

Candice Autry

Mined or Grown?

Introduction:

This is a lesson intended to be an introduction to mineral identification for students in sixth grade.

Objectives:

- Students will be able to differentiate between raw materials that are cultivated and those that are mined.
- Students will collaborate with their eighth grade peers to learn more about the mining complexities at the end of their mineral identification unit.

National Science Standards for this lesson:

Inquiry—Standard A

- Abilities Necessary to Do Scientific Inquiry: 1a, 1c, 1e, 1f, 1g
- Understanding About Scientific Inquiry: 2a, 2b, 2d, 2e, 2f, 2g

Science and Technology—Standard E

- Understanding About Science and Technology: 2a

Materials Needed:

Mirrors (both modern and antique, with pits in the mirror for introduction)

Copper tubing

Cosmetics

Aluminum soda can or Aluminum foil

Jewelry

Toothpaste

Glass jars

Salt

Large sheets of paper and markers

Procedures for a class period of approximately 50 minutes:

As an introduction to the unit, students will be enlightened on some of the first impressions of their day that have to do with mining; for example, their morning

routine of looking in the mirror and brushing their teeth. Students will be made aware of the raw materials used in a modern mirror (silica for the glass, silver foil for reflection, gold foil, copper as a “sacrificial metal”, and 4% lead-based paint). The components of toothpaste (silica, aluminum, phosphate, fluorite, mica, rutile, ilmenite, anatase) will also be discussed. (7-10 minutes)

Students will be instructed to individually answer the following prompt: “make a list of items we use that are neither mined nor grown.” When the students are ready, they can share their ideas. (5-7 minutes)

After discussion, the students, in groups of four, will spend four minutes at six stations. Each station has one item that utilizes minerals in some manner (see list of materials above). The group of students will have four minutes to negotiate to write a group hypothesis sharing where they believe this item(s) came from and what raw materials were used to make this product. Students write their hypothesis on a large sheet of paper (easel size). Each group will move to the next station as prompted from the teacher. The emphasis here is both inquiry and hypothesis writing skills. (24 minutes)

Upon completion of the activity, the class will have several minutes to post their hypotheses for comparison of ideas. Conversations of hypotheses and dialog regarding correct answers will follow. Students will then be informed of further investigation and the future “information exchange” that their eighth grade peers will present to them at the end of the unit on mineral identification.

Due to the fact that this will be presented before a long weekend, one activity must be chosen from the following list. Students also have the option to create their own homework topic and clear it with the teacher:

- Research which minerals are mined in the local area including the uses of each mineral. (written 1 page minimum)
- Interview a person who works or who has worked closely with certain minerals; create a video clip of the interview with examples of minerals the individual uses. (clip must be 12-15 minutes and must include a list of all questions asked)
- Visit the Museum of Natural History’s Hall of Minerals and return with an artifact and 15 specific topics learned or questions that have to do with minerals in a student’s daily life.

This is an outline of the mining unit that the eighth grade completes.

Eighth Grade

The Environment with chemistry and geology

How the Mining Industry touches our lives

Concepts

Mining, Environment, Mineral, Ore

Essential understandings

- We use and consume materials that are either mined or grown every day.
- Ore bodies and other minerals are discovered and mined by the teamwork of many educated individuals.
- The mining industry has a great environmental responsibility.
- Mining is a dangerous yet necessary industry.

Essential questions

- How does the mining industry affect our lives?
- Why is it a difficult challenge to locate an ore body?
- How do mining companies care for the environment?
- Why do mining companies often receive negative publicity?

Laboratory Skills

- Design a data table that includes space to organize all components of an investigation in a meaningful way.
- Design a data table that includes space to organize all components of an investigation in a meaningful way, including levels of the independent variable, measured responses of the dependent variable, number of trials, and mathematical means.
- Identify key components of controlled experiments: hypotheses independent and dependent variables, constants, controls, and repeated trials.

- Formulate conclusions that are supported by the gathered data.
- Organize and communicate data using graphs (bar, line, and pie), charts, and diagrams.

Activities

February (final three weeks)

Considerations in mining

Introduction to mining—'Is it grown or mined?' activity

Understanding geology of an area (review of mineral and rock identification)

Fining an ore body activity

Exploration of ore bodies

Investigating core samples

Economic interests and cost analysis discussion

Environmental laws and permits

Observing the daily activities in the Caledonia Mine in Copper Harbor, MI

Safety concerns

Extracting rock (drilling, blasting, mucking rock)

Mineral processing

Frothing out minerals

Tilden and Empire mine 12 minute videos

Mining industries and the Environment

Reclamation efforts in the USA

Mined and quarried materials in the Washington, DC area (granite quarries in the area)

Resources and literature

Out of the Rock

Science World Magazine

