ARIZONA-SONORA
DESERT
MUSEUM

Arizona Minerals

A 90-120 minute Desert Discovery Lab

To the Teacher:

Thank you for making the *Arizona Minerals* Desert Discovery Lab a part of your curriculum. During this exciting hands-on introduction to geology, students will identify and classify common Arizona minerals using basic analytical tests and discover the importance of minerals to plants and animals, and uses in our everyday lives. This Teacher Information Packet provides resources to help you integrate these themes and concepts into your classroom curriculum.

This packet contains resources for pre- and post- program information and activities along with a vocabulary list and suggested further resources. These materials were developed to help you extend this class topic with both introductory and follow-up lessons. The pre-program information will introduce students to some of the basic concepts presented in *Arizona Minerals,* and help prepare them for the lab.

We hope you'll find this information useful and easy to incorporate into your science curriculum. For more information about the Desert Museum and the Sonoran Desert, visit our website at **www.desertmuseum.org.**

Classroom Set-Up: (for labs at your school)

- Your classroom should be set up with work-stations, one for each lab team.

Please make sure students are aware that this lab is an in-depth, hands-on, two-hour session that will require their utmost cooperation to complete successfully. ASDM Education Staff will provide student lab workbooks as well as a teacher answer key. We recommend that you make it a part of their science grade.

We look forward to working with you and your students.

Sincerely,
ASDM Conservation Education and Science Department

ARIZONA MINERALS LAB

Examine these building blocks of nature in this hands-on introduction to geology. Identify and classify common Arizona minerals using basic analytical tests for hardness, specific gravity, cleavage and streak. Discover the importance of minerals to plants and animals, and uses in our everyday lives.

LAB OBJECTIVES:
Through the examination and analysis of rock and mineral specimens, household materials and live animals, students will be able to:

- Distinguish between a rock and a mineral and describe characteristics of each.
- Identify the three main categories of rocks and describe the conditions by which they travel through the rock cycle.
- Identify different minerals from the Sonoran Desert Region using physical property tests.
- Explain how minerals are formed.
- Recognize the minerals that provide raw materials for specific man-made items.
- Give examples of the cycling of matter between abiotic factors (minerals) and living organisms within an ecosystem.

ARIZONA ACADEMIC STANDARDS IN SCIENCE CORRELATION

The *Arizona Rocks and Minerals* program and supplemental activities correlate to these Arizona Academic Science Standards. See each activity for specific standards and performance objectives.

Earth Science
SC07-S6C1-01,02&03
SCHS-S6C1-01,02&03
SC07-S6C2-01,02&03
Life Science
SC06-S4C1-06
SC07-S4C3-02
SCHS-S4C3-02
SCHS-S4C5-02
Science in Perspective
SC07-S3C1-01&02
SCHS-S3C2-01&04
Inquiry Process
SC06-S1C2-04&05
SC07-S1C2-04&05
SC08-S1C2-04&05
SCHS-S1C2-01&05
SC06-S1C3-01
SC07-S1C3-01&05
SC08-S1C3-01

Arizona State Science Standards
Strand 1: Inquiry Process
- Concept 2: Scientific Testing (Investigating and Modeling)
- Concept 3: Analysis and Conclusions

Strand 3: Science in Personal and Social Perspectives
- Concept 1: Changes in Environments
- Concept 2: Science and Technology in Society

Strand 4: Life Science
- Concept 1: Characteristics of Organisms
  - Structure and Function in Living Systems
- Concept 3: Organisms and Environments
  - Populations of Organisms in an Ecosystem
  - Interdependence of Organisms
- Concept 5: Matter, Energy, and Organization in Living Systems

Strand 6: Earth and Space Science
- Concept 1: Properties of Earth Materials
  - Structure of the Earth
  - Geochemical Cycles
- Concept 2: Earth's Processes and Systems

RESOURCES

Websites/Organizations

- Arizona-Sonora Desert Museum: 2021 N. Kinney Rd., Tucson, AZ 85743. Phone: (520)883-3025. www.desertmuseum.org
- American Geosciences Institute http://www.agiweb.org/geoeducation.html
- Digital Library for Earth Science Education http://www.dlese.org/library/index.jsp
- Tucson Gem and Mineral Show http://www.tgms.org/

Literature:

- Arizona-Sonora Desert Museum. *A Natural History of the Sonoran Desert.* Tucson: ASDM Press, 1999.
- Braus, Judy, ed. *Ranger Rick's NatureScope, Geology: the Active Earth*. National Wildlife Federation. (1-800-722-4726)
- Symes, Dr. R. F. *Eyewitness Books, Rocks and Minerals*. Alfred A. Knopf, Inc., 1988

Mineral Sources:

- Kino Rocks and Minerals Retail Showroom: 6756 South Nogales Hwy, 520-294-0143

VOCABULARY

Rock	Plate tectonics	Mining
Mineral	Igneous	Ore
Streak	Sedimentary	Vein
Luster	Metamorphic	Core-drilling
Hardness	Magma	Extraction
Cleavage	Lava	Leaching
Fracture	Pressure	Resource
Specific gravity	Weathering	Renewable
Double refraction	Erosion	Nonrenewable
Fluorescence	Deposition	Reduce
Heavy metals	Texture	Reuse
Crust	Grains	Recycle

PRE-PROGRAM INFORMATION & ACTIVITIES

ANTICIPATORY ACTIVITIES:

A variety of activities to hook student interest in rocks and minerals and human uses of resources.

Grades 6-8 **Basic Minerals – Macro and Trace**
In option 2, students research minerals to solve a nutrition mystery.

Grades 6-HS **What Materials are in My Car?**
Students investigate minerals and relate them to uses for car parts.

Grades 7-HS **Chile Mining Accident**
Students explore the importance of minerals in their own lives as well as risks of mining.

IMAGE DATABASES

Arizona-Sonora Desert Museum Digital Library
www.desertmuseumdigitallibrary.org/public/mBrowse.php

Geology and Earth Science Images http://www.marlimillerphoto.com/images.html

Earth Science World Image Bank http://www.earthscienceworld.org/images/

Images of Rocks and Minerals http://geology.com/teacher/rocks.shtml

Mineralogy Database http://webmineral.com/

Mineral photos by type http://mii.org/mineral-photos-type

The Mineral and Gemstone Kingdom http://www.minerals.net/MineralMain.aspx

POWERPOINT PRESENTATIONS

Mining 101 Slideshow

Rocks on Your Face Slideshow

Gr 7-9 Rock Solid Introduction

EXPLORATION ACTIVITIES
A variety of activities for students to explore characteristics, properties and uses of rocks and minerals.

Grade 6-8 **Land Mass Formation Demonstration**
Teacher demonstration using wax and water to model formation of Earth crust.

Grades 6-8 **NHMU: Rock Cycle**
Board and dice game simulating the rock cycle.

Grades 6-9 **Rock Cycle Lab**
A fun, hands-on rock cycle lab using everyday materials to help students understand the processes that form rocks.

Grades 8-HS **Minerals Virtual Lab**
Virtually perform mineral identification tests using their properties.

Grades 6-9 **Mining in Texas (cookie mining)**
Students simulate the extraction of nonrenewable minerals by mining chocolate chips from cookies and calculate cost and value of ore.

Grades 6-8 **Minerals in Your Body**
Students investigate distribution and importance of elements in the human body.

POST-PROGRAM INFORMATION & ACTIVITIES

APPLICATION/ELABORATION ACTIVITIES
A variety of activities for students to apply program concepts, and elaborate on the importance of rocks and minerals to humans, and efforts for conservation of resources.

Grades 6-8 **Recycling Includes E-cycling**
Assess different types of household electronics, their lifespan, and opportunities for recycling them.

Grades 6-8 **Personal Mineral Consumption**
Students calculate total amounts of specific minerals they consume in a lifetime, and apply critical thinking to the effects of resource availability to their own lives.

Grades 7-8 **A Product's Life**
Students research steps involved in a product's life cycle and present their findings to the class.

Grades 6-8 **Activity 5: Extracting Metal (Copper) from a Rock**
Student lab activity demonstrating how copper is mined from rock using "solvent extraction" method.

Ages 11-13 **Electroplating Pennies**
Lab activity where students electroplate zinc onto a copper penny to simulate the purification stage of ore processing.

Ages 15-18 **Leaching to Separate Metals from Ore**
Students conduct leaching experiment to extract copper from copper ore.

Ages 15-18 **Orebody Mystery**
Using playdoh and straws, students explore the techniques of core-drilling and geological testing.

Grades 8-HS **Clean up This Mess**
Students are challenged to design a method for separating steel from aluminum based on magnetic properties as is frequently done in recycling operations.

Grades 9-12 **How Does Waste Affect Our Natural Resources**
Students will compare estimated life expectancies of some nonrenewable natural resources and will understand the role recycling and careful use play in extending the availability of these resources.

Grades 9-12 **Recycle all that you can in a school**
Instructions for implementing an effective school recycling program

Grades 9-12 **The Cost of the Toss**
Student role-play activity to discuss cost and benefits to various methods of waste management.

Grades 9-10 **The Fragile Western Biome**
Students will discover the impact of American westward expansion, in particular the mining industry, on the ecosystems of the West.

FURTHER RESOURCES

Mineral Information Institute http://www.mii.org/teacherhelpers.html
Lesson Plans related to the importance of mining for humans