Ancient Cultures in Modern Times

Traveling Trunk Teacher's Guide
Petrified Forest National Park
2010

Developed by:
Petrified Forest National Park and the National Park Service Teacher Ranger Teacher Program

Contents

Lesson Plans

Resources

Trunk Inventory

Items You Can KEEP for Your Classroom

- Large Discovery Coloring Map

Other Materials That We Hope You Will Include When You Return the Trunk

- Photos of students completing lessons
- Copies of exceptional student work that we can use as examples and/or part of our evaluation
- Completed Evaluation Forms from teachers and students

Books and Audio/Video (TO BE RETURNED

- Stalking the Past (1 copy)
- Southwest Indian Designs (1 copy)
- Ancient Indians of the Southwest (1 copy)
- Tapamveni (1 copy)
- Songs from the Loom (1 Copy)
- A guide to Pueblo Pottery (1 copy)
- A guide to Navajo Rugs(1 copy)
- A guide to Indian Jewelry (1 copy)
- Navajo and Hopi Dyes (1 copy)
- Petrified Forest - Story Behind the Scenery (1 copy)
- Painted Desert – Land of Light and Shadow (1 copy)
- Gas Trees and Car Turds – A kids guide to the roots of Global Warming (1 copy)
- The Down to Earth Guide to Global Warming (1 copy)
- Navajo Weaving Way – The Path From Fleece to Rug

Audio/Video

- Petrified Forest: Journey to the Late Triassic CD Rom Tour (7 copies)
- Timeless Impressions (2 DVDs) – 1 hr. version and 20 min. version
- CD rom with PowerPoint Presentations – Triassic Rivers (1 copy)
- Ancient America (1 DVD)

Posters and Diagrams

- Poster of Newspaper Rock

Other Supplies that will be used

- wooden sticks
- yarn
- 3 sizes of string (20", 17", and 14")
- seed beads
- large beads
- plastic bags
- paper cups
- index cards
- blank tiles
- beading thread

Supplies that will be returned

- seed bead needles
- tree trunk samples (18)
- mortar and pestle sets (4)
- small tape measures (19)
- small paint brushes (30)
- large paint brushes (20)
- loom kit and case
- jeweler's eye loupes; hand lens (20)
- unused seed beads and large beads
- unused beading thread
- unused yarn
- 6 Envelopes with "trash"
- Yarn needles (32)

Dear Educator,

We are pleased that your class is taking part in the Petrified Forest National park's Traveling Trunk program. This program is designed to transport students and educators into a world of ancient animals, plants, and environments without ever leaving the classroom!

The Traveling Trunk ***Ancient Cultures in Modern Times*** provides a variety of materials and lessons for you and your students. The trunk is equipped with more materials and resources than you may want to use. First, review the Lesson Plans and contents of the trunk. Then, choose lessons and activities that are most appropriate for your students and your curriculum alignment needs.

Most materials required for each lesson are provided within the trunk, with enough supplies for each student whenever possible. Please make sure that the non-expendable supplies are returned to the trunk, available for the next educator and students.

Many of the items contained in the trunk (books, videos, DVDs) are available for purchase through the Petrified Forest Museum Association (PFMA). Educators receive a 25% discount on all products! PFMA also offers an annual teacher's membership providing additional benefits. More information is available Resources section of this guide.

Please fill out the enclosed **evaluation forms**. One is for your students and one is for the teachers who use the trunks. This feedback is important to us for modifying and developing this and other Traveling Trunks. Also, we encourage you to include photos and samples of your students' efforts when you send the Traveling Trunk back to us. Pictures of students at work or copies of their worksheets can help us to gauge and evaluate the effectiveness of the activity. Not only do we really enjoy seeing student work, but we would love to have actual student products to include in the future Traveling Trunks as examples or demonstrations!

Instructions for shipping the trunk back to Petrified Forest National Par are included at the end of this guide. If the trunk needs replacement items, or if you have questions, please contact us at PEFO_Superintendent@nps.gov, or by phone: (928) 524-6228 ext. 238.

Thank you for traveling with us to the Petrified Forest!

Lauren Carter
Education Program Coordinator
Petrified Forest National Park

Introduction

Why Traveling Trunks?

The mission of Petrified Forest National Park is to preserve, protect, and provide opportunities to experience:

- globally significant Late Triassic paleontological resources,
- nationally significant archaeological sites,
- scenic and natural resources, including the Painted Desert, and
- foster scientific research and public understanding and appreciation of park resources

The purpose of the Traveling Trunk program is to "provide opportunities to experience" and "foster…understanding and appreciation of park resources" within the classroom amongst students and teachers from Arizona, surrounding states, and throughout the continental United States. This curriculum-based program was developed by park rangers and educators to meet both the needs of the park and educators.

The lessons included in the Traveling Trunks center around the natural and cultural resources found in the park. Lessons are aligned with Arizona Academic Content Standards of Science with some Social Studies, mostly at the K-6 level. If you do not live in Arizona, you can cross reference the Arizona standards listed in each lesson with your specific state's standards.

Ancient Cultures in Modern Times Theme

The focus of this Traveling Trunk: Ancient Cultures in Modern Times is archaeology, the study of people and civilizations. Provided in this trunk are several lessons which focus on specific topics in which are of particular importance in studying Southwestern archaeology. These topics include pottery, pictographs and petroglyphs, dating archaeological material, and discussing the timeline of various cultures in the Southwest.

Pottery (ceramics) is one of the few items left behind by ancient cultures that give archeologists an idea of how the people lived their daily lives. A variety of techniques, painting styles, and images are tell-tale markers of a particular culture or time period. Archaeologist can use this information to learn how the pottery was used, where it may have come from, and some of the meanings behind the painted images.

Like pottery, pictographs and petroglyphs are cultural representations of many different ideas. Pictographs are painted images while petroglyphs are images which are carved into a rock or wall face. These images often are used to tell stories, record events, and mark special times. Some of the meanings of these images remain unknown, but others are still used by the descendants of prehistoric cultures.

In the science of archaeology, some of the most valuable pieces of information come from what people left behind. In what has been left, it is possible to determine how old the culture could possibly be. In the science of dendrochronology, tree rings are used to determine the time when a particular cultural site is utilized. In the remains of the location, locating discarded branches,

firewood, or beams in construction can be compared to a library of tree rings to determine how old that particular piece of wood may be, and in turn, how old that location is.

Climate change, such as global warming, is a hotly debated topic in science. Climates have changed throughout the world drastically through the history of life on Earth. Arizona is no exception to climate change. During the Triassic (250 million years ago), Arizona was located closer to the equator and was a lush tropical environment with organisms that were much different from today. Fossils of large crocodile-like reptiles and massive petrified trees are what remain of that environment.

Arizona's climate 500-1000 years ago was very similar to today. The people of that time period experienced a massive drought, which is often associated with the abandonment of a variety of villages which are now archaeological sites. During these times of great stress, pueblos such as Puerco Pueblo in Petrified Forest, Montezuma's Castle in Camp Verde, AZ and Wupatki Pueblo near Flagstaff, AZ could not support a large number of people so the people broke into groups and left these areas.

As we know today, the climate of Arizona is a semi-arid desert with pockets of many other biomes, such as forests and tundra. The human population of Arizona continues to grow, which concerns many in regards to the precious resource of water in this dry environment. However, the future of the climate of Arizona and the western United States is unknown. There are a variety of theories as concepts such as global warming continue to be supported with scientific data. As climates and weather patterns change the impact of human activity continues to be discussed.

The present protection of natural and cultural resources such as those preserved by National Parks depends on the public. Through education and experience, the National Park Service hopes to instill a sense of value in the public about natural and cultural resources for today and future generations.

Evidence of Humans in Petrified Forest National Park

Petrified Forest National Park contains a complex array of archeological resources, including petroglyphs that illustrate a 10,000-year continuum of human land use. Subtle but challenging landforms influenced human movements on both north-south and east-west routes from prehistoric times to the present, affecting regional patterns of settlement, trade and migration. Shifting cultural boundaries in this area created a high diversity of cultural sites and features still important to American Indians of the region today.

Fundamental resources and values:

- Evidence of ongoing use and occupation spans paleo-Indian culture to American Indian culture today. Types of resources include hunter/gatherer sites and early large pithouse villages with an outstanding collection of the earliest pottery in the region. Evidence also illustrates the interaction between people and their environment, for example cultural landscapes, utilization and trade of petrified wood as lithic material, and human relationships to ephemeral sources of water. Examples of archeological resources that are

on the National Register of Historic Places include Agate House Pueblo, Puerco Ruins and Petroglyphs, Flattops Site, and Twin Buttes Archeological District.

- The park encompasses thousands of documented petroglyphs and hundreds of pictographs of high integrity. Many petroglyphs are related to sociopolitical boundaries of the overlapping cultures, and also include a wide variety of solar calendars, which illustrate human interaction with the landscape, awareness of astronomy (thus the importance of dark night skies). Examples of petroglyphs that are on the National Register of Historic Places include Painted Desert Petroglyphs and Ruins Archeological District, Newspaper Rock Petroglyphs Archeological District, and Puerco Ruins and Petroglyphs.
- The area is a crossroads of trade routes, as evidenced by one of most diverse array of ceramics in the U.S., as well as the presence of marine shell, obsidian, and varied architectural styles.
- The cultural significance of this landscape extends from ancestral peoples through modern day native peoples (Hopi, Zuni, Navajo, and Apache), and relates to concepts of "homeland" and ancestral territory.

The continuing importance of the park's heritage resources to associated people – the abundant evidence of use and occupancy in what might seem to some as an uninhabitable land – offers opportunities to explore the powerful and complex concept of "homeland."

Lesson Plans

Lesson 1:
It's a Matter of Time

Learning Objectives
The students will be able to:

- Compare various ancient Native cultures to modern Native cultures.
- Identify the different cultural time periods of the American Southwest
- Discuss different living aspects (lifestyle, living area, food, tools) of Native cultures.
- Discuss how new behaviors, such as agriculture and trade, affected Native cultures.

Arizona State Standards
Elementary:

S1-C2-PO 2: Describe the cultures and contributions of the Mogollon, Ancestral Puebloans, and Hohokam.

S2-C1-PO 2/4/5/8: Recognize how archaeological research adds to our understanding of the past.

Grade 7

S2-C1-PO3: Construct timelines of historical eras being studied.

High School:

S2-C2-PO1: Describe the development of early prehistoric people, their agriculture, and settlements.

S1-C2-PO1: Describe prehistoric cultures of the North American continent: Southwestern United States.

Duration
45 minutes

Location
Classroom

Key Vocabulary

- ancestral Puebloan - a term given to people living in the Four Corners region of the Southwest from approximately 1,200-600 years ago (A.D. 800-A.D. 1400); formerly called *Anasazi*, a Navajo word often translated as ancient enemies, the name has changed out of respect for the modern descendants of these ancient people.
- Anthropology - a science that holistically studies human cultures, behavior, and technology, both currently existing and extinct.
- Archaic Period - an archeological time period assigned to nomadic hunting and gathering people. In the Southwest this time period dates from 8,000-2,500 years ago (6000 B.C.-500 B.C); marks the development of agriculture in the Southwest.
- Artifact – any object made by human beings or used by human beings with a specific purpose; a hand made object such as a tool or parts of one; characteristic of an earlier time or cultural stage; object found at an archeological excavation
- atlatl - a tool used in spear throwing that lengthened the extension of the human arm to throw a spear harder, faster, and with better accuracy
- Basketmaker Period - an archeological time period assigned to prehistoric cultures of the Southwest dating from 2,500-1,200 years ago (500 B.C.-A.D. 800), named for the basketry found; people lived in pithouses and other forms of semi-permanent housing, primarily making their living from agriculture, hunting, and gathering.
- Ceramic styles - recognizable patterns on prehistoric pottery or ceramics that can be assigned to archeological time periods of popular use.
- Culture - a socially shared knowledge of beliefs, customs, technology, and rules of behavior of a group of people.
- Folsom point - a long, fluted projectile point distinctive of the Paleo-Indian time period.
- kiva - an underground ceremonial chamber used by ancestral Puebloan people for meetings, rituals, weaving, making tools and clothing, storytelling, and instruction of children; still used today by modern Pueblo people.
- mano - a stone object held in the hands that is used to grind corn or other seeds into meal.
- metate - the grindstone upon which plant material and corn is ground with a mano.
- Paleo-Indian Period - an archeological time period assigned to prehistoric cultures from 11,500-8,000 years ago (9500 BC-6000 BC) when people were hunting big game (mammoths, horses, camels, etc.) and gathering wild plants.
- pithouse - a structure with a foundation built into the ground with walls and roof reinforced by small tree trunks, branches, and mud; entry was either through a hole in the roof or through a long, narrow entry ramp.
- pueblo - masonry structure or group of structures, from the Spanish term meaning town or village; refers to a specific culture or site when capitalized.

- quarry - in an archeological context, a place where stone was obtained for the purpose of manufacturing stone tools; tools were often started at the quarry so that they would be easier to carry to another site for completion.

Trunk Materials

- Cultural Characteristics worksheet
- Page with Culture Items

Additional Materials

- 5 pieces of large Poster paper
- Class set of Cultural Characteristics worksheet
- Markers
- Scissors

Background

Archeological Time - The archeology of Petrified Forest National Park tells us much about human adaptation in a difficult and sometimes harsh environment. People have been coming to the area for thousands of years to hunt, gather wild foods and medicines, obtain resources like petrified wood to make tools, grow domesticated crops, and for ceremonial reasons. Many archeological sites are located on the grasslands and mesas of the lower Puerco River where loam, sand, and clay soils can support plants, wildlife, and domesticated crops. These resources were vital to the existence of the people.

The region along the lower Puerco River is considered by archeologists to be a contact area for the ancestral Pueblo people and the Mogollon cultures. This interaction among people is based on pottery designs, ceramic styles and petroglyphs that have been found in and around the park. Archeological time periods represented at the park include:

- Paleo-Indian (9500 B.C.-6000 B.C.)
- Archaic (6000 B.C.-500 B.C.)
- Basketmaker (500 B.C.-A.D. 800)
- Pueblo (A.D. 800-A.D. 1400)
- Modern American Indian (A.D. 1400-present)

Suggested Procedures

1. Divide the class into groups of five and provide copies of the reading assignment to each group. Each student in the group can read about a different cultural time period and share it with the rest of the group. Attention should be paid to what artifacts and features represent each time period.

2. Cultural Match-Up : Students can work in their groups or further divide into pairs for this activity.
    - Using the information they learned during the reading assignment, students will fill in the Culture Characteristics table from the lists given on the Culture Items page.
    - All items should be used and all boxes be filled.
    - Several items will often be included in a box.
    - More than one item may apply to more than one box. (An example of appropriate answers is given on page 17). These answers are not conclusive, but merely suggested. Some items on the list are not mentioned in the reading material. Tell students to make their best educated guesses.
    - Conduct a class discussion of the completed tables in the context of cultural change. Here are some questions to get you started.
        - What artifacts are different between Archaic and Paleo-Indian times?
        - What difference in lifestyle (behavior) separates Basketmaker time from Archaic time?
        - What technology was most advanced in Pueblo time?
        - During which time period did agriculture (farming) become an important part of the ancient people's lifestyle?
        - During which time period did trade become an important part of the ancient people's lifestyle?

Alternate Procedure:

1. Before the activity, provide enough copies of the "Archaeological Time Periods" and "Culture Characteristics" for the students to work in pairs. On the 5 pieces of large poster paper included, write a name of each of the 5 cultures (Paleo-Indian, Archaic, Basketmaker, Pueblo, Modern). On each poster, write 5 subheadings: Lifestyle, Living Area, Food stuff, Stone Tools, and Other Materials. Places these around the room with markers near them.
2. Have each pair of students read "Archaeological Time Periods". After reading these pages, provide each pair of students with a copy of "Culture Characteristics". Have the students work together to classify the various *Culture Items* using the reading material "Archaeological Time Periods" as a guide. NOTE: All boxes should have at least one item, but may have more then one item AND some items may be used more than once.
3. After the students have completed their "Culture Characteristics" page, send one pair to each of the 5 different posters. Have each pair of students write ONE fact from their "Culture Characteristics" page onto ONE section of the poster, then rotate those pairs through the poster. Continue to send up and rotate all student pairs until all pairs have been to each poster, then lead into discussion.

Extensions

Address the following either as a class or group discussion, or as a writing assignment:

1. What are the similarities between the different time periods? What are the differences?
2. What artifacts are different between each of the time periods?
3. What are differences in lifestyle (behavior) that separates the Basketmaker time from the Archaic time?
4. Why do you think farming and trading changed the lifestyle of ancient people?

Reading Assignment for Students:

Archeological Time Periods

Paleo-Indian –
The Paleo-Indian time period dates from 11,500-8,000 years ago (9500 B.C.-6000 B.C.) and marks a time of great migrations. Paleo-Indians traveled in groups gathering wild food and hunting big game animals such as mammoth, giant sloth, and large bison. Hunting was done with spears tipped with long, fluted projectile points which archeologists call Folsom points. Little evidence of Paleo-Indian life exists because of their migratory lifestyle. Archeological sites include kill sites and camps in natural rock shelters or tents made of hides or brush. At this time, no kill or camp sites have been documented at Petrified Forest National Park. However, several Folsom points have been found in the park, including at least one made of petrified wood dating to over 10,000 years ago (before 8000 B.C.).

Archaic - The Archaic time period dates from 8,000-2,500 years ago (6000 B.C.-500 B.C.) and marks a change in how people used the land. The Archaic people used a wide variety of native plant resources and began to hunt smaller animals. Instead of following big game during migrations, the people moved by the seasons, when plants like ricegrass, prickly pear, and piñon pine were available and ripe. Smaller spears and points were made to hunt smaller game such as pronghorn, rabbits, and birds. Hunters also began using a spear thrower called an atlatl that helped them throw farther and with better accuracy. People returned to the same areas year after year to gather plant resources. Several Archaic camps have been found at Petrified Forest National Park.

Basketmaker - The Basketmaker time period dates from 2,500-1,200 years ago (500 B.C.-A.D. 800) and marks a time of rapid population growth in the Southwest due to the introduction of agriculture (farming). Farming requires planting, care, harvest, and storage of products. People lived in semi-permanent structures, such as pithouses, built close to farm land. Pithouses were homes built into shallow or deep pits in the ground, roofed with poles tied together, and covered with thick brush and mud. They contained the tools and features necessary to plant, care for, harvest, cook, and store domesticated corn, beans, squash, and wild plant foods. The term Basketmaker comes from the finely woven baskets found at archeological sites. Their baskets were used for cooking and storing harvested and farmed plant products. Early forms of pottery were also developed during this time period.

Pueblo - The Pueblo time period dates from 1,200-600 years ago (A.D. 800-A.D. 1400) and marks the continued growth and development of a culture based on farming. Pottery also became much more complex. People began to construct pueblos as year-round dwelling structures. These above ground, stone-walled rooms were arranged like villages, with storage rooms for storing food, an open activity area in the middle called the plaza, underground rooms called kivas, and outer-lying field houses for shelter and tool storage. Most pueblo dwellings at Petrified Forest National Park face the south or southeast and are found on hilltops and ridgelines.

During Pueblo times there was more contact with other people living throughout the Southwest. This was in the form of trade for information, pottery, food, and raw materials such as petrified wood, shell, and turquoise. Archeologists study trade patterns and objects to better understand prehistoric social interactions and economic systems. A popular pueblo within the park is Agate House in the Rainbow Forest. This structure was partially reconstructed in the 1930's by the Civilian Conservation Corps under the guidance of an archeologist and is listed on the National Register of Historic Places for its significance in understanding prehistory in the area. The walls in the eight room pueblo are unique - they are made of petrified wood. Another structure in the park is Puerco Pueblo, listed on the National Register of Historic Places for its significance in understanding prehistory in the area. Puerco Pueblo may have had 100 rooms. It was one story tall, but sometimes two to three rooms deep, with at least three kivas. The entire Pueblo was not built at the same time. Evidence shows a time of rapid population growth, perhaps through immigration, resulting in the final size of the village. The rooms surround a large plaza. Up to 200 people could have lived in this village. Near the Pueblo are trash deposits, petroglyph panels, and a petrified wood quarry.

Modern American Indian - The Modern American Indian tradition includes likely descendants of the ancestral Puebloan people, including the Hopi, Zuni, and Rio Grande people. These modern people have stories and traditions that include their emergence into this world and clan migrations. The tribes consider prehistoric dwellings in the Southwest to be the remains of their ancient migrations. The sites of the ancestral Puebloan people still have meaning for modern Pueblo people. These places are sacred and on traditional land and should be respected and preserved. The Navajo, or Diné, are different from the Pueblo people. During prehistoric time they lived as hunter-gatherers. However, they learned new technologies, such as weaving and farming, from their neighbors. The Navajo have sacred and traditional land and stories about their people and the journeys they made. Some stories include the region around Petrified Forest National Park. Current archeological evidence indicates that the earliest Navajo site in the park was used as a seasonal winter home during the 1700s.

Culture Items

Lifestyle

Big Game Hunters
Hunters & Gatherers
Weavers
Potters
Basketmakers
Farmers
Government Workers
Miners
Builders
Ceremonial Participants
Traders

Stone Tools

Spears
Folsom Points
Small Projectile Points
Electric Drills
Hammerstones
Axes
Hoes
Atlatl
Petrified Wood Scrapers
Stone Knives
Manos & Metates

Living Areas

Cave Shelters
Stone-walled Pueblos
Kill Sites
Hogans
Pithouses
Camp Sites
Mobile Homes
Petrified Wood Quarries
Brick Houses
Wood Houses

Food Stuff

PLANTS
Grass Seeds
(Rice Grass, Amaranth)
Roots, Tubers (Cattail Reed, Onion)
Leaves(Lambsquarters, Goosefoot)
Pronghorn
Fruits (Berries, Currants, Cactus)
Nuts (Pinyon, Walnut, Acorn)
Beans
Corn
Squash
Grocery Store Foods

ANIMALS
Mule Deer
Wild Turkey
Bison
Mammoths
Rabbits
Lizards
Snake
Birds
Prairie Dogs
Processed Meats
(Hamburger Sausage)
Horses
Giant Sloth

Other Materials

Fire Starting Kits
Baskets
Bone Awls for Sewing
Steel & Plastic Tools
Grass Mats
Looms for Weaving
Clay Figurines
Rope
Store-bought Clothes
Machinery
Animal Skins
Pottery
Antlers, Horns, & Claws
Woven Sandals
Moccasins
Shell Jewelry
Turquoise
Bows & Arrows
Furniture & Appliances
Electricity & Plumbing

Culture Characteristics

	Lifestyle	Living Areas	Food Stuff	Stone Tools	Other Materials
Paleo-Indian					
Archaic					
Basket-maker					
Peublo					
Modern American Indian					

Culture Characteristics Answers

	Lifestyle	Living Areas	Food Stuff	Stone Tools	Other Materials
Paleo-Indian	big game hunters	cave shelters kill sites camp sites quarries	fruits, nuts mammoths bison giant sloth	petrified wood scrapers stone knives spears hammerstones Folsom points	fire starting kits bone awls for sewing animal skins antlers, horns, claws
Archaic	hunter/gatherers	cave shelters kill sites camp sites quarries	grass seeds rots, tubers leaves, fruits, nuts pronghorn rabbits birds prairie dogs	petrified wood scrapers stone knives spears hammerstones projectile points atlatl manos & metates	fire starting kits bone awls for sewing animal skins antlers, horns, claws bows and arrows
Basket-maker	basketmakers potters farmers builders	pithouses quarries	grass seeds roots, tubers, leaves, fruits, nuts, corn, beans, squash, mule deer pronghorn, rabbits lizards, snakes birds, prairie dogs	petrified wood scrapers stone knives spears hammerstones projectile points atlatl manos & metates	fire starting kits bone awls for sewing animal skins antlers, horns, claws bows and arrows baskets grass mats pottery, rope woven sandals
Peublo	potters farmers basketmakers traders builders	stone-wall pueblos quarries	grass seeds roots, tubers, leaves, fruits, nuts, corn, beans, squash, mule deer pronghorn, rabbits, lizards, snakes, birds, horses,prairie dogs wild turkey	petrified wood scrapers stone knives spears hammerstones projectile points atlatl manos & mutates axes hoes	fire starting kits bone awls for sewing animal skins antlers, horns, claws moccasins bows and arrows baskets, grass mats pottery, rope shell jewelry turquoise clay figurines woven sandal
Modern American Indian	potters farmers basketmakers weavers builders government workers miners ceremonial part. traders	hogans brick & wood houses mobile homes	roots, tubers fruits, nuts corn, beans squash grocery store foods mule deer pronghorn rabbits, wild turkey processed meat	electric drills axes hoes manos & mutates	store-bought clothes furniture & appliances electricity and plumbing looms for weaving steel & plastic tools machinery animal skins baskets, shell jewelry turquoise, pottery clay figurines

Lesson 2:
Dating with Trees

Learning Objectives
At the end of this lesson students will be able to:
- Define dendrochronology and its importance in archaeology.
- Model the process of dendrochronology with simulated samples.
- Discuss the benefits and challenges of the science of dendrochronology.

Arizona State Standards
Elementary

S1-C2-PO 2: Describe the cultures and contributions of the Mogollon, ancestral Puebloans, and Hohokam.

S2-C1-PO 2/4/5/8: Recognize how archaeological research adds to our understanding of the past.

Grade 8

S1-C1-PO2; S2-C1-PO 2: Distinguish among dating methods that yield calendar ages, correlated ages, and relative ages.

Duration
30 minutes

Location
Classroom

Key Vocabulary
- Dendrochronology- the science involving the use of annual tree rings to determine the dates and chronological order of past events.
- Annual tree ring – an annual formation of growth in trees consisting of two concentric layers; one of springwood and one of summerwood.

Trunk Materials
- wood sample (circular)
- wood sample (half – shows what a "core" sample would look like)
- "Tree Ring Sample Sheet" original

Additional Materials
- scissors
- tape
- class set of "Tree Ring Sample Sheet" (1 per pair of students)

Background

Dendrochronology is the science of using growth rings of trees to determine the age of a tree sample. Many trees (but not all) have regular growth rates that are preserved as tree rings (or growth rings) inside the "stem" or trunk of the tree. Growth rings are added approximately each year that a tree is alive. These rings can inform scientists of what the climate was like during various points in history. Wetter, more plentiful years generally have thicker, more defined growth rings while drier, more stressful years have thin layers, with almost little or no growth. The thick rings are years of good weather, resulting in good growth. The thin rings, usually seen on dark bands or lines, are times of slow growth such as during the winter. When these dark bands are very close to each other, weather conditions for several years were not good for growth, such as during drought.

Since many archaeological sites have wood in some form, such as in firewood, roof beams, loom supports, and even artwork, scientists are able to use the growth rings in the wood to compare with a dendro-chronological "timeline". Thousands of wood samples have been used to make consistent "timeline" of growth and climate change dating back to the 13th century. Comparing archaeological samples with this timeline allows scientists to determine when the tree was cut. Archaeologists then have a general idea of the age of the archaeological site or features (a structure or features is at least as old as when the tree was cut down). Using dendrochronology and other dating techniques, archaeologist can determine the exact date for a pueblo, kiva, or other features, for dates such as 1323 rather than the 1300s!

Suggested Procedures

1. Explain the science of dendrochronology and demonstrate how tree rings are counted using the wood sample provided. Remember that scientists and researchers get a core sample from a tree if the tree is alive (represented by the half piece wood sample)
2. Divide the students into pairs. Provide each pair of students with one copy of the Tree Ring Sample Worksheet and 2 pairs of scissors.
3. Explain to the students that they are going to determine the age of a piece of firewood found at an archaeological site in Petrified Forest National Park. We can't get an exact age of when that tree was placed in the fire, but we can get a general idea of how old the tree was when it was cut down. This gives us some idea of how old the archaeological site is. Have the students cut out each of the "samples" of wood. Make sure that the left and right edges of the wood "samples" are cut off so no line is present (it will look like a growth line and their numbers would be off).
4. Have the students align each "sample" along matching sets of lines. Explain that these lines are small core samples of tree rings (like wood samples). They represent certain years of growth. The wetter the year the thicker the lines are and the more spread out each of the lines are (lots of growth in the same amount of time). The drier the year, the thinner the lines are and the closer they are together (little growth in the same amount of time).
5. Have the students' tape the sample sets together, with "Tree Cut 1 year ago" on top and "Firewood Sample from Site" on the bottom. The final product should have a stair stepping appearance (see answer key for further visual representation of final product). Make sure the sample has the ✿ on the LEFT SIDE. For higher level thinking (and a greater challenge), create a set without the ✿ .

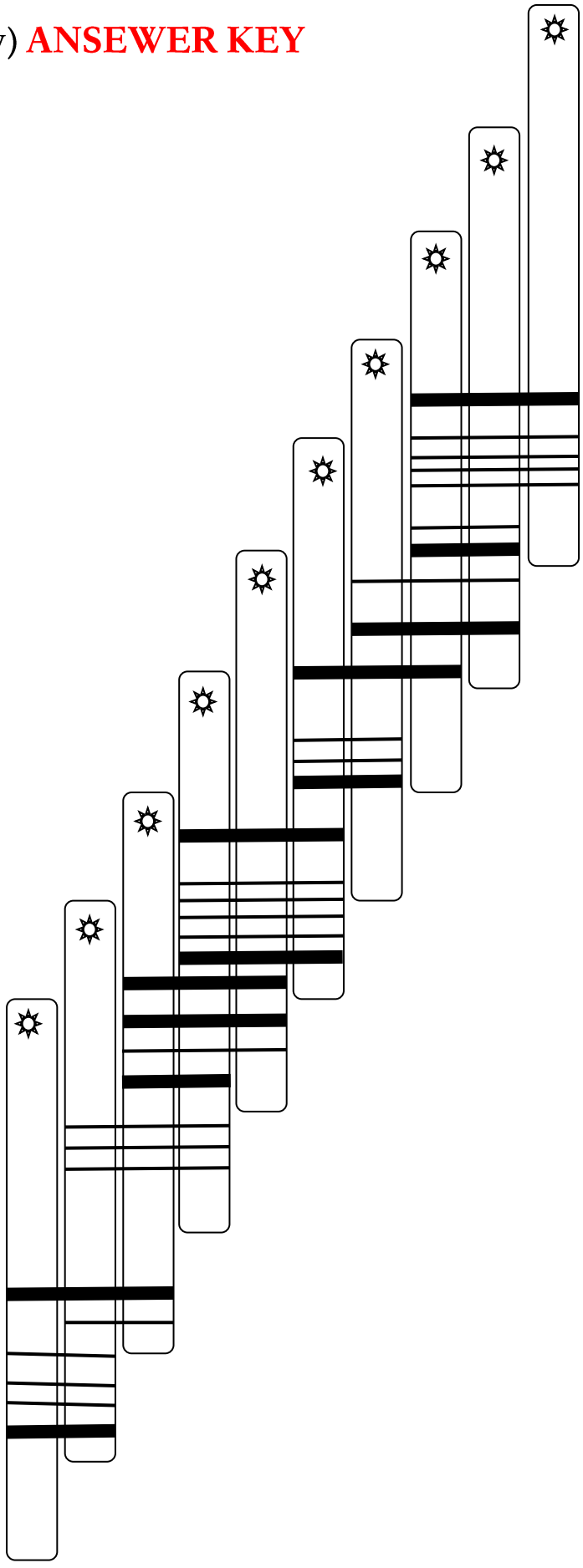
6. Have students calculate a possible age for the "Firewood Sample". For this model, each line will represent 5 years of growth. For example, the "Tree Cut 1 year ago", has 1 year plus each line that is present = 21 years old. Firewood sample site is?

Extensions

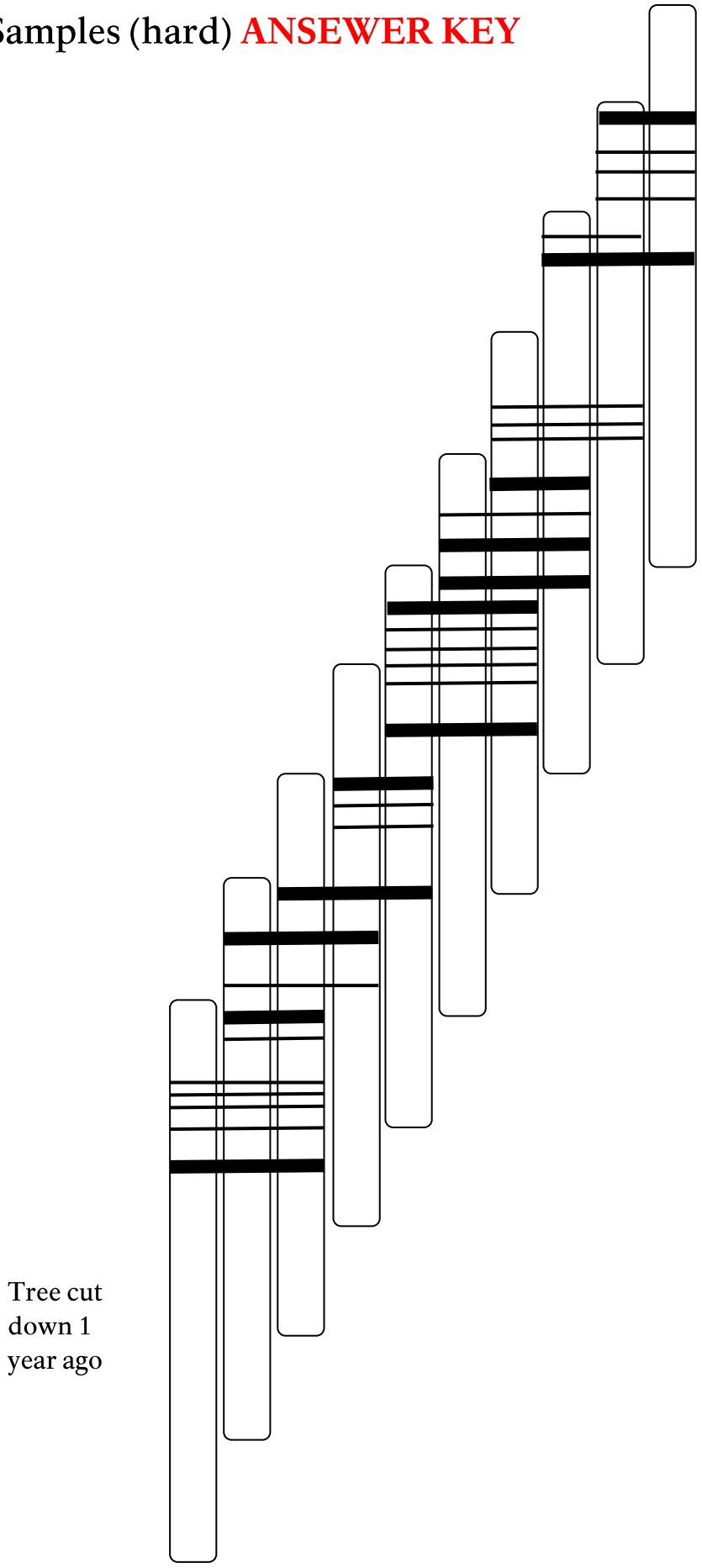
Address the following either as a group or class discussion, or as a writing assignment:

1. What are the benefits of using this type of dating technique on archaeological samples? What are the challenges?
2. Not all trees grow at the same rate. Some trees produce more growth rings (1 line/ring=1 month), and some produce less (1 line/ring=5 years). How could this be a problem for scientists using wood samples to date archeological sites? (Firewood sample from a site is 155 yrs old)
3. The Hopi live in some buildings that are considered among the oldest continually inhabited structures in the world. For example, parts of the village of Oraibi have been dated using dendrochronology to 1150 AD. Develop a poster for a younger audience (K-3) discussing how dendrochronology works using the Hopi village of Oraibi as an example.

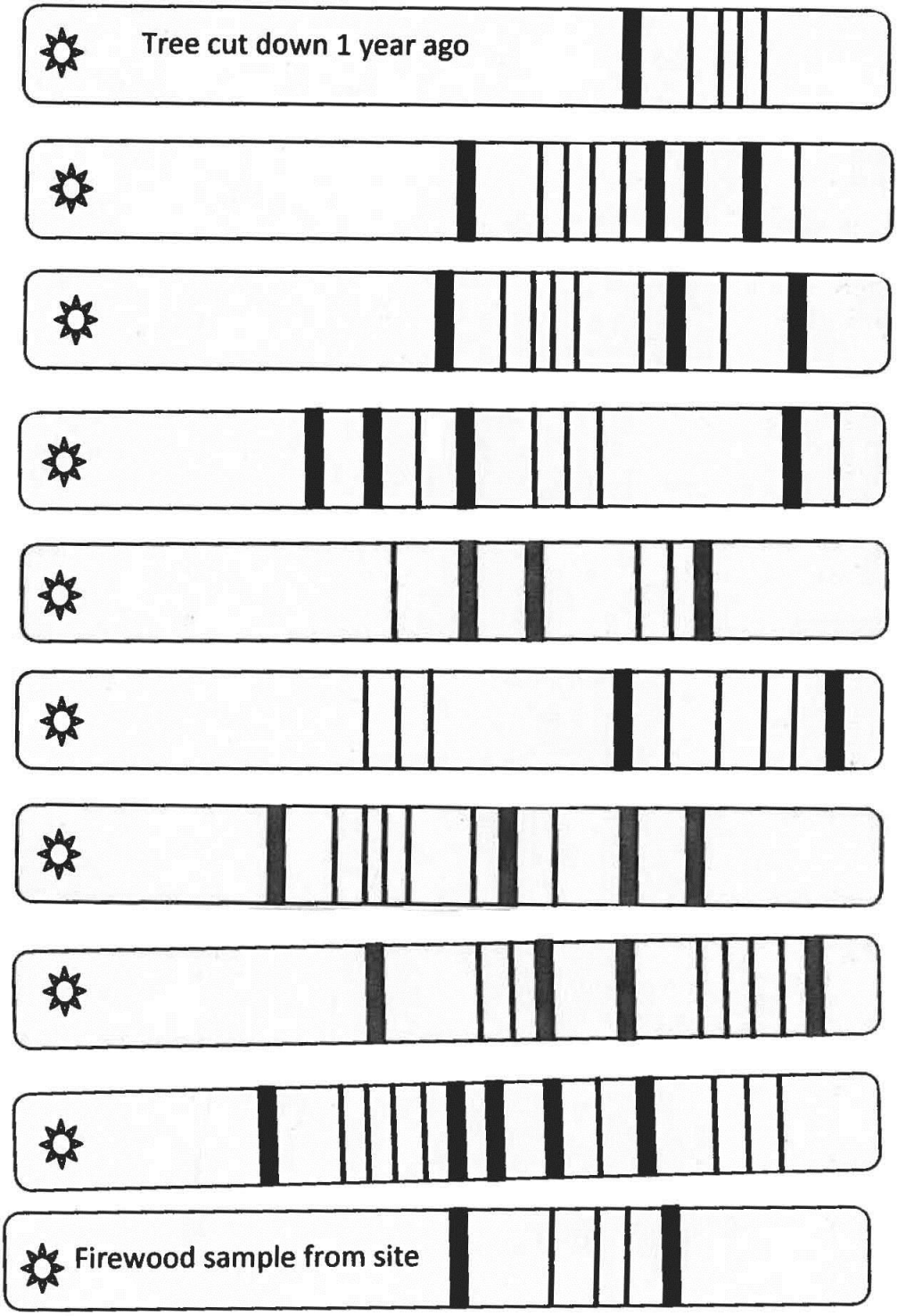
Tree Ring Samples (easy) ANSEWER KEY



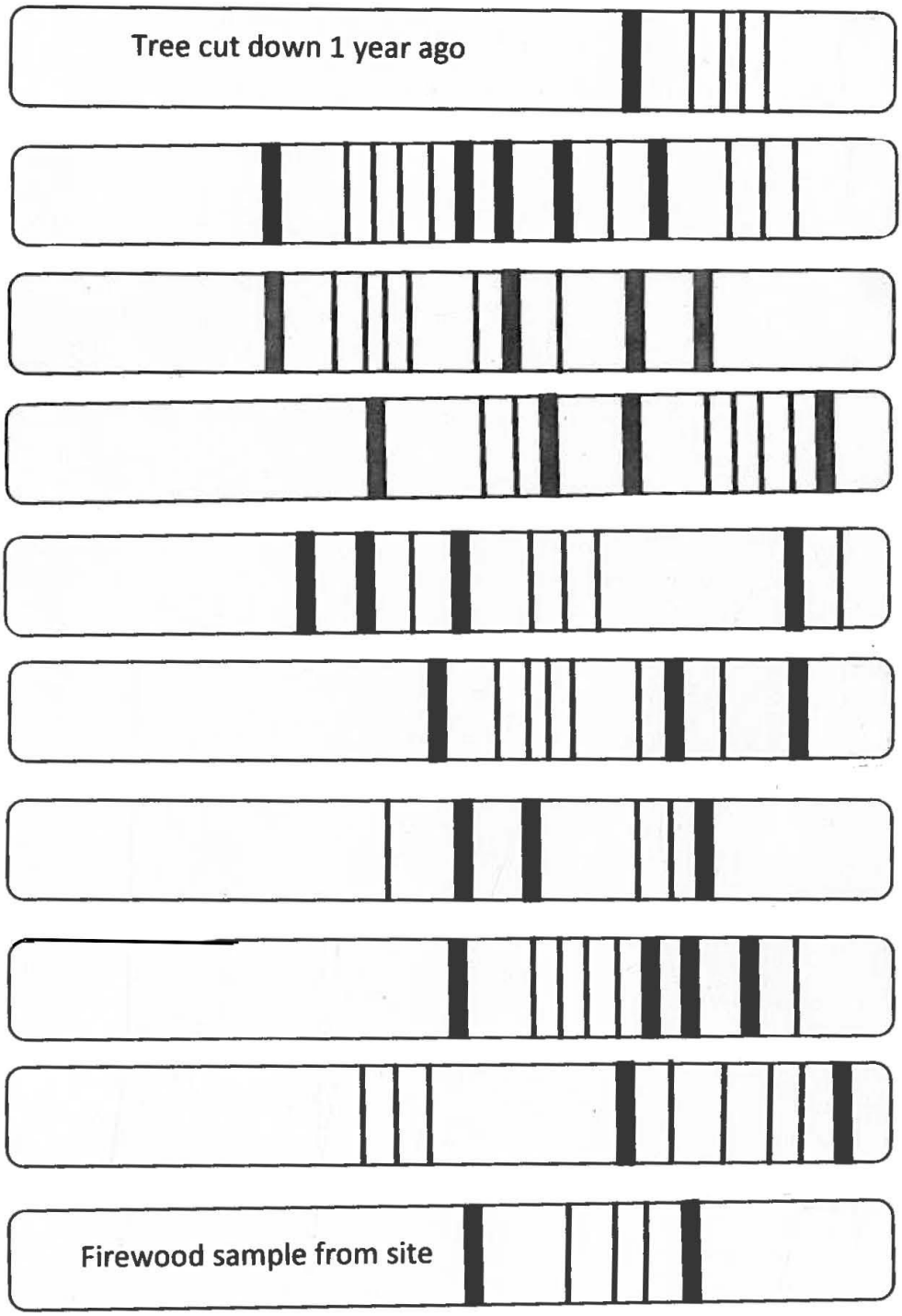
Tree Ring Samples (hard) ANSEWER KEY



Tree Ring Samples 2



Tree Ring Sampels



Lesson 3:
Weaving is a Way of Life

Learning Objectives
The students will be able to:
- Create a small rug.
- Discuss how weaving impacted the culture of the Navajo (Diné).
- Describe how an artist represents individuality when making a rug.

Arizona Social Studies State Standards
Elementary:
S3-C1-PO4: Describe the varied backgrounds of people living in Arizona.
S5-C1-PO4: Give examples of trade in the local community.

High School
S1-C5-PO4: Describe the impact of European-American expansion on native peoples.

Duration
2 days

Location
Classroom

Key Vocabulary
- Weave - to interlace threads, yarns, strips, or fibrous materials to form a fabric or material.
- Navajo (Diné) – An American Indian culture (also Nation and Athabaskan language) in the southwestern U.S.
- Legend - a non-historical or unverifiable story handed down verbally through many generations.
- Trade – the act of buying, selling, or exchanging goods.
- trading post - a store established in an unsettled or thinly settled region by a trader or trading company to obtain local products in exchange for supplies, clothing, other goods, or for cash

Trunk Materials
- wooden craft sticks
- yarn
- comb

Additional Materials
- glue
- marker

Background

The Navajo (or Diné) tell a tale of learning to weave from Spider Woman, a deity (spirit)of their culture. The story of Spider Woman is that she found her gift by accident, taught herself to weave, and then instructed the Diné (the people) how to weave. The weaving of rugs has been a staple trade item in the Navajo culture dating back to the 17th century. These items had a variety of uses, from utilitarian to decorative. The styles of the weaves vary by artist and region. As interest in the Navajo rug increased, the use of new styles and colors was encouraged. Today, a Navajo rug produced in the traditional fashion is a prized artistic piece and considered a proud tradition in the culture. Diagrams of some Navajo rug patterns can be found in the book "Navajo Weaving Way".

Products such as rugs and jewelry where often used as barter at trading posts located throughout the West. Many of the patterns and techniques used to create rugs and jewelry were influenced by what was of interest for trading posts. Painted Desert Inn, a National Historic Site inside Petrified Forest National park, is an example of such a trading post. Railroads, such as the Santa Fe, increased awareness of Native artwork and commercialized functional and cultural items into valuable works of art.

Suggested Procedures

1. Take 4 wooden craft sticks and glue the ends to form a square. This will serve as a loom.
2. Have the students select a base color for their rug. Wrap the square from side to side about 40 times, and leave enough string loose to tie to the next color yarn. On a side where the yarn has not been wrapped, have the students write their names.
3. Have the students select another color to work with. Measure out a length of that color (suggested amount=2 ft). Tie the end of the first string on the loom. Weave the color through (over and under) for the first layer. Use the comb to tighten the weave after each layer. Alternate the next layer (under and over), so that the weave is secure.
4. When changing colors, tie the end of the yarn in use to another color of yarn. Continue the process until the loom is full of weave. The students are encouraged to use various colors and develop designs for their rug.
5. The completed "rug" can be left on the loom for display, or the wooden sticks can be broken and removed.

Evaluation

Address the following either as a group or class discussion, or as a writing assignment:

1. What might a woven item, like a Navajo rug, be used for?
2. Navajo rugs became an important trade item as far back as the 17th century, when sheep were first introduced. How might the tradition of weaving have changed the way of life for the Navajo people?

3. Every artist, even when practicing the same style, has his or her own technique. Every Navajo rug is a unique work of art. Why is it important for an artist to be able to bring originality to a piece, even when patterns may be similar?
4. What was the role of the trading post in influencing rug designs?

Extensions

- Research the different styles of Navajo rug weaving and discuss how the styles have changed over time.
- Identify the traditional patterns compared to more modern patterns.
- List cultural, economic, or other reasons for the appearance of new designs and colors.

Lesson 4:
Puzzling over Pottery

Learning Objectives
The students will be able to:
- Develop a pottery puzzle simulating how pottery is often found in broken pieces.
- Model how archaeologists examine and assemble collected material.
- Discuss the challenges archaeologists face with understanding collected material.

Arizona State Standards
S1-C2-PO 2: Describe the cultures and contributions of the Mogollon, Ancestral Puebloan, and Hohokam cultures.
S2-C1-PO 2/4/5/8: Recognize how archaeological research adds to our understanding of the past.

High School
S2-C2-PO1: Describe the development of early prehistoric people, their agriculture, and settlements.
S1-C2-PO1: Describe prehistoric cultures of North American continent: Southwestern.

Duration
30 – 45 minutes

Location
Classroom

Key Vocabulary
- Pottery (ceramics) – the craft of making wares out of ceramic materials to include earthenware, stoneware, and porcelain.
- **Potsherd – a fragment (broken piece) of pottery found in or around an archeological site**
- Archaeology – the study of human activity in the past through the recovery and analysis of material culture.

Trunk Materials
- box of wooden craft sticks
- Book of Southwest designs
- Lesson 3 puzzle example

Materials You Provide
- markers
- masking tape
- pencils

Background

Just as plates, bowls, storage containers, and plastic bags are found in every modern kitchen, clay pottery serving similar needs has been found in pueblos of the Southwest for over 1000 years. Pottery in both ancient and today's native cultures has a variety of uses, including storage, decoration, ceremonies, and trade. Pottery is an artistic canvas, where designs for beauty as well as cultural meanings may be placed. The paints used to make these designs were originally made from plant and mineral material found in the environment. These plants or minerals were ground to a powder and mixed with a base, such as water or wet clay.

A midden is an archeological term used to describe any kind of feature containing waste products relating to daily human life. They may be convenient single-use pits (created by nomadic groups) or long-term designated dumps used by active communities. The long-term dumps may accumulate products over several generations.

Designs found in Southwestern art have a variety of meanings, including symbols, stories, and a record of special events. They can be classified into 6 different categories: anthropomorphs (human-like figures), zoomorphs (animal-like figures), Kachinas (spiritual beings), hands/tracks, geometrics, and indeterminate (unable to classify). The meanings and stories of some of these designs are still used by modern native cultures though their meanings may vary between groups. The variances are due to some meanings being lost through time as they get passed down verbally.

Suggested Procedures

1. Each student will receive 10 wooden sticks and a plastic bag. Have the students write their names on the plastic bags. Lay these sticks next to one another so that there is a flat surface (about 5" x 5"), which will be used as a space to create a drawing. Put masking tape on the "back" of the sticks, connecting them together (look at sample).
2. Flip the sticks over to the non-taped side. Using markers, have the students draw a sample of pottery with various designs and colors, using all of the sticks.
3. Remove the tape, mix up the sticks and place them in the plastic bag. Have each student take 2 sticks out randomly. Each stick represents a potsherd.
4. Collect the plastic bags and redistribute them randomly. Allow about 10-15 minutes for the students to try and complete the pottery puzzle from one of their classmates. Be sure to keep the 2 sticks that were taken out separate from the puzzle as they try to complete it.
5. Return the missing piece to the plastic bag. If time allows, re-distribute the puzzles so the students can attempt a different puzzle.

Evaluation

Putting together pottery found in the field can be a challenge. Sometimes pieces are missing and the uses for that pottery are unknown. Follow with discussion, either as a group, or as a writing assignment.

Extensions:

- Using air dry clay and acrylic paints have the students make their own pinch pots. Break the pots when they are dry and place the pieces into bags which will be given to different students to put together.
    - Use the pottery reconstruction kit in the trunk as an example by piecing it together using masking tape.
    - Use the following guide to help with the reconstruction of the pots.

Background:

Until the recent invention of plastic the most widely used material for making cookware and storage containers was ceramic. Pots made with ceramic were somewhat fragile and could break if dropped but the pieces of pottery, called 'pot sherds' by archeologists, could survive buried in the ground for hundreds of years. Sometimes archeologists discover the broken pieces of an entire pot and can reconstruct it using glue that would not damage the pot and could be removed if necessary. The following are some steps to help you reconstruct your pot.

1. Sort your pot sherds into 4 groups: pieces of the base, pieces of the body, pieces of the rim, and special parts like a spout, handle, or legs.

2. Begin to fit your base pieces together first then add pieces of the body working your way up to the top using your tape or glue.

3. Looking at the decoration or painting as well as the shape of your pot sherds will give you clues to where the pieces fit.

Lesson 5:
Pottery with Purpose

Learning Objectives
The students will be able to:

1. Create a model of pottery that contains designs which represent a story or narrative.
2. Discuss how stories and meaning can be represented in artistic pieces.
3. Determine the similarities and differences between pottery use today and by ancient cultures.

Arizona State Standards
Elementary
S1-C2-PO 2: Describe the cultures and contributions of the Mogollon, ancestral Puebloan, and Hohokam cultures.
S2-C1-PO 2/4/5/8: Recognize how archaeological research adds to our understanding of the past.

High School
S2-C2-PO1: Describe the development of early prehistoric people, their agriculture, and settlements.
S1-C2-PO1: Describe prehistoric cultures of North American continent: Southwestern.

Duration
3 days

Location
Classroom

Key Vocabulary
- Petroglyph – an image carved, incised, or pecked into the surface of stone (usually sandstone in the southwest US) representing ideas of a culture.
- Pictograph – an image that is painted on stone representing the ideas of a culture.
- Anthropomorphs – images representing human figures (spiritual or literal)
- Zoomorphs - images representing animal figures
- Hands and tracks – images of human or animal hand or footprints
- Kachinas – images of sprit beings in Pueblo cosmology and religious practices
- Geometrics – images of geometric shapes such as squares, spirals, lines, and zig-zags
- Indeterminates – images that cannot be classified

Trunk Materials

- bowl molds (1 bowl per student)
- 10 paint brushes
- Book of Southwest petroglyphs

Materials You Provide

- poster paint
- glue
- newspaper strips
- white paper strips
- 2 large trays
- water
- pencils
- petroleum jelly

Background

Just as plates, bowls, storage containers, and plastic bags are found in every modern kitchen, clay pottery serving similar needs has been found in pueblos of the Southwest for over 1000 years. Pottery in both ancient and today's native cultures has a variety of uses, including storage, decoration, ceremonies, and trade. Pottery is an artistic canvas, where designs for beauty as well as cultural meanings may be placed. The paints used to make these designs were originally made from plant and mineral material found in the environment. These plants or minerals were ground to a powder and mixed with a base, such as water or wet clay.

Designs found in Southwestern art have a variety of meanings, including symbols, stories, and a record of special events. They can be classified into 6 different categories: anthropomorphs (human-like figures), zoomorphs (animal-like figures), Kachinas (spiritual beings), hands/tracks, geometrics, and indeterminate (unable to classify). The meanings and stories of some of these designs are still used by modern native cultures though their meaning may vary between cultures. The variances are due to some meanings being lost through time as they get passed down verbally.

Suggested Procedures

1. Day 1-Before the activity, take sheets of newspapers (2 full sheets=one bowl) and cut into strips 1" x 8" in size. Be sure to cut enough for the number of students making bowls. Repeat the same procedure with the white paper (1 sheet=one bowl). Mix 3 parts glue to 1 part water in each large tray.
2. To begin activity, introduce to the students that ancient bowls where made with clay then fired and painted using natural materials. They will use Paper Mache to simulate the clay and poster

paint to simulate the paints made from natural material. Pass out to each student one bowl model. NOTE: These bowls will need to be returned for other students to do this activity.

3. Have the students place a thin layer of petroleum jelly onto their bowl models. Each student can now begin placing strips of newspaper dipped in the glue mixture on their bowl. Be sure the students don't go too much past the lip of the bowl. After about 4 layers of newspaper strips, have the students place 1 layer of white paper. Let dry overnight. NOTE: newspaper print may stain the glue mixture, a new batch of glue mixture may be necessary.
4. Day 2: Introduce to the students that much of the art of the ancient Southwest was used to tell a story or had special meaning (see Background). Display the 6 examples of the different symbol categories.
5. Have the students carefully sketch their personal story on their "pottery", using the six different groups as a guide. Possible themes to draw: symbols that represent who they are, a story about their family, a creative story that may be funny or serious. Have the students paint their design using poster paint. Allow the paint the dry overnight. NOTE: Do not remove the bowl mold until the final day of the project.

Evaluation

Day 3-After the paint on the "pottery" has dried each student can remove their bowl from the molds, and discuss the meanings behind their design. Follow with discussion, either as a group, or as a writing assignment.

Discussion:

1. How is prehistoric pottery, like what has been modeled today, similar to modern pottery? How is it different? *An example of modern pottery could be a ceramic bowl or plastic cup.
2. The native peoples of this area often have specific meanings and messages in their art work. Why do you think that art was of such importance to the native people?

Extensions

- If the students are using the bowl to illustrate a creative story, have the students write the story before conducting this activity. Have the students present their stories to the class. Most Native cultures pass down their traditions orally, and it is suggested that the story have a moral or lesson to learn.

Lesson 6:
Rock Art

Learning Objectives
The students will be able to:
- Model the use of natural materials on prehistoric pottery.
- Discuss how art can be used to convey meaning.
- Compare modern pottery uses and prehistoric uses.

Arizona State Standards
Elementary
S1-C2-PO 2: Describe the cultures and contributions of the Mogollon, Ancestral Puebloan, and Hohokam cultures.
S2-C1-PO 2/4/5/8: Recognize how archaeological research adds to our understanding of the past.

High School:
S2-C2-PO1: Describe the development of early prehistoric people, their agriculture, and settlements.
S1-C2-PO1: Describe prehistoric cultures of the North American continent: Southwestern.

Duration
3 days
Location
Classroom

Key Vocabulary
- Metate – a large stone that is the platform for grinding corn or other food
- Mano – the hand held stone that is used on top of a metate to grind food
- Petroglyph – an image carved, incised, or pecked into the surface of stone (usually sandstone in the southwest US) representing ideas of a culture.
- Pictograph – an image that is painted on stone representing the ideas of a culture.
- Anthropomorphs – images representing human figures (spiritual or literal)
- Zoomorphs - images representing animal figures
- Hands and tracks – images of human or animal hand or footprints
- Kachinas – images of sprit beings in Pueblo cosmology and religious practices
- Geometrics – images of geometric shapes such as squares, spirals, lines, and zig-zags
- Indeterminates – images that cannot be classified

Trunk Materials

- one Terra Cotta tile for each student
- 4 mortar and pestle sets
- one diagram (6 total) of each different type of Southwestern petroglyph categories
- metate artifact image
- mano artifact image
- Books: Ancient Indians of the Southwest, Southwest Indian Designs, Stalking the Past

Materials You Provide

- SAFETY GOGGLES, 1 per student
- 10 paper cups
- 10 paint brushes
- pencil
- paper
- water
- 2 cooking trays
- oven
- at least 5 different natural dye materials (suggestions in procedures)
- 1 measuring tablespoon
- dry grass
- straw or yucca leaves (authentic paint brushes)

Background

Designs found in Southwestern art have a variety of meanings, including symbols, stories, and a record of special events. They can be classified into 6 different categories: anthropomorphs (human-like figures), zoomorphs (animal-like figures), Kachinas (spiritual beings), hands/tracks, geometrics (squares, circles, etc), and indeterminate (unable to classify). Designs can be found on clay pottery pieces and on rock faces. If a design has been carved into a rock face, it is referred to a *petroglyph*, while one which is painted on a rock surface, it is a *pictograph.* Petroglyphs are related to socio-political boundaries of overlapping cultures and include a wide variety of solar calendars indicating human interaction with the landscape and awareness of astronomy.

The paints used by ancient Native cultures were made of plant and mineral material found in the environment. These plant and minerals were ground into a power and mixed with a base, such as water or wet clay. Materials were chosen for color, durability, and availability. Most material was collected in the area around a pueblo but some may have been obtained through trading originating from places far away.

Suggested Procedures

1. **Day 1**-At least one day before the activity begins, have the students brainstorm at least 5 natural items which could be used to make a dye or paint.
2. **Day 2**-Have the students collect/bring in at least 5 of those suggested ideas. You will need about 1 cup of each item (once crushed the material should equal 6 teaspoons). If there is difficulty with ideas on what colors can be produced naturally, here are some suggestions:
    - **a)** Black: charcoal
    - **b)** Brown: dirt, cherries
    - **c)** Green: plant leaves
    - **d)** Red: cranberries, strawberries, raspberries
    - **e)** Blue/Purple: blueberries, canned beets
3. Label each cup with the name of the material. Add 1 tablespoon of water into each labeled cup. Distribute a separate cup to pairs or groups of students with water to rinse their paint brushes.
4. Using a mortar and pestle, grind or crush each natural item as fine as possible. Rinse mortar and pestle, and repeat the process for each item. The mortar and pestle simulate the metate and mano used by native cultures, even to this day. The *metate* was the mortar-a large flat stone, often with a basin-like depression. The *mano* was the pestle-a smooth, hand-held rock pushed across the metate. (show artifact images)
5. Divide the ground material into labeled cups, with about 3 tablespoons of color in each and Place a modern paint brush inside the cup. For a true ancient artist experience, dry grass, yucca, or straw blades can be used as natural paint brushes. To make a grass paint brush, take one side of the grass blade and crush it with a rock. Be careful of the spines if using yucca!
6. Each student will receive a ceramic tile. Display examples from the "Southwest Indian Designs". Have students draw a design on the tile with pencil. On these tiles, each student will develop a drawing or design with pencil, using the six different categories as a guide. Have the students write their names on the backs of the tiles.
7. Tell students to paint their design over the pencil using the various dyes they made. Have them keep track of which dyes they use by making a sketch of their design on paper with labels showing where each dye was used.
8. After painting, place the tiles on cooking sheets to dry (they may be touching one another).
9. There are two options for setting the color:
    a. BEST METHOD: After they have dried (about 2 hours), place them in an oven at 250 degrees for 1 hour. CAUTION: TILES WILL BE HOT FOR AT LEAST 1 HOUR. Remove the tiles and let cool overnight before handling.
    b. ALTERNATE: After they have dried, place the tiles in UNINTERRUPTED sunlight for at least 6 hours. Let tiles cool overnight before handling.
10. Be sure the tiles stay away from water, as the dyes may not have completely absorbed into the tile.
11. **Day 3-** After the DYES on the tiles have set, each student will receive their tile and discuss the meanings behind their patterns and discuss the different dyes they used. NOTE: Some dyes may wash off the tiles; keep water away from the finished tiles.

Evaluation

Address the following either as a class or group discussion, or as a writing assignment.

1. What natural dyes did you use and how did those dyes look on your final product?
2. What are some uses for pottery that prehistoric people may have utilized?
3. Did the "firing" process change the colors or design? Describe the changes.

Extensions

- In many native stories, there is often a moral or life lesson. Some of the patterns in pottery are used to discuss and teach. The students can write a short story or poem explaining the meaning or story behind the pattern on their tile.
- The students can experiment with other natural dyes or modern paints using the same techniques to make a final product. Discuss the pros and cons of natural dyes versus modern paint.
- Set up a display in the classroom or at another location in the school to show the final tiles, compared to diagrams (showing change) and the types of materials (either actual material or drawings/pictures of it) used to make the dyes.

Lesson 7:
Trash *or* TREASURE

Learning Objectives
The students will be able to:
- Describe artifacts in their "trash" samples.
- Classify each "trash" sample by age.
- Hypothesize possible uses for the items in each "trash" sample.

Arizona State Standards
Elementary
S1-C2-PO 2: Describe the cultures and contributions of the Mogollon, ancestral Puebloans, and Hohokam.
S2-C1-PO 2/4/5/8: Recognize how archaeological research adds to our understanding of the past.

High School:
S2-C2-PO1: Describe the development of early prehistoric people, their agriculture, and settlements.
S1-C2-PO1: Describe prehistoric cultures of North American continent: Southwestern US.

Duration
45 – 60 minutes

Location
Classroom

Key Vocabulary
- Midden – a location where prehistoric humans deposited 'trash' from their daily lives.

Trunk Materials
- 6 pre-stuffed "trash" envelopes
- hand lens

Materials You Provide
- pencils
- class set of "Trash or TREASURE" Worksheet (1 per group)
- metric rulers

Background

Middens are collections of trash and other discarded debris found near archaeological sites. These trash piles provide valuable information about the day to day life of the people of that area. Items found in middens range from broken pottery to unused food items, even dung and human remains. Middens provide a window into the life of ancient people that would be otherwise difficult to determine. Middens can also be used to look at the use of an area over time. There can be a layering of the trash which can provide as much information as the items themselves

Suggested Procedures

1. Place students into groups of 3-4, for up to 6 groups.
2. Give each group a pre-stuffed envelope of "trash".
3. Have the students CAREFULLY examine each of the samples, completing the worksheet provided (1 per group). The more details that are provided, the easier it is to determine the use and function of the various samples. Use the hand lens for close examination and the metric rulers to take measurements.
4. After each group has completed examining their samples, have each group share their samples and the description of that sample from their worksheet.
5. After the students have discussed their samples, the class can work as a whole to determine the sequence of each of the samples from most recent to the oldest. Have the students create general categories for each of the six "trash" sample sets, and list the artifacts which were found.

Evaluation

Address the following either as a class or group discussion, or as a writing assignment:

1. Based on the samples examined, what can we learn about various cultures using the "trash" they have left behind?
2. How might some of these items have found their way to a "trash" site?
3. How can trash be of value in some ways and harmful in others?

Extensions

- Students select an item from their "trash" and attempt to identify that item through research. The students can then develop a short presentation on that particular item, including its origin, age, use, and some possible theories of how it got to that particular location.
- The teacher can collect trash from various parts of the school or homes. Using gloves, the students can CAREFULLY examine the trash from these areas and compare them to each other.

Trash or TREASURE Worksheet

Name(s)_____ Date_____

As you analyze the "trash" from your envelope use your hand lens and a ruler to investigate more details. In the boxes below write a description of each item, when it might have been discarded and what the item may have been used for. Remember, you might only have a portion of what was originally left behind. You can use M for "modern trash" Rt. 66 for "trash" from the 1930s and 40s and AP for "trash" left by ancestral Puebloan.

Description	Time Period	Possible uses

What do you think Archeologists can learn by studying middens and ancient trash?

_____

_____

_____

What do you think our modern trash might tell archeologists in the future about our culture?

_____

_____

_____

Lesson 8:
Jewelry for Trade

Learning Objectives
The students will be able to:
- Create a pattern to be reproduced in jewelry.
- Discuss the uses of jewelry in modern society.
- Describe the value of specific items in a society, such as jewelry.

Arizona Social Studies State Standards
Elementary:
S3-C1-PO4: Describe the varied backgrounds of people living in Arizona.
S5-C1-PO4: Give examples of trade in the local community.

High School:
S1-C5-PO4: Describe the impact of European-American expansion on native peoples.

Duration
Up to 2 days

Location
Classroom

Key Vocabulary
- Jewelry – items used by people as personal ornaments, often made with visually appealing stones and precious metals.
- Trade – the act of exchanging items for other items of similar value; can also include selling or purchasing of goods
- trading post – a common meeting place established for trading or selling goods

Trunk Materials
- string (3 bags of 3 different sizes)
- seed beads
- necklace clasps
- seed bead needles
- graph paper master

Materials You Provide

- scissors
- paper cup
- plastic bags
- copies of graph paper (cut in half)
- tape

Background

The Native people of Arizona have been creating jewelry for thousands of years. Beads of stone and shell have been found in ancestral dwellings dating back to the 1st century. These beautiful items have been and still are used in trade as markers of status and family heirlooms. Metal-smithing for jewelry making may have been introduced to Native cultures in the 1500s by Spanish explorers. Today Native jewelry incorporates the use of various metals, including copper and silver, as well as many precious and semi-precious stones such as turquoise.

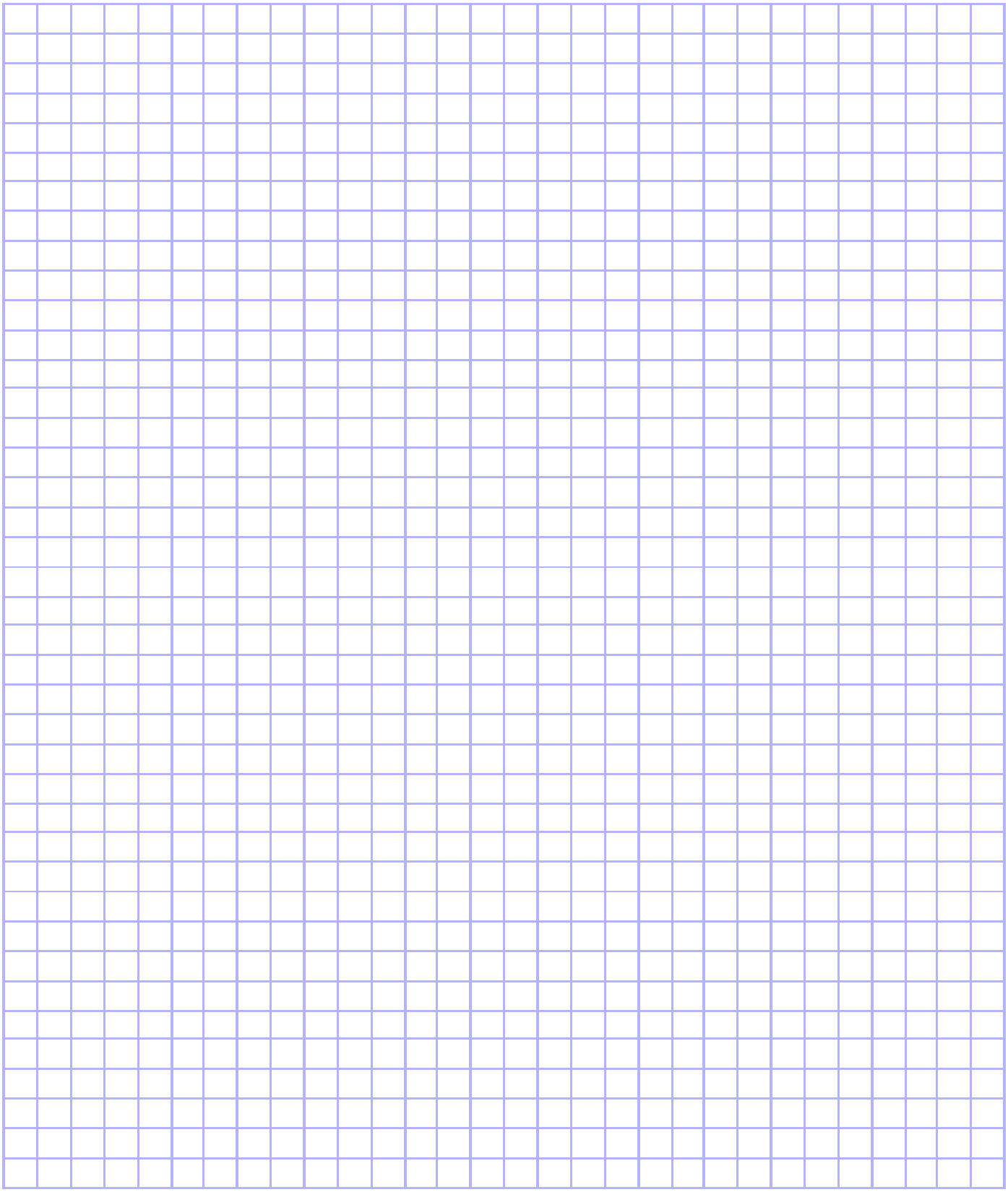
Products such as rugs and jewelry were often used as barter at trading posts located throughout the West. Many of the patterns and techniques used to create rugs and jewelry were influenced by what was of interest for trading posts. Painted Desert Inn, a National Historic Landmark inside Petrified Forest National Park, is an example of such a trading post. Railroads, such as the Santa Fe, increased awareness of Native artwork and commercialized functional and cultural items into valuable works of art.

Suggested Procedures

1. Have the students develop a pattern for their necklace using 5 different colors. The pattern must use all 5 colors provided and must repeat in some way. Have students label three rows on the graph paper #1, #2, and #3. Using colored pencils they should color in their pattern BEFORE beginning the necklace.
2. Distribute 1 of each size string from each of the 3 different plastic bags (numbered 1, 2, and 3), a plastic bag, and a 2 part clasp. Have the students write their names on their plastic bag. Tie each string to one end of the clasp. Place the other end of the clasp in the plastic bag so it's not misplaced.
3. Provide each student with a paper cup. Pour about ¼ cup of the mixed seed beads into each cup. Thread the seed bead needle on one of the strings. NOTE: The needle is VERY sharp. Use caution. You may want to do this step for younger students.
4. Have the students string the beads onto each of the 3 lengths of string, following the pattern they developed on the graph paper. Each student should do one string at a time, leaving about two inches of space at the end. Fold a small piece of tape over the end to keep the beads in place until all of the strings are finished.
5. At any point during the necklace creation, if the class needs to stop, have the students place small pieces of tape at the end of their string of beads. Have the students return needles when

not in use. Be sure to have them remove the tape when they continue stringing or are ready to finish their necklace.

6. When finished stringing beads, have students CAREFULLY remove any tape from the ends of each of the strings (Reminder: each string should have about two inches of space at the end). Tie all three strings together with the other end of the clasp. Collect and return the needles and any unused beads to the trunk.
7. Each student may present their necklace in small groups, comparing the final product with the original design on the paper.



Evaluation

Address the following either as a class or group discussion, or as a writing assignment:

1. How does jewelry today have special meaning or significance? *Hint: Wedding/Engagement rings
2. Describe the different ways modern societies use jewelry. How do you and/or your family use jewelry today?
3. Why do people find items such as jewelry valuable?

Extensions

Jewelry can have a special meaning to some people. For example, Navajo women pass down to their female relative's jewelry that may be several generations old. Develop a short story about a piece of jewelry you or one of your family members has that has special value.

Lesson 9:

Video Viewing – *Timeless Impressions* OR *Ancient America*

Learning Objectives
The students will be able to:

1. Describe the features of Petrified Forest National Park and the Painted Desert
2. Discuss how the Petrified Forest region has changed over time.
3. Identify factors impacting the history of Petrified Forest.

Arizona State Standards
High School
S1-C2-PO4: Describe how scientists continue to investigate and critically analyze aspects of theories.

Duration
65 minutes

Location
Classroom

Key Vocabulary
none

Trunk Materials
- *Timeless Impressions OR Ancient America* DVD

Materials You Provide
- class set of "*Timeless Impressions*: Video Worksheet
- TV and DVD player

Background

Petrified Forest National Park was first set aside as a National Monument in 1906 for the scientific value of the petrified wood. But it was quickly realized that the park contained natural and cultural resources very different from, yet just as magnificent, as the petrified wood. These additional resources helped Congress in the decision to upgrade the National Monument to a National Park in 1962. The General Management plant for Petrified Forest National Park states the significance of the park film: "The intent of Timeless Impressions is as an overview of all the resources at Petrified Forest National Park. A 20 minute version of the movie is shown at the park visitor centers to orient visitors before they enter the park."

Suggested Procedures

1. Provide each student with a copy of the "Timeless Impressions: Video Worksheet.
2. Play the video.
3. Have the student's complete worksheet of the video. An answer key is provided.

Evaluation

Address the following either as a class or group discussion, or as a writing assignment:

1. How has the Petrified Forest area changed over time?
2. How have humans used the Petrified Forest?
3. What has been done in the past and currently being done today to preserve the Petrified Forest?

Lesson 10:
Petrified Forest Virtual Field Trip

Learning Objectives
The students will be able to:
- Describe the geologic process that formed features of Petrified Forest.
- Identify how paleontology is studied in the Petrified Forest.
- Identify how archeology is studied in the Petrified Forest.

Arizona State Standards
High School Science
S2-C1-PO1: Describe how human curiosity and needs have influenced science, impacting the quality of life worldwide.
S1-C1-PO1: Evaluate scientific information for relevance to a given problem.

Duration
30 – 75 minutes

Location
Classroom with computer access

Key Vocabulary
none

Trunk Materials
- 10 copies of "Journey to the Late Triassic" CD Rom
- "Petrified Forest: Virtual Field Trip" Worksheets I, II, and III originals
- answer key for each worksheet

Additional Materials
- computer (1 per 2 – 3 students) with QuickTime and Media Player
- class set of "Petrified Forest: Virtual Field Trip" Worksheets I, II, and III
- internet access

Background
Petrified Forest National Park was first set aside as a National Monument in 1906 for the scientific value of the petrified wood. But it was quickly realized that the park contained natural and cultural resources very different from, yet just as magnificent as the petrified wood. These additional resources helped Congress in the decision to upgrade the National Monument to a

National Park in 1962. The purpose of the "Journey to the Late Triassic" CD is to try and compare today's landscape to the ancient landscape of the Triassic. Through the images, graphics, video, and audio clips, students are given the opportunity to be immersed even in the classroom.

Suggested Procedures

1. Before running this virtual field trip, determine the amount of time to be spent on this activity. There are 3 worksheets, each one will take about 25 minutes to complete. Worksheet I focuses more on petrified wood; Worksheet II-petrification and archaeology; Worksheet III focuses mostly on geology.
2. Determine the number of groups based on the number of computers available. Provide enough copies of the selected worksheet(s) for each group. Suggested group size is 2-3.
3. There are 10 copies of the "Journey to the Late Triassic" CD included in the trunk. If this is not enough, the contents of the CD may be copied onto a shared folder (consult your school's computer technician), and used by the students. NOTE: the contents of the CD "Journey to the Late Triassic" may ONLY be used for educational purposes and should not be copied for personal use.
4. In each group, determine who will be the researcher and who will be the writer. If the groups have an odd number, or to share the work load, alternate between each of the roles with the various members of the group.
5. After completing the virtual field trip, explore the official Petrified Forest National Park website at www.nps.gov/pefo to find additional information.

Evaluation

An answer sheet for each worksheet is provided.

Extensions

- For additional review of the material, have the students divide into three groups, each of which will cover a particular part of the park (South End, Mid-Park, and North End). Subdivide each group into pairs then have the pairs select a location or site. Each pair will develop a 3 minute presentation (oral, poster, PowerPoint, etc.) discussing the features of that particular location.
- Have each pair present their research to the class.

Name:_____ Date:_____

Petrified Forest National Park: Virtual Field Trip Worksheet I

Welcome to this virtual field trip of Petrified Forest National Park! You are about to start an amazing journey beginning today and ending up all the way back to the age when dinosaurs first roamed the Earth and the petrified trees stood tall and alive. During your tour, here are a few helpful hints:

-to enter a location, just click the blue circles on the map on the right side of the screen for a specific area, or there are white arrows within the panoramic pictures to go to various locations.

-to view features within a different location, click on the red circles that appear on your tour

-to exit a feature of a location, click "Back to Panorama" at the bottom right corner of the viewing screen

-to explore a location, just hold the button of your mouse down and move your mouse in the direction you would like to look. Information available on that feature or location will appear in the text section underneath your tour area as well as any information provided by the rangers.

South End: click "Start" to begin your tour

Ranger Marge can help you answer:

1. The Petrified Forest was made into a national park to protect a variety of resources. What are the seven resources that the Petrified Forest protects?

2. Describe what the Petrified Forest looked like during the Triassic Period.

Rainbow Forest Museum

3. The diorama of two phytosaurs fighting within a Triassic landscape was produced by the Civilian _____ under the direction of University of _____.

4. Science is dynamic, which means it's always changing. What example is does ***Ranger Hallie*** give for how science in the park has changed?

5. *Desmatosuchus* (a type of aetosaur) had what kinds of features for protection?

6. *Postosuchus* (a type of rausuchian) has features of a _____ or an organism that is a meat-eater.

7. The center skeleton displayed in the Rainbow Forest Museum belongs to _____, a type of large, plant-eating reptile with tusks and a turtle-like beak.

Agate House-Ranger Ted

8. How old do archaeologists think the Agate House is?

9. What purpose might the Agate House have served for Pueblo people?

10. What feature is present on the reconstructed version of Agate House that was not there when it was originally built?

11. What is the Agate House made of?

Long Logs-Ranger Rita

12. What is the scientific name for most of the petrified trees in the park?

13. What is the main mineral responsible for petrifying the trees?

14. What type of clay/clay stone is found here?

Fossil Digs

15. Why is keeping a notebook important for scientists like ***Paleontologist Bill***?

16. While talking about layers of rocks, ***Paleontologist Bill*** mentions *horizons.* What do you think the term horizon means?

17. What is the first step when collecting fossils?

18. Describe in four sentences the process the fossil crew takes in order to collect in the field.

***Fossil Digs: Virtual Dig*-you can dig up a fossil and preserve it just like a paleontologist!**
Helpful information:

- Awl  used to scrape away sediment and rock material
- Brush  used to move away sediment and rock
- Trowel  used to dig away sediment and rock
- Plaster: use mouse to drag plaster strips from the bucket onto the bones. Move 4 hands under plaster. Click lift.

19. What are some of the tools paleontologists use to recover fossils from the field?

Crystal Forest-Ranger Rita

20. In the process of *petrification*, the center of the wooden logs becomes filled with minerals that include:

21. Why is it important for visitors in the park to leave the petrified wood and not take even the smallest piece from the landscape?

22. What are names of the Triassic organisms that lived in this area?

Jasper Forest-Ranger Marge

23. What type of environment was present in this area during the Triassic?

Agate Bridge-Ranger Marge

23. The Late Triassic landscape was dominated by a winding _____ system.

24. The trees where buried quickly under sediments and decay was slowed down. The 5 types of sediments that these trees were buried under include:

Name:_____ Date:_____

Petrified Forest National Park:
Virtual Field Trip Worksheet II

Welcome to this virtual field trip of Petrified Forest National Park! You are about to start an amazing journey beginning today and ending up all the way back to the age when dinosaurs first roamed the Earth and the petrified trees stood tall and alive. During your tour, here are a few helpful hints:

-to enter a location, just click the blue circles on the map on the right side of the screen for a specific area, or there are white arrows within the panoramic pictures to go to various locations.

-to view features within a different location, click on the red circles that appear on your tour

-to exit a feature of a location, click "Back to Panorama" at the bottom right corner of the viewing screen

-to explore a location, just hold the button of your mouse down and move your mouse in the direction you would like to look. Information available on that feature or location will appear in the text section underneath your tour area as well as any information provided by the rangers.

Mid Park: to continue your tour, click on the green "L" shaped section of the park located at the top right corner of the screen.

Blue Mesa-Ranger Janet

1. How is the sedimentary rock *sandstone* formed?

_____

_____

_____

2. What geologic process shaped the mesas out of their original layers of rock?

_____

3. How old are the trees of Petrified Forest?_____

4. This part of the Petrified Forest is located in the geologic layer named the _____ Formation.

5. The most common vertebrate fossil in Petrified Forest is the _____.

6. The Petrified Forest is located near the southern edge of the _____ Plateau, which began uplifting about _____ million years ago.

7. Dinosaur fossils are rare in the park. Is that due to the few numbers of animals that lived during the Triassic or the process of fossilization? Explain your choice.

_____

_____

_____

8. Why doesn't vegetation grow on many of the badland hills in the park?

_____

_____

9. Some other examples of badland landscapes that are persevered as national parks include:

_____

_____

_____

10. The Spanish word/s that translates to badlands is _____.

The Tepees

11. Why are the rocks that make up the hills in the park different colors?

12. If the age of the Earth, was represented as a single year, where January 1st is the beginning of Earth and December 31st is now, the Triassic would start on_____.

Newspaper Rock

13. There are _____ images on Newspaper rock. The people of the Puerco River Valley farmed here between _____ and _____ years ago.

14. There are a variety of petroglyphs present on Newspaper rock they include:
_____: represent human figures
_____: represent animal figures
_____: represent spiritual figures
Other shapes include hands, tracks, and geometrics.

Puerco Pueblo-Ranger Rita and Tyra

15. Four of the ancient and modern cultures that live or have lived in the Southwest are:

16. What activities might have happened within the plaza in *Puerco Pueblo*?

17. *Puerco Pueblo* had at least _____ rooms and was occupied until _____ A.D.

18. What did the Puebloan people do with petrified wood that they found in the area?

Name:_____ Date:_____

Petrified Forest National Park: Virtual Field Trip Worksheet III

Welcome to this virtual field trip of Petrified Forest National Park! You are about to start an amazing journey beginning today and ending up all the way back to the age when dinosaurs first roamed the Earth and the petrified trees stood tall and alive. During your tour, here are a few helpful hints:

-to enter a location, just click the blue circles on the map on the right side of the screen for a specific area, or there are white arrows within the panoramic pictures to go to various locations.

-to view features within a different location, click on the red circles that appear on your tour

-to exit a feature of a location, click "Back to Panorama" at the bottom right corner of the viewing screen

-to explore a location, just hold the button of your mouse down and move your mouse in the direction you would like to look. Information available on that feature or location will appear in the text section underneath your tour area as well as any information provided by the rangers.

North End: to continue your tour, click on the blue "square" shaped section of the park located at the top right corner of the screen.

Lacey Point-Ranger Marge

1. The Antiquities Act (1906) was put in place by Congressman Lacey for what purpose?

2. What is an *unconformity*? Describe an example of an unconformity found in the park.

Whipple Point-Ranger Marge

3. Define *deposition.*

Pintado Point-Ranger Marge

4. Why can features many miles away be seen from the Petrified Forest?

5. What are some features of a *badlands* environment? What type of rock is found here?

Chinde Point-Ranger Janet

6. What was the name of an early dinosaur found at this location?

7. Some fossils are remains of organisms even older then those of the Triassic. These organisms include _____ and _____ and are from the _____ time period.

Petrified Stump-Ranger Janet

8. How did all of the petrified logs end up in uniform broken sections?

Scenic View

9. How does the raven deal with excess body heat here in the desert?

Kachina Point-Ranger Rita

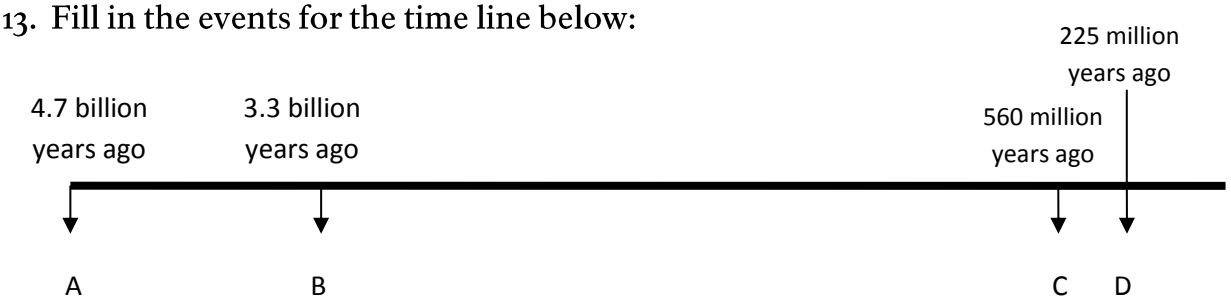
10. What style of architecture does the Painted Desert Inn represent?

11. What are the two main locations that the Painted Desert is located between?

12. How were the Painted Desert rock layers exposed?

Tawa Point-Ranger Ted

13. Fill in the events for the time line below:



A:_____ C:_____

B:_____ D:_____

14. The Painted Desert is made up of 5 specific types of sedimentary rocks. These include:

_____

_____

Tiponi Point

15. Where does the red color of the Painted Desert come from?

_____

16. In the past, the continents were a part of a _____ land mass, called _____.

Visitor Center

17. The following colors of petrified wood are produced by what minerals/elements:

Red, orange, yellow and brown: _____

Blue, purple, and black: _____

Gray and black: _____

18. Where can people find news about the park on the internet?

_____

Lesson 11:
Climate Change

Learning Objectives
The students will be able to:
- Develop a presentation discussing climate change throughout Arizona history.
- Discuss how the climate has changed/is changing in Arizona.
- Evaluate possible solutions to prevent human induced climate change.

Arizona Social Studies State Standards
Elementary
Grade 3
S3-C1-PO2: Describe the beneficial and harmful impacts of natural events and human activities on the environment.
Grade 4
S3-C1-PO1: Describe how natural events and human activities have positive and negatives impacts on environments.
S3-C1-PO2: Evaluate the consequences of environmental occurrences that happen either rapidly or over a long period of time.
S4-C3-PO4: Describe ways in which resources can be conserved.
Grade 6
S3-C2-PO1: Propose viable methods of responding to an identified need or problem.
S3-C2-PO6: Analyze evidence that indicates how life and environmental conditions have changed.

High School
S3-C1-PO1: Evaluate how processes of natural ecosystems affect, and are affected by, humans.
S3-C1-PO2: Describe the environmental effects of the following natural and/or human-caused hazards: drought, flooding, extreme weather.
S3-C1-PO3: Assess how human activities can affect the potential for hazards.

Duration
5 days

Location
Classroom/Computer Lab

Key Vocabulary

- climate change: The change in climate of a particular area represented by averages of weather conditions over many decades.
- global warming: the increase in average global temperatures due to an increase in greenhouse gasses generated by human activity.
- greenhouse gases: Gasses such as carbon dioxide that trap energy in the Earth's atmosphere creating a 'greenhouse effect'. Greenhouse gasses are increased by humans burning carbon based fossil fuels such as coal and gasoline.

Trunk Materials

- reference books
- websites listed on "Additional Resource" page
- CD with "Triassic Rivers" slideshow
- "Climate Change Rubric" original

Materials You Provide

- computer and internet access (per group)
- additional reference material
- class set of "Climate Change Rubric"

Background

Climate change, such as global warming, is a hotly debated topic in science. Climates have changed throughout the history of life on Earth. Arizona is no exception to climate change. During the Triassic Period (250 million years ago), Arizona was located closer to the equator and was a lush, tropical environment. Fossils of large crocodile-like reptiles and massive petrified trees are what remain of that environment.

Arizona's climate 500-1000 years ago was very similar to today. The ancestral people of that time period experienced one or more long periods of drought. It is the droughts that are most often cited as factors in the abandonment of a variety of villages which are now archaeological sites. During these times of great stress, pueblos such as Puerco Pueblo in Petrified Forest, Montezuma's Castle in Camp Verde, AZ and Wupatki Pueblo near Flagstaff could not support a large number of people so the people broke into smaller groups and left these areas.

The climate of Arizona today is a semi-arid desert with pockets of many other biomes throughout, including forest and tundra. Yet in this environment, millions of people have made their home, using existing water sources and hauling water in order to support themselves, livestock, and crops. Humans today have more advanced technology then the ancestral people in order to adapt to a harsh environment. The human population of Arizona continues to grow, which puts pressure on the water resources in this dry environment.

The future of the climate of Arizona and the western United States is unknown. A large amount of scientific data supports global climate change as a real issue which is affecting this generation and will affect generations to come. Our actions today may help or hinder future generations in dealing with continued climate change. As climates change, the extent of impact from human activity is still being discussed.

Suggested Procedures (Grades 3-6)

1. Divide students into groups of 2-3. Have each group develop a short presentation (oral, poster, PowerPoint), discussing climate changes in Arizona and the western United States over specific periods of time. In each group, assign a researcher, a writer, and/or presentation creator.
    - **a.** The climate of Arizona during the Triassic Period (250 million years ago) was lush and tropical, with large floodplains covering what is now Northeastern Arizona.
        - **i.** What features make up a swamp?
        - **ii.** What types of plants and animals would have lived in this ancient environment?
        - **iii.** How is the climate of today similar to the ancient climate? How is it different?
    - **b.** The climate of Arizona 500-1000 years ago was very similar to today.
        - **i.** What were the different ways people and animals could get water before technology was available?
        - **ii.** A major drought occurred during this time frame. How would drought affect the survival of the people and animals?
        - **iii.** How did the ancient cultures farm this dry area?
    - **c.** The climate of Arizona today
        - **i.** Describe the climate of Arizona, including precipitation, temperature, vegetation, etc.
        - **ii.** How does animal and human activity affect the availability of water in Arizona?
        - **iii.** How does modern human activity affect the climate and environment of Arizona?
    - **d.** The climate of Arizona in the future

i. What are some concerns for the future in regards to temperature and water availability in Arizona?
ii. Describe global climate change and how it affects places like Arizona and the western United States.
iii. Discuss possible solutions for dealing with and possibly slowing down global climate change.

Suggested Procedures (Grades 7-12)

1. Divide students into groups of 2-3. Have each group develop a presentation (oral, poster, PowerPoint), discussing climate in Arizona and the western United States over specific periods of time. More than one group may be assigned to the same time period. In each group, assign a researcher and writer and/or presentation creator.
    a. Climate of Arizona during the Triassic Period (250 million years ago)
        i. The climate in detail (temperatures, precipitation, vegetation)
        ii. Discuss similar locations today that reflect the climate of Arizona during the Triassic Period.
        iii. Describe the types of organisms found and how they lived.
        iv. How did climate affect the animals of Arizona during the Triassic?
        v. Discuss the climate then compared to today's climate.
        vi. Discuss how life changed over time for the area.
    b. Climate of Arizona 500-1000 years ago
        i. The climate in detail (temperatures, precipitation, vegetation)
        ii. Discuss similar locations today that reflect the climate of 500-1000 years ago.
        iii. How did the climate affect the animals of Arizona 500-1000 years ago?
        iv. Describe how the climate could have affected ancient human life and survival. What could they do to survive a change in climate?
        v. Discuss the climate then compared to today's climate.
        vi. Discuss how life (plant and animal, including humans) has changed over time.
    c. Climate of Arizona and the Southwest today
        i. The climate in detail (temperatures, precipitation, vegetation)
        ii. Discuss similar locations today that reflect today's climate.
        iii. How does climate affect the survival of animal and plant life, including humans?
        iv. Discuss how the climate may be changing now.

v. Discuss how human behavior might impact the climate.
vi. Discuss possible solutions to deal with climate change.

d. Climate of Arizona and the Southwest in the future.
   i. Describe how the climate may change over time (temperatures, precipitation, vegetation, etc).
   ii. Discuss similar locations today that could reflect the future climate of Arizona.
   iii. How would climate change affect the survival of plant and animal life, including humans, in the future?
   iv. Discuss how the climate may be changing or evidence of climate change occurring today.
   v. Discuss how human behavior may impact climate.
   vi. Discuss possible solutions to deal with the climate change.

Evaluation

Students present their research to the class as a whole. A possible rubric for grading the presentations is provided.

Extensions

- Develop a student generated, short quiz for their presentation, which is then given to the class after their presentations.
- Have the students' grade their classmate's presentations using the provided rubric.
- Write a letter to the governor, a senator, as a congressman that explains their findings and any concerns they have about our changing climate. They may offer suggestions or examples of what could be done to slow down climate change, including what they may personally do to help.
- A PowerPoint Presentation is included on CD on this topic: *Triassic Rivers.* The presentation discusses the environment of Arizona during the Late Triassic.

Climate Change in AZ Presentation Rubric

Using a scale of 1-10, with 10 being the best, rate each of the following aspects of the presentation.

Group members:

_____

_____

_____

Overall Presentation

_____covers the assigned topic
_____creative and professional
_____accurate climate descriptions

Triassic Period

_____provides examples of ancient plant and animal life

_____discusses the effects of climate change on animals and plants

_____compares the ancient climate with today

500-1000 Years Ago

_____discusses effects of climate change on animals and plants

_____compares the past climate with today

_____discusses how humans adapted to climate change

Today

_____describes the effects of climate change on animals and plants

_____describes how the climate may change

_____presents examples of human impact on climate

_____provides examples of life change and/or possible solution to deal with climate change

Future

_____describes effects of climate change on animals and plants

_____describes how climate may continue to change

_____presents examples of human impact on the climate

_____provides examples of life changes and/or possible solutions to deal with climate change

____Total Points (out of 180)

Lesson 12:
Preserving Natural and Cultural Resources

Learning Objectives
The students will be able to:
- Write a business letter.
- Discuss the value of National Parks and their role in preserving natural and cultural resources.
- Edit a completed letter at a peer level.

Arizona State Standards
Science:
High School - S2-C1-PO4: Analyze how specific cultural and/or societal issues promote or hinder scientific advancements.

Social Studies:
Grade 7 - S3-C4-PO2: Discuss the character traits that are important to the preservation and improvement of constitutional democracy in the US.

Writing:
Grade 7, 8 - S2-C2-PO1: Use a structure that fits the type of writing.
S3-C3-PO4: Write a formal letter that follows a conventional business letter format.
High School - S2-C2-PO1: Use a structure that fits the type of writing.
(Grade 10) - S3-C3-PO1: Write a business letter.
(Grade 10, 11, 12) - S3-C4-PO1: Write a persuasive composition.

Duration
3 days

Location
Classroom/Computer Lab

Key Vocabulary
none

Trunk Materials
- Pre-addressed envelope to the Department of the Interior

Materials You Provide

- computer (per student)
- paper

Background

The present protection of natural and cultural resources such as those preserved by National Parks depends on the public. Through education and experience, the national park Service hopes to instill a sense of value in the public about natural and cultural resources for today and future generations.

Suggested Procedures

1. Have the students draft a letter to the U.S. Department of the Interior about the value of national parks such as Petrified Forest National Park.
2. In a business letter format, have the students discuss the following:
    a. Inform the recipient that this letter is part of an assignment with the Traveling Trunks of Petrified Forest to discuss the value of National Parks.
    b. How they feel about preserving National Parks like the Petrified Forest. Why they think we should preserve areas such as these for future generations.
    c. How preserving natural and cultural resources in National Parks is helpful to science.
    d. Why it's important to prevent the theft of resources such as archaeological artifacts, petrified wood, and fossils. Provide a suggestion on how to prevent the theft of such items.
3. In pairs, have students peer review and edit their letters before completing their final product. After discussion and review of the letters, if desired collect the letters and they can be mailed for you.
4. Included in the Traveling Trunk is a large pre-addressed envelope to the Department of the Interior. Be sure to include your class and school address in the return address. Place this pre-addressed envelope back in the trunk when it is returned, and it will be mailed for you.

Evaluation

Discuss why it is important for individuals to voice their opinion on topics such as National Park preservation and how this activism can be of value for the future.

Extensions

- For additional activism in preserving park areas, research and discuss areas of current and possibly future preservation. Develop a letter to a local or national

government agency about whether or not such areas should be preserved for the future and why.

- Find a National Park area near your school or city. Write a letter of thanks to the park superintendent for helping to protect America's natural and cultural treasures. The addresses for mailing these letters can be found on the National Park website www.nps.gov.

Resources

Information Packing and Shipping

Please reassemble the trunk contents as you found them. Use the Trunk Inventory sheet to be certain all supplies and materials are returned. If pieces have been lost or damaged, please notify us so that we may replace them. Please take care with the fragile materials, such as potsherds and petrified wood specimens.

Shipping

You can ship the trunk back to the park using USPS, UPS, or FedEx. USPS should be the least expensive. Use the following weight and dimensions for estimating the shipping cost. (http://postcalc.usps.com/)

Trunk weight – 45 lbs
Length – 32in
Height – 15in
Width – 18in

Park Address:
Petrified Forest National Park
P.O. Box 2217 One Park Rd.
Petrified Forest, AZ 86028

If you have any questions regarding return shipping procedures, please call or email us.

(928) 524-6228 ext. 238

Evaluation Form: Student

We appreciate you taking a few moments to complete and return this form with the Traveling Trunk so that we can continue to develop educational programs with you, the student, in mind!

School Name:
_____

City: _____
State: _____

Name of Trunk Used:
_____

Which activity did you like the most? Why?

Which activity did you like the least? Why?

How could we make the activity you liked the least a better activity?

National Parks were created to protect natural and cultural resources for future generations. Why is protecting these resources so important?

Rate your overall experience with this Traveling Trunk

○ Excellent ○ Good ○ Good, but needs improvement ○ Poor

Please provide additional comments, suggestions, or recommendations.

Evaluation Form: Teacher

Evaluation forms are provided to help us make improvements to existing and future educational programs and curriculum. We appreciate you taking a few moments to complete and return this form along with the student evaluation when the Traveling Trunk is returned. You may choose to mail them separately, or put them into the Traveling Trunk.

School Name:
_____

City: _____
State: _____

Name of Trunk Used:
_____

How many students used the trunk?
_____
How many separate classes used the trunk?
_____
Have you used other Traveling Trunk programs from other parks/resources in the past? _____
If so, where were they from and what topics did they cover?

Please check the items that were used in the trunk:
( ) lesson plans
Which ones? ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9

( ) PowerPoint slide shows
Which ones?

( ) Books
Which ones?

Which activity did you find the most helpful? Why?

Which activity did you find the least helpful? Why? Do you have any suggestions on improving it?

Rate your overall experience with this Traveling Trunk

◯ Excellent ◯ Good ◯ Good, but needs improvement ◯ Poor

Please provide additional comments, suggestions, or recommendations.

Petrified Forest Museum Association
Teacher Membership

For more than half a century, Petrified Forest Museum Association (PFMA) has worked closely with the national park to enhance visitor experiences. Several PFMA membership options are available, providing discounts on sales items and support of Petrified Forest National Park.

A Teacher Membership cost is $10 a year. Along with a membership card, you will receive a copy of *Petrified Forest – A Story in Stone*. When you identify yourself as a teacher, you will get a 25% discount at all PFMA locations. When you show your card at other cooperating association stores nationwide, you will get a discount ranging from 10 to 15% off purchases.

We value your privacy. The information you give us will only be used for future mailings including newsletters, park updates, renewal notices, etc. No other entities will have access to the information you provide.

Sales items are arriving all the time and can be ordered by calling (928) 524-6558 or email pfma@cybertrails.com

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Copy and send this page to:

Petrified Forest Museum Association
PO Box 2277 – One Park Road
Petrified Forest, AZ 86028

Name:_____

Address:_____

_____

Phone:_____

$10 Teacher's Membership (Membership dues are tax deductable.)

____Check enclosed.

____Credit Card #:_____Exp. Date_____

Signature:_____

ADDITIONAL RESOURCES

For additional enrichment activities, included in this trunk is a DVD "Timeless Treasures-Petrified Forest National Park" and a CD-Rom "Journey through the Late Triassic" and a worksheet for each are included.

If you enjoyed the "Traveling Trunks" program, here is a list of other parks which also participate in the program with similar subject material:

Grand Canyon:
http://www.nps.gov/grca/forteachers/classrooms/traveling-trunks.htm

Aztec Ruins National Monument:
http://www.nps.gov/azru/forteachers/travellingtrunks.htm

Saguaro National Park: http://www.nps.gov/sagu/forteachers/plan-a-classroom-visit.htm

Navajo Indian Information
http://www.discovernavajo.com/

Hubbell Trading Post National Historic Site
http://www.nps.gov/hutr/historyculture/index.htm

Route 66
National Historic Route 66 Federation
http://www.national66.org/

National park Service Route 66 Corridor Preservation Program
http://www.nps.gov/history/rt66/HistSig/index.htm

Rail Roads
Union Pacific: History and Photos
http://www.uprr.com/aboutup/history/index.shtml

General Information

Canyons, Cultures and Environmental Change: Addresses many facts about the Four-Corners region, including history and climate change.
http://cpluhna.nau.edu

National Park Educational Websites

Junior Ranger: Become a junior ranger by learning about various National Parks. Participating parks are listed, which includes Petrified Forest National Park.
http://www.nps.gov/kids/jrRangers.cfm

Web Ranger: If you can go to a National Parks, visit it virtually! Complete the various activities for the different park locations and become a certified Web Ranger.
http://www.nps.gov/webrangers/

Teacher Resources:
To search for additional curriculum based programs and teacher resources in any national park site visit
http://www.nps.gov/teachers/index.htm