

PRE-1500

SITES

LESSON PLAN

Arner Site: Out on the Prairies of Western Nebraska

This lesson is based on information about the Arner Site
found in several different publications:

*1994 Archaeological Activities by the UNL Department of Anthropology in and
around the Oglala National Grasslands* by LuAnn Wandsnider et al.

and several articles from the 1994-1995 *Nebraska Anthropologist* Volume 11, Number 1.

The lesson was written by archaeologist Damita Hiemstra

for the NebraskaStudies.org website,

which is a production of NET, the Nebraska State Historical Society,
and the Nebraska Department of Education.

Students will interpret primary historical evidence
(including images from excavations, maps, artifact images,
and collected data) and examine the human-environment
relationship between ancient Native American and the
Nebraska landscape, all to understand more about how
technological advances changed the lives of prehistoric
people in Western Nebraska.

**GRADE
LEVEL**

4th - 8th

23
pages

Arner Site: Ancient Cooking in the Hills of Western Nebraska (A.D. 200-900)

The badlands are a unique and fascinating feature of western Nebraska, giving you a sense of ever-changing scenery. Water has etched the face of the earth exposing long buried traces of history.



Unless otherwise noted, images throughout this lesson are Courtesy of the University of Nebraska-Lincoln (UNL) Department of Anthropology & Geography. The objects photographed for this lesson are from the collections of the UNL Department of Anthropology & Geography.

While the badlands are dry and arid today, 1,500 years ago the area was drastically different. When ancient Nebraskans roamed the area, they saw gently rolling prairies, tall lush grasses, and active streams, very similar to what eastern Nebraska looks like today. Over a thousand years ago, ancient Nebraskans used pit hearths dug into the ground. Little is known about these pit hearth features, but archaeologists have begun doing research, searching for an answer. These features are thought to be all over the western Nebraskan landscape as well as reaching into Wyoming and South Dakota. These features hold the key to understanding ancient Nebraskans' diet and way of life.

As the climate shifted in the last 1,500 years, the moist environment gave way to drier times. The streams dried up and the grasses disappeared, making the ground surface susceptible to erosional forces.

As you progress through this lesson, you will find out what archaeologists discovered about the pit hearth features and how erosion plays a part in archaeology. You will also learn how climate changes are studied by archaeologists and what those changes meant for ancient Nebraskans.

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For Teachers: About This Lesson

This lesson is based on information about the Arner Site found in several different publications: *1994 Archaeological Activities by the UNL Department of Anthropology in and around the Oglala National Grasslands* by LuAnn Wandsnider et al. as well as several articles from the 1994-1995 *Nebraska Anthropologist* Volume 11, Number 1 (see “Some Basic References” at the end of this lesson for complete references).

The lesson was written by archaeologist Damita Hiemstra for the NebraskaStudies.org web site, which is a production of Nebraska Educational Telecommunication, the Nebraska State Historical Society, and the Nebraska Department of Education. This lesson asks school children to interpret primary historical source materials in the form of archaeological data, such as artifacts, ecofacts, site sketches, photographs, and tabulated data.

Where it fits into the curriculum

Topics: The lesson could be used in American Indian culture units dealing with prehistoric times. The lesson’s main concerns are human interactions with the environment and the interpretation of primary historical sources in the form of archaeological evidence. As such, there are ties to social studies, math, science, and reading & writing standards.

Time Period: AD 200-AD 900

Relationship to the Nebraska Education Standards: At the end of this lesson is a listing of Nebraska Education Standards that can be addressed through the use of this lesson. Following each listed educational standard, the part of this lesson to which the standard pertains is listed in brackets {}.

Objectives for students

- 1) To interpret primary historical evidence, including images from excavations, maps, artifact images, and collected data.
- 2) To interpret the human-environment relationship between ancient Native American and the Nebraska landscape.
- 3) To understand more about how technological advances changed the lives of prehistoric people in Nebraska.

Materials for Students

The materials listed below either can be used directly on the computer or can be printed out, photocopied, and distributed to students. The maps, images, and data are associated with comprehension and interpretation questions.

1. Two Maps
2. Two Student Readings
3. One Diagram
4. Three Photographs
5. One Data Table

Getting Started Inquiry Questions

Photo 1- Pit hearth with cobbles

Native Americans created features called “pit hearths.” Archaeologists use the word “feature” in a lot of different ways. In this case, a feature is a hole that ancient people dug into the ground. This particular hole was dug to be used for some kind of cooking.



Imagine what would happen if you dug a pit in your backyard. Now imagine you were doing some cooking, so you placed hot rocks and coals in that pit. What would happen after you were done using the pit and centuries passed? The pit would probably fill up with mud and dirt. After many years, it would be very difficult to find that old pit just by looking at the surface of your backyard.

Study the photograph above very carefully. You are looking at a “side view” of a pit just like the one you imagined for your backyard. People dug this pit many centuries ago. Because the land is eroding, this pit has been revealed to us in side view. At the bottom of the pit, you can see rocks. The black spots are ancient coals. The soil that fills the pit is gray in color. The gray color comes from the ash created by ancient fires. Over the centuries the pit filled up with dirt. If the hillside were not eroding away, it would be very difficult to find this ancient pit.

The pit hearths were used to cook plants for eating. The pit hearths were lined with rock and burnable materials and a fire was started. After the coals were hot and the rock had been heated from the fire, the plants needing to be cooked were added. Some water was added into the pits to create steam to help cook the plants faster.

Archaeologists have found very few ancient tools near the pit hearth features. Archaeologists have a difficult time figuring out how these features were built and used.

What kinds of tools would you use to dig a hole like this today? Do you think ancient Nebraskans had access to such tools? Why don't we find the tools they used near these features? Many of these pits were used in a relatively small area. Ancient Nebraskans could have returned every year to the same spot and built new pits or reused old ones. Why do you think they used lots of small pits and not larger ones?

Setting the Stage: Historical Context

Pit hearths were discovered in northwestern Nebraska in the early 1900s. Similar features were found in the adjacent parts of southeastern Wyoming and southwestern South Dakota. The first people to find these features were not archaeologists, but ranchers who owned the land. The “Arner Site” got its name from the owners of the area, Milton and Wilma Arner. Ranchers knew the features were created by ancient Nebraskans and were important enough to preserve and study. They contacted local archaeologists who began to study the pit hearth mystery.

Researchers have asked questions such as what was being burnt for fuel? What was the need for deep pits lined with rock? What food could they have been cooking? How large of a food surplus was produced from using these pit hearths? How long ago were these pits in use? Archaeologists believe there are hundreds or thousands of these pit hearths in this area and have studied the Oglala National Grasslands area in Nebraska to determine the research potential of these features. Little visual evidence is left as to the original function of the pit hearths.

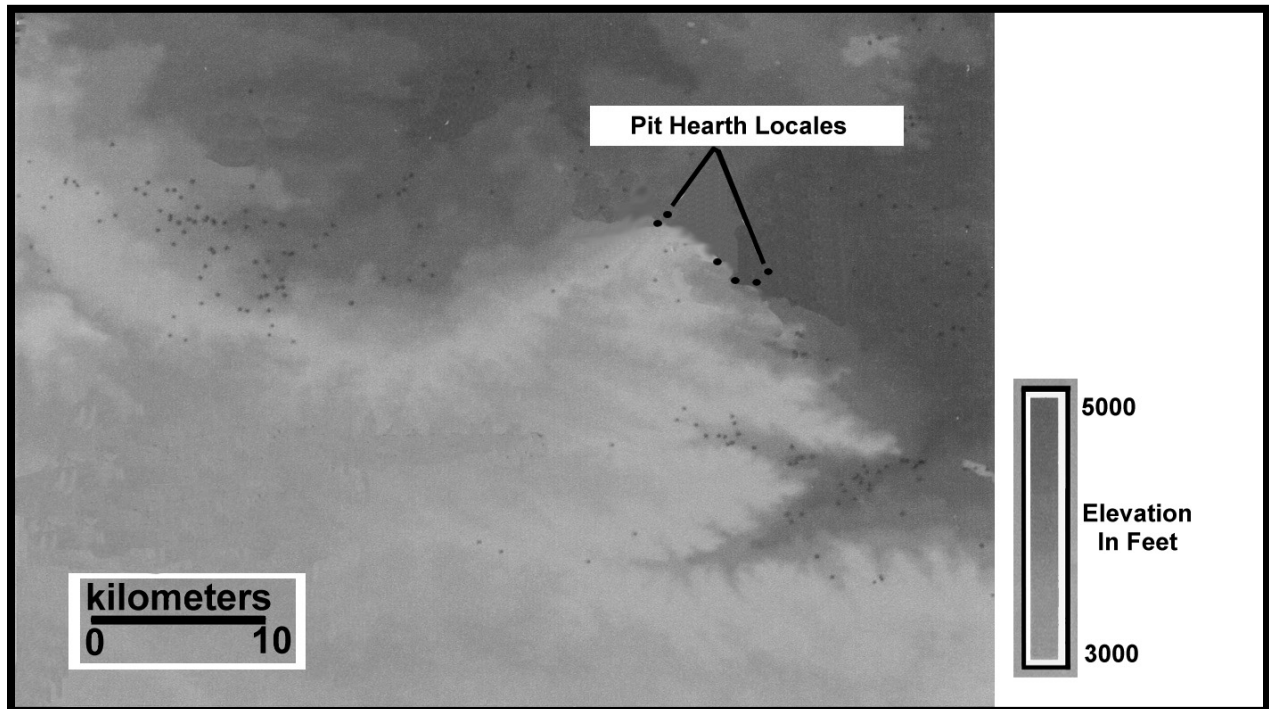
Few of these questions can be answered, but new technology has aided in analysis including ways of finding a date as to when these features were used and what residues were found in the pits.

Locating more of these features is difficult due to large amounts of soil that has built up over the pit hearths in the last 1,500 years. In areas where erosion has cut through areas of ancient prairies these features are exposed. By studying where these features have already been found, archaeologists can potentially predict where more might be found.

Without other clues to Native Americans using these areas, archaeologists have to rely on these pit hearths to tell us all about life in western Nebraska 1,500 years ago.

Locating the Site: Maps

Map 1: The Arner Site on Edge of Badlands

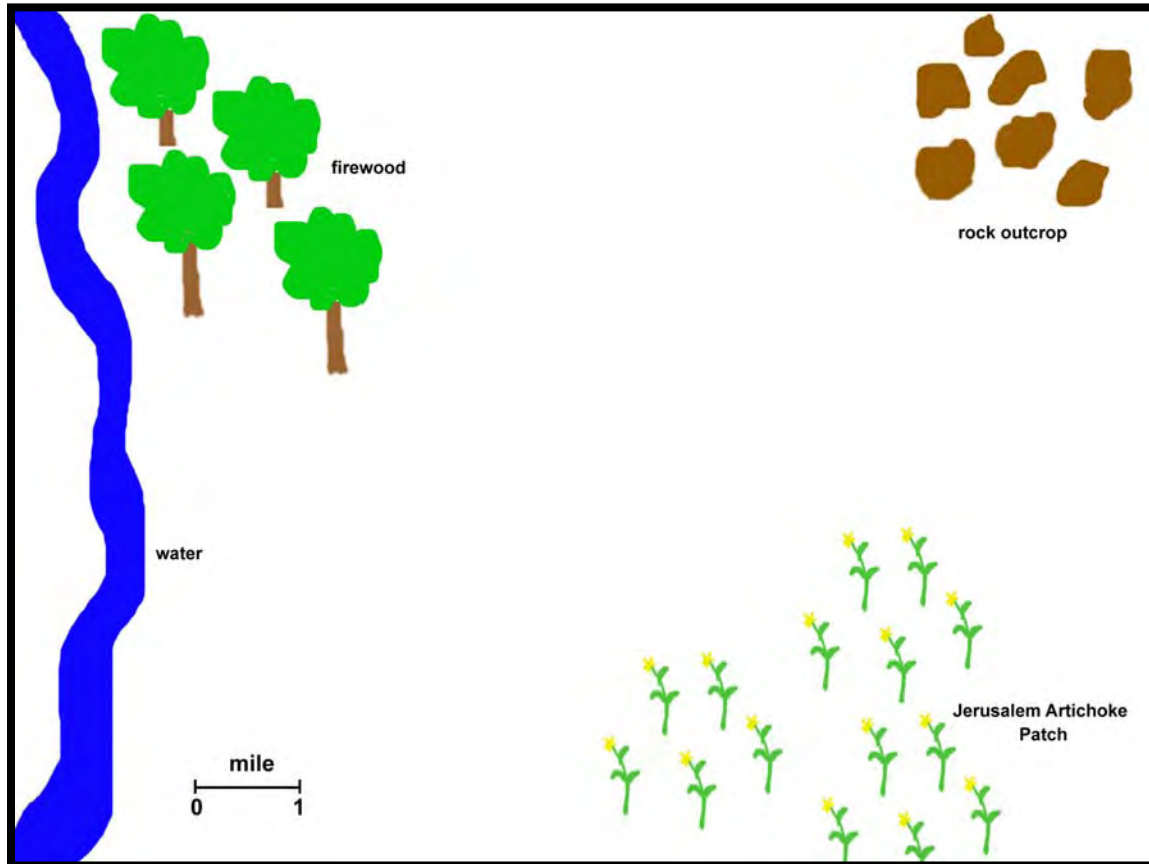


The pit hearths at the Arner Site lay along the edge of an area of badlands. This area has drastic changes in elevation. Maps that show changes in elevation are often called “**relief maps.**” Using maps like this one allows archaeologists to see the distances between points and also changes in the elevation between those points.

When archaeologists find a site and take notes, they make sure to record the elevation of the site. This way if artifacts are being eroded downhill, archaeologists can track how far the artifacts move over time. Elevation is usually recorded in feet, using the average sea level as “zero” elevation. All the elevation points in the United States are based off of the level of the sea. Most road maps will give the elevations of cities and mountains. Here the elevations have been color coded with dark gray representing the highest elevations and the light gray representing the lowest elevations.

Questions for Map 1

1. Using the scale in the lower left hand corner, how large is the area where these pit hearth features are found?
2. Six pit hearths were found at the Arner site. If archaeologists found 125 sites that each had six pit hearths, how many pit hearths would be discovered in all?
3. Using the elevation scale to the right of Map 1, are the pit hearths closer to 3,000 feet above sea level or 5,000 feet above sea level?

Map 2: Gathering Supplies To Use a Pit Hearth

In order to build a pit hearth, supplies had to be gathered by Native Americans, before they could start. Firewood and other materials had to be gathered to fuel the fire. Water was added to the pit hearths for steam heating. Rocks were used to trap heat in the pit hearth and keep the temperatures high. The Jerusalem Artichoke patch had to be harvested and a pit dug nearby.

Questions for Map 2

1. What is the distance between the Arner site and a source for rock?
2. What is the distance between the Arner site and a source of water?
3. The pit hearths at Arner were dug close to the Jerusalem Artichoke patch, instead of close to the rock outcrops or the water. Why do you think that is?
4. Imagine you built a pit hearth in the Jerusalem Artichoke Patch. To use your pit hearth, you will need to gather rocks, firewood, and water. Using the scale on the map, how far would you have to travel to make one trip to get rocks and one trip to get water? Remember: you have to go back to the Jerusalem Artichoke Patch and drop off the first supplies before going for the others- you can't carry it all at once!

Visual Evidence

Photo 2: Close Up of a Pit Hearth



Pit hearth in hill side cutbank with charcoal, ash, and rocks visible

In Photo 2, we can see an ancient pit hearth cross-sectioned in the side of a hill. Years of soil have filled in on top of the rocks and charcoal so very little evidence of the feature can be seen from the ground surface above. Only through the erosion are these features exposed in the sides of hills.

Archaeologists can study these features through the charcoal to find out what was used to fuel the fire, sometimes what was cooked (although most times this material was removed completely) and what kind of rocks were used to trap the heat from the fire.

Questions for Photo 2

1. Can you see the black charcoal in the bottom of the pit in Photo 2?
2. Erosion has exposed this pit hearth well enough that you can see it outlined clearly in the hillside. Do you think there are other pits that have yet to be exposed? How do you think archaeologists could find the pits that aren't visible in the eroding hillside?
3. The pit hearth in the photo is 75 cm in depth. The charcoal layer at the bottom is 23 cm thick and the topsoil that has filled in is 46 cm thick. Using some basic algebra, how thick is the layer of rock in the middle?
4. What percentage of the entire pit's depth is the charcoal layer? (Divide the charcoal layer's depth by the total depth of the pit hearth. Multiple your answer by 100 to get the percentage.)

Determining the Facts

Student Reading #1: The Arner Site Pit hearths: How were they used?

Imagine a wide open prairie, stretching as far as you can see, with lush grasses and plants growing in fertile soil. Now imagine that same area 1,500 years later, only now the area is dry with hardly any grass. Wind and water erode the prairie, making it look like a smaller version of the Grand Canyon. We call this area the badlands. The area that you imagined exists in northwestern corner of Nebraska in the White River Region and the Oglala National Grasslands.

Between 1,000 and 1,500 years ago, grasses, plants, roots and berries could be found. Evidence of this cooler, moister time period still exists in layers of highly organic soil buried under today's ground surface. A highly organic soil is very black in color. A black, rich soil is very good for plants.

These black soils are underneath ten meters of dryer soils in some place. Why? These dark black soils were covered over by dust and dirt. The dust and dirt was moved by wind and water for 1,500 years. The old black soils that are buried are called "**paleosols.**"

Archaeologists who study paleosols know that lush stands of grass grew in them for several reasons. First, very old casts of burrowing insects have been found. These insects live in areas where grass, plants, and water are available. Second, pollen from these plants and grasses has been preserved in the soil. By studying the pollen, researchers are able to pin point what kind of grasses and plants were growing in the area. Last, blacker soils are more oxygen-rich. Oxygen builds up in soils that have plants living and dying on them. Think about the best farmland in your area. The soil is very dark and rich compared to other, less productive areas where the soil is lighter in color.

As the wind and water have cut through the earth, we are able to see the black layers of soil underneath the ground. Have you ever cut a layered cake? When you pull a piece away, you can see all the layers of frosting and cake. Looking at layers of earth is much like looking at a layered cake. One layer is deposited by wind when the area is dry, and then a different layer of earth is deposited by water during floods.

The black soils were actually deposited when the ancient surface of the land supported many grasses and plants. As plants grew and died, the rich black color of the topsoil increased. Dead plants help fertilize the soil.

Climate will change over the years. There are times when things are so dry that very few plants can grow. In these drier times, erosion by wind and water moved dust and dirt over the land, covering over the ancient black topsoil. Covering up the old black topsoil took a really long time. Look at Photos 1 and 2 again. Can you see the black, organic layer of soil in the hill side? That took almost 700 years to form!

When plants and grasses grew in the old black topsoil, ancient Nebraskans gathered the plants and used them. Researchers have evidence of ancient Nebraskans used this area because they found pits that are filled with rock, ash and charcoal. These pits measured 50 centimeters in diameter and 75 centimeters deep.

Our diet today includes lots of starchy foods like potatoes, corn and rice. These foods are rich in carbohydrates. In addition to starch, there is another kind of carbohydrate people eat called "**fructans.**" Foods like onions, leeks and Jerusalem artichokes (also known as sun chokes) store plant energy as fructans rather than starch. Since many fructan-rich foods are difficult for

people to digest, foods with fructans must be cooked for a long time to make digestion easier. The cooking times for these plants can be two to twelve hours!

So what about all those pit hearths at the Arner site? Researchers think that ancient Nebraskans used this area of the Nebraska for short periods of time. They gathered and cooked enough of the plants for their family or for a small group of people. The pits were lined with rock and burnable materials and a fire was started. After the coals were hot and the rock had been heated from the fire, the people cooked the plants by putting them in the heated pit. They added water to the pits to create steam. Steam can help cook plants faster.

Once the plants were cooked, the people removed the plants from the pit hearth. The ancient cooks took the food to their camps. Their camps were far away from the pit hearths. The people could store the cooked food or eat it immediately. By thinking about what artifacts and features are found at an archaeological site, archaeologists can give us an idea of what activities took place.

Comprehensive Questions for Student Reading #1:

1. Many different uses for the pit hearths were analyzed to determine what actually took place at sites like Arner. How many can you remember?
2. What is the correct term for a black layer of dirt that has been buried?
3. What are some of the clues archaeologists have to tell us a paleosol once had grasses and plants growing in it?
4. What do you need to cook plants like Jerusalem artichokes? If you were living in western Nebraska 1500 years ago, would you have liked to dig pit hearths and cook plants?
5. The cooking times for the plants could be as long as twelve hours. What activities might ancient Nebraskans have been doing while they waited for the plants to cook?

Determining the Facts

Student Reading #2: Experimental Archaeology and Pit hearths

Sometimes archaeologists are puzzled about how an artifact or feature was used in the past. An artifact is an object ancient people created that you can hold in your hand, like a pot, an arrow, or a doll. A feature is something that ancient people created that you cannot hold in your hand, like an old fireplace, an ancient house, or an underground pit. By recreating a spear point or a pit hearth, researchers can learn how an ancient item might have been used. This is called **Experimental Archaeology**.

In Nebraska this kind of research is helpful since a lot of features known as “pit hearths” were found. Pit hearths were pits that ancient people created. They heated the pit hearths with fire for cooking. Modern-day researchers make their own modern pit hearths. These modern people are trying to duplicate the ancient people’s pit hearths, like the ones found at the Arner site. These modern researches want to study the heat and moisture needed to cook ancient foods 1,500 years ago.

Lots of factors go into determining how a pit hearth was used by Native Americans long ago. Researchers thought maybe the size and shape of the pit depended on what the pit would be used for. Archaeologists thought other things might affect the use of the pit hearth, such as the burnable materials used for fuel in the fire and also what kinds of foods were being cooked.

Foods like the Jerusalem artichoke (discussed in Student Reading #1), need to be cooked for a very long time over high heat. Other kinds of food do not require such high temperatures or long cooking times.

Archaeologists wanted to test different methods of cooking to see if the size and shape of a pit hearth would affect the cooking. Three pit hearths were made by the archaeologists to simulate how ancient pit hearths were constructed. The first pit hearth was dug very shallow. The second was dug twice as deep. The third was also dug deep.

Archaeologists built a fire in each of the pit hearths. The first and second pit hearths were exposed to the air until a nice bed of coals developed. The archaeologists then put in rocks and put food packets on top of the rocks. They covered the whole pit and everything inside with a layer of soil to trap the heat in the pit hearth, just like closing the door on an oven.

The third pit was treated differently. Instead of letting the fire die down to a bed of coals, the fire was stoked with the rocks lying right in the fire. This took a lot more fire wood but the temperature was much higher. The food packets were added while the fire was still going and then the soil was used to seal the pit hearth.

By placing “**thermocouples**” or thermometer probes in the hearth at different places, archaeologists could monitor the temperature changes during the cooking. The most differences were seen between the “bed of coals” method and the “still-burning” fire method. Archaeologists learned that whether the pits were shallow or deep didn’t really affect the cooking. Both the first two pit hearths had readings that were similar during the experimental archaeology test.

The two pit hearths with the bed of coals had lower temperatures than the pit hearth with the still burning fire. Archaeologists could tell the coals produced less heat just by looking at the rocks in the pits. The rocks in the bed of coals were not blackened, but the rocks exposed directly to the fire were blackened by soot and ash. The rocks that were in the fire were already hot when the food was added.

In the pit hearths where the rocks were added after the fire had died down to coals, the rocks actually cooled down the pit hearth. The rocks absorbed the heat from the coals. Even more heat was lost while the archaeologists were waiting for the fire to die down to the bed of coals stage, releasing most of the heat into the air. This is kind of like cooking in an oven with the door open!

Archaeologists figured out that plants and roots that require a long cooking time and high temperatures were most likely cooked with rocks placed in a burning fire. The only drawback to the burning fire method is that it required a lot more burnable material to get the rocks heated up before they filled the pit with food. This method might not be the best way to cook things if wood and other burnable materials are scarce.

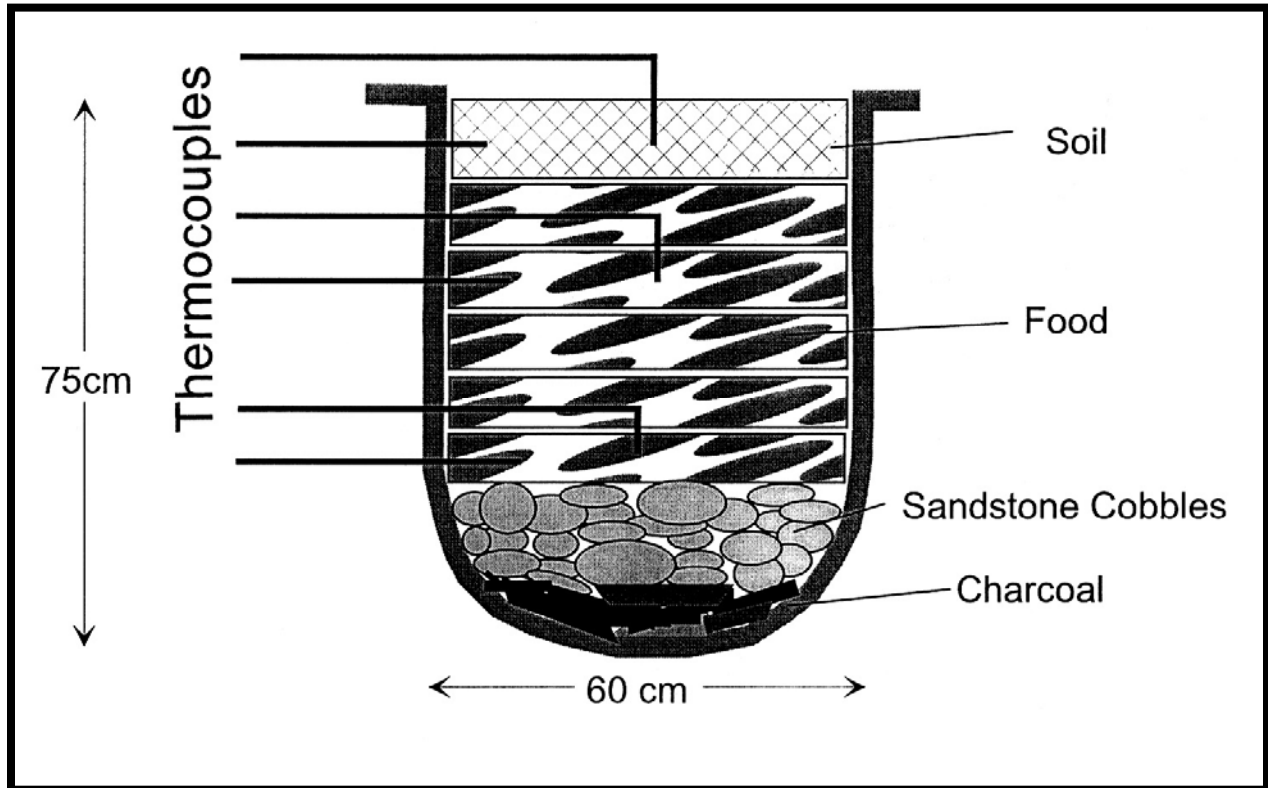
Knowing the ways Native Americans probably cooked plants and roots, archaeologists can draw conclusions from pit hearths from long ago. Rocks inside the pit hearths that are not blackened suggest the “bed of coals” method and might be an indication that fire wood was scarce. Archaeologists can not always find evidence of what happened in Nebraska thousands of years ago, but experimenting with the ancient technology may get us closer to an understanding.

Comprehensive Questions for Student Reading #2:

1. What is experimental archaeology?
2. If you were an archaeologist and found only blackened rocks in a pit hearth, what would you conclude?
3. If you had to build a pit hearth, would you use a large fire or a bed of coals to cook something that takes a long time, like Jerusalem Artichokes? Why?

Images

Diagram 1: Reconstruction of a Pit Hearth



Archaeologists reconstructed a pit hearth at the Arner Site during the experimental archaeology study. Diagram 1 shows all the different layers that go into making a pit hearth. The term “**thermocouple**” shown to the left of the pit hearth refers to thermometer probes that were inserted into the pit hearth to monitor the temperature during cooking.

Questions for Diagram 1:

1. The pit hearth measures 75 centimeters deep by 60 centimeters in length by 60 centimeters in width. Using the formula for area (width **X** length **X** depth), how many cubic centimeters are found in this pit hearth?
2. Eight different layers can be seen in the pit hearth. If five of the eight layers are made of food, what **percentage** of layers is taken by the layers that are **not** food?
3. Each pit hearth is thought to be able to process 132 pounds (60 kilograms) of plant material. If we know that there were six pit hearths at Arner, how many pounds of plant food were potentially processed if all the pits were used at once?

Visual Evidence

Photo 3: Erosion Damage at the Arner Site

Some of the pit hearth features have been eroded entirely away. In Photo 3, cobbles from the pit are tumbling down the hill.

Erosional forces such as wind and water wash away artifacts and features. Some features like the one shown here are scattered about, making it hard for the archaeologists to understand what it looked like originally.

Archaeologists fight against this erosion in order to preserve archaeological sites.



Pit hearth with rocks from the pit hearth tumbled down the hill

Many sites however are not able to be saved and have been completely destroyed. The notes and pictures taken by the archeologists are sometimes the only evidence that there ever was a site at all.

Questions for Photo 3

1. If you were an archaeologist, could you figure out what the pit used to look like? How would you figure it out?
2. The remnants of this pit hearth will soon be completely eroded out of the hillside. If archaeologists found just the scatter of cobbles, do you think they could tell there used to be a pit hearth here? Why or why not? (Hint: Remember what we learned in Student Reading #2 about blackened rocks.)
3. If you saw a pit hearth eroding out of a hillside, what would you do?

Visual Evidence

Table 1: Artifacts from a Pit Hearth

Layer	Chipped Stone Artifacts	Bone	Rock	Comment
1	0	0	0	
2	0	0	0	
3	8	1	10	
4	8	1	0	Charcoal
5	10	0	5	Charcoal
6	24	1	20	Charcoal

*Modified Table III-2 of N101-14

Chipped stone artifacts are frequently found in sites. These artifacts are produced when a stone tool is sharpened and small flakes of stone are struck off of a tool. For this pit, chipped stone artifacts, bone and rock were found in different amounts throughout the layers of earth and soil.

Questions for Table 1

1. In which layer were the most rocks found?
2. In which layer were the most chipped stone artifacts found?
3. In which layer(s) were the least amount of items found?
4. Are there any patterns in the chipped stone artifact amounts? What do you think this could mean?

Putting It All Together

Activity 1: Gathering Expedition

Have your class go on a gathering expedition. If it is not feasible to take a real trip, set up stations around the room where various resources would be located. Give them tasks to gather these resources, but have them add up the time it would have taken them to find and gather the supplies on the prairie. Have them cooperate and build a mock pit hearth, making sure to line the pit with rock and add layers of burnable material. Have them discuss how much water would be needed to produce the steam-heating without releasing all the heat or putting out the fire. How long would it take for the fire to cool down before you could remove the plants? How many people would it take to keep a fire going for 12 hours?

Activity 2: Planning Ahead: Yearly Trips to Harvest the Plants

Have your students divide up into small groups of five or six people. Have them figure out if they were planning a return trip to an area to gather plants for processing, what duties would have to be assigned. Remember: This is an expedition away from the camp where they actually live. You will need supplies for a two-day trip to get to the harvesting area, two days stay while you harvest and cook the plants, and then a return two-day trip. Bringing the cooked plants back will add weight. What tools will you bring along? Where will you sleep at night if you are away from camp? How will you find the place you were last year? What will you do if you can't find any plants at that particular place to harvest?

Supplementary Resources for Teachers

- www.holoweb.com/cannon/jerusalem.htm
- www.fs.fed.us/r2/nebraska/units/prrd/ogla.html

Some Basic References

Sheldon, A. E.

1905 Ancient Indian Fireplaces in South Dakota Badlands. *American Anthropologist*, 7:44-49.

Wandsnider, LuAnn

1999 Late Prehistoric High Plains Foragers: Starving Nomads, Affluent Foragers? *Great Plains Research*, 9(1):9-39.

1997 Roasted and the Boiled: Food Composition and Heat Treatment with Special Emphasis on Pit-Hearth Cooking. *Journal of Anthropological Archaeology* 16:1-48.

Wandsnider, LuAnn, Heidi Athan, Jennifer Galindo, and George MacDonell

1995 *Ovens of the Oglala: 1994 Archaeological Activities by the University of Nebraska-Lincoln Department of Anthropology in and around the Oglala National Grasslands*.

Wandsnider, LuAnn and Fateh Singh Sodha

1998 Pit Hearth Heat Transfer. To appear in *Once Hot Rocks*, edited by J. Leach and A. Thoms.

Relationship to the Nebraska Education Standards

Social Studies Standards

FOURTH GRADE

4.1.1 Students will compare communities and describe how United States and Nebraska communities changed physically and demographically over time.

Example Indicators:

- Identify changes in daily life past and present, e.g., roles, jobs, communication, technology, schools, and cultural traditions. {Inquiry Questions, Historical Context, Map 1, Map 2, Reading 1, Photo 1, Photo 2, Photo 3, Activity 1, Activity 2}

4.1.2 Students will describe the contributions from the cultural and ethnic groups that made up our national heritage: Native Americans, Hispanic Americans, African Americans, European Americans, and Asian Americans.

Example Indicators:

- Identify regional characteristics, e.g., Navaho, Amish, and Polynesian. {Inquiry Questions, Historical Context, Map 1, Map 2, Activity 1, Activity 2}

4.1.4 Students will describe the interaction between Native Americans and their environment on the plains prior to European contact.

Example Indicators:

- Explain how Native Americans used the resources for daily living. {Inquiry Questions, Historical Context, Map 1, Map 2, Reading 1, Photo 1, Photo 2, Photo 3, Diagram 1, Activity 1, Activity 2}
- Describe the daily life of a Native American. {Inquiry Questions, Reading 1, Reading 2, Activity 1, Activity 2}

4.1.7 Student will use higher level thinking processes to evaluate and analyze primary sources and other resources.

Example Indicators:

- Identify, analyze, and make generalizations using primary sources, e.g., artifacts, diaries, letters, photographs, art, and newspapers. {Diagram 1, Photo 1, Photo 2, Photo 3, Table 1, Activity 2}

4.1.10 Students will identify and use essential map elements.

Example Indicators:

- Use cardinal directions. {Map 1}
- Understand map keys, e.g., scale, symbols, compass rose. {Map 1, Map 2}

4.1.11 Students will use maps and globes to acquire information about people, places, and environments. {Map 1, Map 2}

4.1.12 Students will identify the geographic and human characteristics of the regions of the United States and Nebraska. {Map 1, Map 2}

EIGHTH GRADE

8.1.1 Students will analyze major cultures in the Americas before the 17th century.

Example Indicators:

- Describe the regional culture groups of early Native Americans in North America, e.g., the Northern, Northwestern, Plains, Mound Builders, Eastern Woodlands, and Southwestern Native Americans, etc. {Inquiry Questions, Historical Context, Map 1, Map 2, Reading 1, Reading 2, Diagram 1, Photo 1, Photo 2, Photo 3, Table 1, Activity 1, Activity 2}
- Explaining how geography and climate influenced the way Early American cultural groups lived. {Inquiry Questions, Historical Context, Map 1, Map 2, Reading 1, Activity 1, Activity 2}

8.4.2 Students will demonstrate skills for historical analysis.

Example Indicators:

- Identify, analyze, and interpret primary sources, e.g., artifacts, diaries, letters, photographs, art, documents, newspapers, and contemporary media, e.g., television, movies, and computer information systems to better understand events and life in United States history to 1877. {Diagram 1, Photo 1, Photo 2, Photo 3, Table 1}

8.4.6 Students will improve their skills in historical research and geographical analysis.

Example Indicators:

- Identify analyze, and interpret primary sources and secondary sources to make generalizations about events and life in world history up to 1000 A.D. {Map 1, Map 2, Diagram 1, Photo 1, Photo 2, Photo 3, Table 1, Activity 1, Activity 2}

Science Standards

FOURTH GRADE

4.1.2 By the end of fourth grade, students will develop an understanding of evidence, models, and explanation.

Example Indicators

- Create a model, graph, or illustration that represents an object, living thing, or an event. {Activity 2}

4.1.4 By the end of fourth grade, students will develop an understanding of form and function. {Photo 1, Photo 2, Photo 3, Diagram 1, Activity 2}

4.2.1 By the end of fourth grade, students will develop the abilities needed to do scientific inquiry.

Example Indicators

- Ask a question about objects, organisms, and events in their surroundings. {Inquiry Questions, Diagram 1, Map 1, Map 2, Activity 1, Activity 2}
- Use data to develop reasonable explanations. {Inquiry Questions, Map 1, Map 2, Activity 1, Activity 2, Photo 1, Photo 2, Table 1}
- Communicate procedures, results, and explanations of an investigation. {Activity 1, Activity 2}

4.5.1 By the end of fourth grade, students will develop an understanding of the characteristics of earth materials.

Example Indicators

- List earth materials that are used by humans (e.g., water, fossil fuels, ores, soils). {Photo 1, Photo 2, Diagram 1, Reading 1, Reading 2, Activity 1, Activity 2}

- Select the best earth material for a specific human use (e.g., marble–buildings, clay–pottery, coal–heat). {Reading 1, Activity 2}

4.6.3 By the end of fourth grade, students will develop an understanding of the abilities to distinguish between natural objects and objects made by humans.

Example Indicator

- Classify an object as either natural or manufactured. {Photo 1, Photo 2, Photo 3}

4.8.1 By the end of fourth grade, students will develop an understanding of science as a human endeavor.

Example Indicators

- Research and report on how science is used in different careers. {Reading 2}

EIGHTH GRADE

8.1.2 By the end of eighth grade, students will develop an understanding of evidence, models, and explanation. {Map 2, Table 1, Drawing 1, Photo 1, Activity 1, Activity 2}

8.1.3 By the end of eighth grade, students will develop an understanding of change, constancy, and measurement.

Example Indicators

- Apply English and metric systems of measurements. {Map 1, Map 2, Diagram 1}

8.1.4 By the end of eighth grade, students will develop an understanding of form and function.

Example Indicator {Photo 1, Photo 2, Photo 3, Diagram 1, Activity 2}

8.2.1 By the end of eighth grade, students will develop the abilities needed to do scientific inquiry.

Example Indicators {Inquiry Questions, Table 1, Map 1, Map 2, Activity 1, Activity 2, Photo 2, Photo 3, Diagram 1}

- Identify questions and form hypotheses that can be examined through scientific investigations.
- Use appropriate tools and techniques to gather, analyze, and interpret data.
- Given evidence, develop descriptions, explanations, predictions, and models.
- Show the relationship between evidence and explanations.
- Recognize and analyze alternative explanations and predictions.
- Communicate scientific procedures and explanations.
- Use mathematics in scientific inquiry.

8.8.1 By the end of eighth grade, students will develop an understanding of science as a human endeavor. {Reading 2}

8.8.2 By the end of eighth grade, students will develop an understanding of the nature of science.

Example Indicators {Inquiry Questions, Table 1, Map 1, Photo 1, Photo 2, Photo 3}

- Formulate and test a hypothesis using observations, experiments, and models.
- Use questioning, response to criticism, and open communication when defending a conclusion.
- Evaluate the results of scientific investigations, experiments, observations, theoretical models, and the explanations proposed by other scientists.
- Understand that scientific theories are based on observations, governed by rules of reasoning, and used to predict events.

Mathematics Standards

FOURTH GRADE

4.2.1 By the end of fourth grade, students will estimate, add, subtract, multiply, and divide whole numbers without and with calculators and solve word problems.

Example Indicators:

- Choose correct operation and solve word problems {Map 2}

4.3.1 By the end of fourth grade, students will estimate, measure, and solve word problems using metric units for linear measure, area, mass/weight, capacity, and temperature.

- Use the appropriate units of measurement. {Map 1, Map 2, Diagram 1}
- Estimate and accurately measure length to the nearest meter or centimeter and calculate area. {Map 1, Map 2}

4.5.1 By the end of fourth grade, students will collect, organize, record, and interpret data and describe the findings.

Example indicators:

- Collect, organize, and interpret data in line plots, tables, charts, and graphs (pie graphs, bar graphs, and pictographs). {Table 1, Diagram 1}
- Draw valid conclusions from displayed data. {Table 1, Diagram 1, Map 2}

EIGHTH GRADE

8.2.5 By the end of eighth grade, students will apply strategies of estimation when solving problems with and without the use of technology.

Example indicators:

- Properly round to an appropriate place value if context permits. {Diagram 1, Table 1}

8.5.1 By the end of eighth grade, students will collect, construct, and interpret data displays and compute mean, median, and mode.

Example indicator:

- Select appropriate representations of data when constructing data displays (graphs, tables, or charts). {Table 1}

8.5.2 By the end of eighth grade, students will read and interpret tables, charts, and graphs to make comparisons and predictions. {Table 1}

Reading/Writing Standards

FOURTH GRADE

4.1.3 By the end of the fourth grade, students will identify the main idea and supporting details in what they have read.

Example indicators:

- Identify purpose for reading, recall prior knowledge, and preview illustrations and headings to make predictions. {Reading 1, Reading 2}
- Answer literal, inferential/interpretive, and critical questions. {Map 1, Map 2, Reading 1, Reading 2, Diagram 1, Photo 1, Photo 2, Photo 3, Table 1}

4.1.7 By the end of the fourth grade, students will identify and apply knowledge of the text structure and organizational elements to analyze nonfiction or informational text.

Example indicators:

- Identify the structure of nonfiction (e.g. question/answer, cause/effect, sequence, comparison/contrast, problem/solution, description). {Photo 1, Photo 2, Reading 1, Reading 2}
- Ask how, why, and what-if questions in interpreting nonfiction text. {Reading 1, Reading 2}
- Follow written directions. {Map 1, Map 2, Diagram 1, Photo 1, Photo 2; Photo 3}

4.2.5 By the end of the fourth grade, students will demonstrate the use of self-generated questions, note taking, and summarizing while learning.

Example indicators:

- Record important ideas from information provided by others. {Reading 1, Reading 2, Activity 1, Activity 2}

4.3.1 By the end of the fourth grade, students will participate in group discussions by asking questions and contributing information and ideas.

Example indicators:

- Contribute information and ask questions relevant to the topic discussed. {Activity 1, Activity 2}
- Use subject-related vocabulary in discussions. {Reading 1, Reading 2, Activity 1, Activity 2}

EIGHTH GRADE

8.1.1 By the end of the eighth grade, students will identify the main idea and supporting details in what they have read.

Example indicators:

- Answer literal, inferential/interpretive, and critical questions. {Map 1, Map 2, Reading 1, Reading 2, Diagram 1, Photo 1, Photo 2, Photo 3}
- Scan to locate specific details. {Reading 1, Reading 2}

8.1.5 By the end of the eighth grade, students will identify and apply knowledge of the text structure and organizational elements to analyze nonfiction or informational text.

Example indicators:

- Identify the structure of expository text (question/answer, cause/effect, sequence, comparison/contrast, problem/solution, description). {Reading 1, Reading 2}

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- Generate how, why, and what-if questions in interpreting nonfiction text. {Reading 1, Reading 2}

8.2.5 By the end of the eighth grade, students will demonstrate the ability to use self-generated questions, note taking, summarizing and outlining while learning.

Example indicators:

- Generate questions, take notes, and summarize information gleaned from reference works and experts. {Reading 1, Reading 2, Activity 1, Activity 2}

8.3.1 By the end of the eighth grade, students will participate in group discussions by asking questions and contributing information and ideas.

Example indicators:

- Contribute knowledge and ask questions relevant to the topic discussed. {Activity 1, Activity 2}
- Use subject-related vocabulary in discussions. {Reading 1, Activity 1, Activity 2}