

# Lesson Title: Calling all Earth Detectives!!!

## An Exploration of the Elements of the Lithosphere

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**Unit Overview:** This lesson is designed to introduce students to the composition of the lithosphere of the planet Earth. Students will analyze mineral content of several virtual lab specimens to determine if they could have come from the planet earth or from some other location.

### Materials:

1. Computers with Virtual Lab Installed
2. Slides of Costa Rican Sand (EDS), Meteorite (EDS), Stromatolite (EDS), Pond Scum (EDS)
3. Reference materials (i.e. Textbooks, PowerPoint, Class Notes)
4. Paper and pencil for additional notes

**Timeframe (in hours):** 1 hour max with 30 minute follow up/discussion

## Stage 1 – Desired Results

### Established Goal(s):

1. Students will understand that the Earth's surface is a dynamic system of interconnected parts
2. Students will be able to identify the 8 naturally occurring elements in the earth's crust.
3. Students will be able to analyze a sample using the EDS, and determine if that specimen could have come from the Earth's crust.

### Understanding(s):

*Students will understand that...*

1. The crust is made up of distinct parts
2. Analyzing unknown specimens is part of a scientist's job
3. You can identify unknowns by applying prior knowledge and using observation skills

*Students will know...*

1. That the earth is made up of the upper crust and the mantle
2. That oxygen, silicone, aluminum, iron, calcium, sodium, potassium and magnesium are naturally occurring elements in the lithosphere
3. That they can differentiate between earth specimens and non-earth specimens by analyzing mineral content.

### Essential Questions:

1. What is the lithosphere?
2. What elements make up the lithosphere?
3. How can you identify the origin of a specimen?

*Students will be able to...*

1. Explain the lithosphere, identify its importance to the planet, and explain what elements are found naturally in the crust.
2. Graphically represent their results
3. Identify what features of the lithosphere qualify it as a dynamic system

## Stage 2 – Assessment Evidence

### Performance Task(s):

1. Lab Report
2. Graphs & Data Analysis

### Other Evidence:

End of unit assessment (multiple choice/essay test)

## Stage 3 – Learning Plan

### Learning Activities:

#### Pre-lab Activity: (hook):

1. Give students 3 minutes to study the section of the text related to the lithosphere, have them write down facts they learn onto a note card. Next, give students two minutes to circulate around the room, talking to other students and writing down anything that their peers discovered that they didn't.
2. Bring students back to their seats and then create a list on the board of all facts discovered.
3. If the elements of the crust did not come up, repeat the activity giving students a new note card or scrap of paper and tell them they must discover what elements make up the lithosphere.
4. By the time this activity is complete, you should have covered the following important points: a. what is the lithosphere, b. what are the two major parts of the lithosphere, c. what major elements make up the lithosphere, d. what sorts of objects would be found on the lithosphere.

#### Lab Activity:

1. Ahead of time make sure that your slides are downloaded and waiting for the students
2. Tell students that they are all applying to be hired as Earth Detectives, the most prestigious detective agency in the galaxy! In order to prove their readiness, they must first earn their Earth Detective League Badge. To get the badge, students must analyze and accurately predict the origin of 4 rock samples that got mixed up in the lab. Scientists at the Earth Detectives headquarters accidentally mixed them up and now need your help to determine which are of earth origin and which are not.
3. Students should then analyze the Costa Rican Sand, the Meteorite, the Stromatolite, and the Pond Scum to determine if these samples are earth samples or are samples collected from other planets belonging to the EDL (Earth Detective League). *\*\*\*Be sure to use EDS samples only\*\*\**
4. Students should turn off all elements in the EDS, then systematically click them back on, if all 8 of the major elements present in the earth's crust light up in the sample; then students can, with some certainty, state that the sample is of Earth origin. You should have students record data onto their data table, to be processed and graphed later.
5. Students get to join the Earth Detectives, if they correctly identify each specimen and can demonstrate that using a graph (students can choose graph type or teacher can tell them which type of graph to use).

6. When all specimens are analyzed and graphs completed with a written conclusion, teacher can then choose to hand out EDL badges (you would need to create them, I recommend using a Microsoft template and blank/printable stickers. You can also order custom made stickers online).

OTHER OPTIONS:

1. Have a ceremony where badges are conferred with celebration
2. Have students work together to create their graphs, analyzing and discussing their data together and reaching and representing a conclusion together.
3. Define lithosphere for students and then ask them to brainstorm what types of things might be found on the lithosphere of the earth. Create a class bubble map including all the student generated ideas. *\*\*\*this idea works for an alternate hook assignment\*\*\**