

## Mining Module

### Objectives

- Students understand the local history of mining and the societal significance of mining.
- Students understand how surface mining, underground mining, and milling and processing work.
- Students understand the impacts mining can have on water quality and the environment.
- Students understand water chemistry changes related to acid mine drainage.

### Colorado Standards

Grade	Subject	Expectation	Module Activity
High School	Physical Science	<a href="#">Matter has definite structure that determines characteristic physical and chemical properties</a>	Acid Mine Drainage and Dissolved Oxygen Lab Mining History and Methods Research Activity
High School	Physical Science	<a href="#">Matter can change form through chemical or nuclear reactions abiding by the laws of conservation of mass and energy</a>	Acid Mine Drainage and Dissolved Oxygen Lab Mining History and Methods Research Activity
High School	Earth Systems Science	<a href="#">There are costs, benefits, and consequences of exploration, development, and consumption of renewable and nonrenewable resources</a>	Acid Mine Drainage and Dissolved Oxygen Lab Mining History and Methods Research Activity
High School	Earth Systems Science	<a href="#">The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes</a>	Mining History and Methods Research Activity
High School	History	<a href="#">Analyze the key concepts of continuity and change, cause and effect, complexity, unity and diversity over time</a>	Mining History and Methods Research Activity
High School	Geography	<a href="#">Explain and interpret geographic variables that influence the interaction of people, places, and environments</a>	Mining History and Methods Research Activity

High School	Economics	<a href="#">Productive resources – natural, human, capital – are scarce; therefore choices are made about how individuals, businesses, governments, and societies allocate these resources</a>	Mining History and Methods Research Activity
High School	Patterns, Functions, and Algebraic Structures	<a href="#">Functions model situations where one quantity determines another and can be represented algebraically, graphically, and using tables</a>	Acid Mine Drainage and Dissolved Oxygen Lab
High School	Data Analysis, Statistics, and Probability	<a href="#">Visual displays and summary statistics condense the information in data sets into usable knowledge</a>	Acid Mine Drainage and Dissolved Oxygen Lab
10 <sup>th</sup>	Oral Expression and Listening	<a href="#">Effectively operating in small and large groups to accomplish a goal requires active listening</a>	Mining History and Methods Research Activity
10 <sup>th</sup>	Research and Reasoning	<a href="#">Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions</a>	Mining History and Methods Research Activity
11 <sup>th</sup>	Reading for All Purposes	<a href="#">Ideas synthesized from informational texts serve a specific purpose</a>	Mining History and Methods Research Activity
11 <sup>th</sup>	Research and Reasoning	<a href="#">Self-designed research provides insightful information, conclusions, and possible solutions</a>	Mining History and Methods Research Activity
12 <sup>th</sup>	Oral Expression and Listening	<a href="#">Effective speaking in formal and informal settings requires appropriate use of methods and audience awareness</a>	Mining History and Methods Research Activity
12 <sup>th</sup>	Oral Expression and Listening	<a href="#">Effective collaborative groups accomplish goals</a>	Mining History and Methods Research Activity
12 <sup>th</sup>	Reading for	<a href="#">Interpreting and evaluating complex</a>	Mining History and Methods Research Activity

	All Purposes	<a href="#">informational texts require the understanding of rhetoric, critical reading, and analysis skills</a>	
12 <sup>th</sup>	Research and Reasoning	<a href="#">Independent research designs articulate and defend information, conclusions, and solutions that address specific contexts and purposes</a>	Mining History and Methods Research Activity

### **STEM Connections**

**Science** – Students will explore the science behind mining techniques, with a particular focus on the chemical processes associated with mining.

**Technology** – Students will gain hands-on experience with lab equipment and computer systems used to measure and compare water quality indicators.

**Engineering** – Students are challenged to consider how environmental impacts of mining operations can be remediated using various processes and techniques.

**Math** – Students use graphing techniques to understand changes in concentrations using real-world data during the water quality lab exercise.