scale of Hardness*

 *1. Using their pre-established “appointment clocks” they will partner up in groups* *of two. Have each group come to the front of the room and get the materials listed above.*

*2. Ask them to try to scratch each mineral with their fingernail. They are to scratch each mineral with their fingernail, the steel nail, a penny and then try to scratch the glass plate with each mineral.*

*3. In their notebook, they will note what scratches each mineral.*

*4. Then students will try to scratch each mineral with the other minerals to determine relative hardness.*

*5. When all scratch tests are complete, students will create a chart (ES.1c) that will try to list the minerals from softest to hardest.*

**Explain -- Time Estimate – 10 minutes**

*Using each mineral, ask students to describe their test results. Make a master chart on the board and record results when consensus is reached. Ask students to now define mineral hardness again.*

*Introduce Mohs Scale of Hardness. Show a copy of one, either from the text or internet. Discuss the hardness of the tools used: fingernail (2.5), copper penny (3.0), nail (4.5), glass (5.5), streak plate (7.0). Compare Mohs scale to the students’ determination of order of hardness. If there are discrepancies, discuss what could have caused these variations.*

**Extend -- Time Estimate – 45 minutes**

*Using the same minerals, students can now identify surface color, streak color, luster, cleavage and fracture. Examples may need to be used to explain the difference between cleavage and fracture, as well as luster choices of metallic or nonmetallic. When these physical properties have been determined, give students a mineral identification key to name each mineral.*

**Evaluate -- Time Estimate – 10 minutes**

*When all lab tests are complete and identification is complete student lab sheets will be graded.*

**Plans for Diversity**

*Special needs students will be able to perform all hardness tests and do all physical tests. They may need support in reading the identification key to locate the names of each mineral.*

**Connections**

*This lab activity ties in with the unit on mineral identification. Physical properties can be associated with useful forms of minerals such as ores and gems. Hardness is an important property to associate with birthstones, such as emeralds, rubies and sapphires.*