

# Ores to Minerals

## Lesson 7

### Research Project

## LESSON PLAN

Standards Alignment, Learning Objectives, Materials List, Step-by-Step Instructions, Differentiation Suggestions



### Standards

AP Environmental Science Standard: 5.9 Impacts of Mining - LEARNING OBJECTIVE-EIN-2.K: Describe natural resource extraction through mining.

Next Generation Science Standard: HS-ESS3-1 - Construct an explanation based on evidence for how the availability of natural resources [and/or the] occurrence of natural hazards...have influenced human activity.

### Learning Objective

Formulate a research question and practice a logical research methodology. Identify key theoretical concepts and frameworks relevant to the chosen topic via research. Effectively communicate research findings through a written report in a chosen modality.



### Materials

1

Student Worksheet

2

Student Slides

### Step-by-Step Instructions

1. Discuss the research process with students and provide them with USGS resources as appropriate.
2. Model an effective research question and allow students to generate their own research question. Examples of research questions include:
  - a. For a specified mineral, how is it mined, refined, and used? Is it recycled?
  - b. What federal and state laws or statutes pertain to mining and land reclamation?
  - c. What are the risks and rewards of mining practices? Consider deforestation, erosion, and possible alteration of soil, surface water, and wetlands as well as positive outcomes and benefits like modern-day technological devices, safety features, conveniences, employment, and taxes to support schools and public works.
3. Discuss best practices for conducting research and emphasize the use of valid sources.

4. Share the provided rubric with students.
5. Go over the Student Worksheet - Tips for Research Project with students.
6. Ask students to choose the modality for their report. Choices may include:
  - a. A guidebook
  - b. A written report
  - c. A pamphlet
  - d. A slide deck (a template is provided)
  - e. A webinar/podcast
  - f. Other, as specified by the teacher
7. Set aside time for research and set a due date. Decide if you want students to present their reports to the class, and allow time for presentations if needed.
8. Evaluate reports using the rubric.

## **Differentiation Suggestions**

- Scaffolding Support: Provide or allow aids, like additional text or images, as reference resources.
- Reduce Cognitive Load: Adjust the level of complexity.
- Limit choices for research topics or report modality.
- Assign Peer Groups: Form heterogeneous groups to ensure a mix of abilities and skills, fostering peer support and collaboration.
- Ongoing Check-Ins: Regularly check in to provide feedback and support, ensuring all students participate and understand the task.
- Use extra visual materials showing additional examples.
- Use translation technology or a bilingual dictionary.
- Provide templates for various report modalities.
- Model additional research questions.
- If applicable: Allow alternative ways to present to the class, such as recording a video.