Lesson Title	Science and the scientific process
Length of Lesson	30-45 min. Activity, 45-60 min Discussion or Lecture/ One Day Total
Created By	Lucas Pounders
Subject	Physical Science
Grade Level	9^{th} - 12^{th}
State Standards	1b, 1c, 1e, 1f, 1g
DOK Level	2,3
DOK Application	Assess, communicate, understand
National Standards	9-12 Science as Inquiry Standards
Graduate Research Element	The Scientific Method and Mapping using attribute information

Student Learning Goal:
This lesson will focus on allowing the kids to know and understand the scientific process and be able to troubleshoot the process from start to finish. They will be presented with a problem and be asked to work through the problem using the steps of the scientific method.

State Standards:
b. Identify questions that can be answered through scientific investigations. (DOK 3)
c. Identify and apply components of scientific methods in classroom investigations. (DOK 3)
- Predicting, gathering data, drawing conclusions
- Recording outcomes and organizing data from a variety of sources (e.g., scientific articles, magazines, student experiments, etc.)
- Critically analyzing current investigations/problems using periodicals and scientific scenarios

e. Analyze procedures and data to draw conclusions about the validity of research. (DOK 3)
f. Formulate and revise scientific explanations and models using logic and evidence (data analysis). (DOK 3)
g. Communicate effectively to present and explain scientific results, using appropriate terminology and graphics. (DOK 3)

National Standards
9-12: Science as Inquiry Standards: Understanding about scientific inquiry
*The scientific method is an established method for solving various scientific inquiries.

Materials Needed (supplies, hand-outs, resources):
soil samples (3 to 4 different types)

hand out of soil characteristics (to guide the students)
Map of a local area with different land forms.

Lesson Performance Task/Assessment:
The class time will start with a small discussion of what the students think is meant by the term Scientific Method. This will lead quickly into a short 10- 15 minute lecture on the areas of the scientific method and what each area means. Students will then be broken off into the same number of teams as the number of soil samples. Each team will be given information as to the characteristics of the soils, a map of the local area where the soil was taken from, a list of questions outlining the steps to the scientific method and one soil sample. The soil sample will be presented to them as evidence in an ongoing criminal case. The soils sample is supposed to have been taken from the sole of the suspects shoe. Their task will be to find out what type of soil they have been given, by comparison to labeled samples. They will then take the map and the characteristics of the soil type to map areas of interest where the soil would be found and share their reasoning behind their final conclusions. The students will utilize the scientific method in their reasoning.

Lesson Relevance to Performance Task and Students:
This lesson is designed to let the students find their own way of solving a problem, in the hopes that they will realize in the end that the scientific method that is being taught is a skill that they already posses. This in return will allow them to realize that science is not a mystery in itself. Instead science is a well thought out process that anyone can follow.

Anticipatory Set/Capture Interest:
This lesson is designed to capture the interest of the students by showing them a real world application to the knowledge they are understanding about soils. It also allows them to further ask questions.

Guided Practice:
This activity is done in a way that allows students to ask questions about the problem at hand as needed and come up with their own questions to find the answers.

Independent Practice:
There is to be no independent practice on this lesson. The students will do all the work in the classroom as this is just an introductory lesson for the students, designed to capture their interest in the subject material.

Remediation and/or Enrichment:
Follow Student IEP,
For those students that do not have an IEP, remediation and enrichment will come in the form of a handout asking the students to:

State the Problem
Do background Research
Construct a Hypothesis about the soil placement
Test Your Hypothesis by Mapping the soils' possible location
Analyze Your Data and Come to a Conclusion
Communicate Your Results

Check(s) for Understanding:

1.) What information brought you to your final conclusions and why?
2.) Was there any information that may have been related that was not used in this decision?
3.) What could have been done differently to produce the correct outcome?

Closure:

Closure comes toward the end of the class where there is a class wide group discussion of the information covered and the final conclusions that were drawn. There can be a final correct answer or it could be left openended for more discussion and another lesson.

Possible Alternate Subject Integrations:

Soil and Plant Biology, Meteorology, Agriculture

Teacher Notes:

This lesson can be applied to many different areas of study with many different scenarios. For instance is you would like to apply this lesson to a more forensic based scenario you could actually have the students acquire more evidence and solve the crime. This lesson can also be extended with a part two to solve the crime.