MONTICELLO
Digital Classroom

Red Soil & Dimensional Analysis

MATHEMATICS **AP ENVIRONMENTAL SCIENCE**

Overview:

For this exercise, we will focus on the ways to represent soil samples (including those found at Monticello) using ternary graphs and a dimensional analysis math problem that puts the labor-intensive work of the enslaved into an understandable frame of reference. This is a two part activity for two subjects. One part will be given to the AP Environmental Science class and one part will be given to the math class during the dimensional analysis unit. These lessons can be done in just the math class, just the AP Environmental Science class, or given to both classes.

Prior Knowledge

Math
Determine the volume of a rectangular prism given the three side lengths.
Perform unit conversions (using dimensional analysis or alternative method)

Science
Basic geologic principles, such as:
–The distinction between a rock and mineral
–Weathering processes (chemical and mechanical).

Standards

Objectives

Math
Students will understand how calculate the volume of a rectangular prism.

Students will be able to use dimensional analysis to convert units in order to solve a problem.

Students will know how to solve multi-step problems.

Science
Students will practice reading ternary graphs in order to evaluate the composition of soil or rock samples.

Students will be able to describe the physical changes that occur to change an underlying bedrock (greenstone) into a red clay (Davidson clay).

Students will know how to plot data on a ternary diagram.

Steps:

1. Divide class into groups of 3-4.
2. Hand out both or either of the copies of the Math and Science handouts. Allow students to work on

the worksheet for approximately 10 – 20 min.
3. Review student responses and provide correct answers to problems.
4. Facilitate a discussion about the life of slaves at Monticello.

Materials: Copies of worksheets, scientific calculator

Assessments:

Formative

Assessment Criteria:

This content can be incorporated into a larger unit test or project for a math class, geology, or environmental science. It falls within the AP environmental science unit on earth systems and resources, and within a unit on rocks and minerals in a geology course. It falls within a unit of a math class that deals with unit conversions. (Trigonometry, Geometry, Alg2/Trig, etc).

Accommodations:

For students that have not had experience with dimensional analysis or volume of a rectangular prisms, some pre-lessons would be needed.

For classes with an ELL population, mix groups to have a balance of native English speakers in each group.