ARIZONA ROCKS & MINERALS PRE-PROGRAM ACTIVITIES

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

ARIZONA ACADEMIC STANDARDS

SC01-S6C1-01 &03
SC03-S6C1-06
SC03-S4C3-05
SC07-S4C3-02
SC04-S4C3-02
SC07-S3C1-01 &02
SCHS-S3C2-01

VOCABULARY

Rock
Mineral
Resource
Mining

ANTICIPATORY

Grades 3-5 (adaptable for Gr 1-2)
Minerals in Your Home
From Mineralogical Society of America - Mineralogy 4 Kids
http://www.mineralogy4kids.org/house.html
In this internet-based activity, students explore a virtual house room by room to investigate household items that contain minerals. Teachers can pair this activity with a digital library of minerals where students need to find pictures of the minerals and match them to the items in the house.

Grades 3-8
Basic Minerals – Macro and Trace
From Utah Education Network
http://www.uen.org/Lessonplan/preview.cgi?LPid=1260
In option 2, students research minerals to solve a nutrition mystery.

Grades 5-HS
What Materials are in My Car?
From Geological Society of America
http://www.geosociety.org/educate/LessonPlans/i_rocks.htm
Students investigate minerals and relate them to uses for car parts.

Grades 7-HS
Chile Mining Accident
From ASU School of Earth and Space Exploration
http://sese.asu.edu/teacher-resources
Students explore the importance of minerals in their own lives as well as risks of mining.

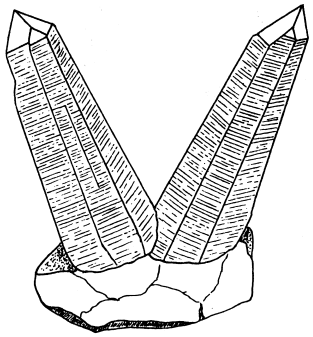

IMAGE DATABASES

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

POWERPOINTS

Mining 101 Slideshow
From Mineral Information Institute
http://www.mii.org/teacherhelpers.html

Rocks on Your Face Slideshow
From Mineral Information Institute
http://www.mii.org/pdfs/RocksOnYourFace.pdf

Gr 7-9
Rock Solid Introduction
From Teach Engineering – Resources for K-12
http://www.teachengineering.org/view_lesson.php?url=collection/cub_/lessons/cub_rock/cub_rock_lesson01.xml

ARIZONA ROCKS & MINERALS PRE-PROGRAM ACTIVITIES

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

ARIZONA ACADEMIC STANDARDS

SC01-S6C1-01&02
SC03-S6C1-01,02,03&06
SC07-S6C1-01,02 &03
SCHS-S6C1-01,02 &03
SC04-S6C2-03
SC07-S6C2-01,02&03

VOCABULARY

Rock
Mineral
Soil
Crust
Igneous
Sedimentary
Metamorphic
Magma
Lava
Pressure
Weathering
Erosion
Deposition
Texture
Grains
Plate Tectonics

EXPLORATION ACTIVITIES

Grades 1-2
First Rocks
From FOSS Pebbles, Sand and Silt Module
Students investigate rocks by rubbing, washing, sorting and describing rocks.
or
Grades 1-2
Rocks, Rocks Everywhere
From Utah Education Network
http://www.uen.org/Lessonplan/preview.cgi?LPid=28232
Students sort rocks based upon color, hardness, texture, layering and particle size.

Grades 3-6
Land Mass Formation Demonstration
From the Franklin Institute – Resources for Science Learning
http://sln.fi.edu/tfi/activity/earth/earth-7.html
Teacher demonstration using wax and water to model formation of Earth crust.

Grades 1-5
Rock Cycle Activity
From Oracle Education Foundation Think Quest
http://library.thinkquest.org/J002289/rcycleact.html
Students use crayon shavings and aluminum foil to demonstrate the changes that rocks undergo in the rock cycle.

Grades 3-8
NHMU: Rock Cycle
From Utah Education Network
http://www.uen.org/Lessonplan/preview?LPid=11513
Board and dice game simulating the rock cycle.

Grades 5-9
Rock Cycle Lab
From Geological Society of America
http://www.geosociety.org/educate/LessonPlans/i_rocks.htm
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
From Glencoe Earth Science
http://glencoe.mcgraw-hill.com/sites/0078778026/student_view0/unit1/chapter3/virtual_lab.html
Virtually perform mineral identification tests using their properties.

Grades 5-9
Mining in Texas (cookie mining)
From Science-class.net –resources for elementary and middle school science teachers
http://science-class.net/Geology/rocks_minerals.htm
Students simulate the extraction of nonrenewable minerals by mining chocolate chips from cookies and calculate cost and value of ore.

Grades 5-8
Minerals in Your Body
From USGS Life Cycle of a Mineral Deposit
http://pubs.usgs.gov/gip/2005/17/gip-17.pdf or http://pubs.usgs.gov/gip/2005/17/
Students investigate distribution and importance of elements in the human body.

ARIZONA ROCKS & MINERALS POST-PROGRAM 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.

ARIZONA ACADEMIC STANDARDS

SC01-S6C1-02,03&05
SC03-S6C1-06
SC03-S4C3-05
SC07-S4C3-02
SC04-S4C3-02,03&04
SC07-S3C1-01 &02

VOCABULARY

Rocks
Minerals
Resource
Renewable
Nonrenewable
Metal
Consumption
Reduce
Reuse
Recycle

APPLICATION /ELABORATION

Grades 3-5 (adaptable for Grades 1-2)
Engineering for the Three Little Pigs
From Teach Engineering – Resources for K-12
http://www.teachengineering.org/view_activity.php?url=collection/cub_/activities/cub_earth/cub_earth_lesson1_activity1.xml
Students build three different sand castles and test them for strength and resistance to weathering. Then, they discuss how the buildings are different and what engineers need to think about when using rocks, soils and minerals for construction.

Grades 1-3
Materials2: Recycled Materials
From AAAS Science Netlinks
http://sciencenetlinks.com/lessons/materials-2-recycled-materials/
Students investigate the types of materials that can be reused, as well as potential uses for each type of recyclable material.

Grades 3-5
Straight Scoop on Soils, You Dig?
From Mid-continent Research for Education and Research
http://www2.mcrel.org/compendium/activityDetail.asp?activityID=173
Student lab investigation comparing soil samples based on properties of color, texture, water capacity and composition in order to solve a problem in a farming scenario.

Grades 4-8
Recycling Includes E-cycling
From EPA- The Quest for Less Packet
http://www.epa.gov/osw/education/quest/pdfs/qfl_complete.pdf
Assess different types of household electronics, their lifespan, and opportunities for recycling them.

Grades 5-8
Personal Mineral Consumption
From USGS Life Cycle of a Mineral Deposit
http://pubs.usgs.gov/gip/2005/17/gip-17.pdf or http://pubs.usgs.gov/gip/2005/17/
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
From EPA- The Quest for Less Packet
http://www.epa.gov/osw/education/quest/pdfs/qfl_complete.pdf
Students research steps involved in a product's life cycle and present their findings to the class.

ARIZONA ROCKS & MINERALS POST-PROGRAM 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.

ARIZONA ACADEMIC STANDARDS

SC07-S6C1-01
SC07-S4C3-02
SC04-S4C3-02,03&04
SC07-S3C1-01 &02
SCHS-S4C3-02
SCHS-S3C2-01 & 04

VOCABULARY

Mining
Ore
Vein
Core-Drilling
Extraction
Leaching
Resource
Renewable
Nonrenewable
Metals
Reduce
Reuse
Recycle

APPLICATION /ELABORATION

Grades 5-8

Activity 5: Extracting Metal (Copper) from a Rock
From USGS Life Cycle of a Mineral Deposit
http://pubs.usgs.gov/gip/2005/17/gip-17.pdf or http://pubs.usgs.gov/gip/2005/17/
Student lab activity demonstrating how copper is mined from rock using "solvent extraction" method.

Lesson Plans—Geology, Mining, Mining Processes, Ore Processing, Minerals for Everyday Life for Ages 11-13, 13-15 and 15-18
From Ground Rules: Mining Right for a Sustainable Future, Caterpillar
https://mining.cat.com/groundrules
Suggestions:
Electroplating Pennies
From Ore Processing Lesson Plans, Ages 11-13
Lab activity where students electroplate zinc onto a copper penny to simulate the purification stage of ore processing.
Leaching to Separate Metals from Ore From Ore Processing Lesson Plans, Ages 15-18
Students conduct leaching experiment to extract copper from copper ore.
Orebody Mystery From Mining Processes Lesson Plans, Ages 15-18
Using playdoh and straws, students explore the techniques of core-drilling and geological testing.

Grades 8-HS

Clean up This Mess
From Teach Engineering – Resources for K-12
http://www.teachengineering.org/view_curricularunit.php?url=collection/van_/curricular_units/van_cleanupmess_unit/van_cleanupmess_unit.xml
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.
Recycle all that you can in a school
Instructions for implementing an effective school recycling program
The Cost of the Toss
Student role-play activity to discuss cost and benefits to various methods of waste management.
From Cornell Waste Management Institute
http://cwmi.css.cornell.edu/TrashGoesToSchool/Activities9-12.html

Grades 9-10

The Fragile Western Biome
From PBS: New Perspectives on The West http://www.pbs.org/weta/thewest/lesson_plans/lesson07.htm
Students will discover the impact of American westward expansion, in particular the mining industry, on the ecosystems of the West.

ARIZONA ROCKS & MINERALS POST-PROGRAM ACTIVITIES

Find more curriculum resources.

FURTHER RESOURCES

American Geosciences Institute
http://www.agiweb.org/geoeducation.html

Digital Library for Earth Science Education
http://www.dlese.org/library/index.jsp

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