



SUPPORT MATERIALS FOR TEACHERS

HANDS-ON LESSON PLAN

Connect Through Hands-on Experience: Experimental Archaeology - Making Cordage

One way that archaeologists learn about the cultural material of the past is by attempting to replicate the technical processes used. They examine artifacts and consider how they might have been created and then begin to experiment. Your students can have the same experience by making their own cordage.

Overview

In one to two class sessions, students will study experimental archaeology by experiencing a technique and skill Kentucky's ancient Native peoples needed for everyday life: making cordage.

Materials

Most craft stores sell a variety of suitable fibrous materials that can be used to make cordage. For this lesson, you will need to purchase:

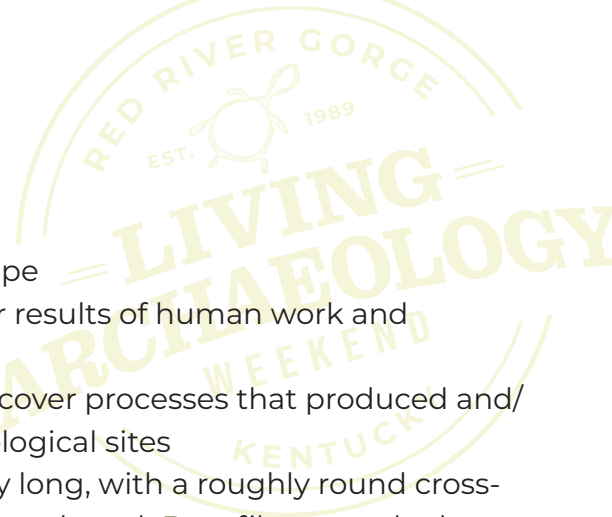
- 2-ply jute or twine
- One bundle of raffia fibers

You will also need:

- **Steps in Making Z-Twist Cordage** diagram (see pages 11-12)

Preparing to Teach

1. Purchase the materials.
2. Cut the 2-ply jute or twine into one-foot lengths.
3. Prepare the raffia fibers for the activity by separating the strands from the bundle. Use the longest and widest pieces.
4. Make copies of the **Steps in Making Z-Twist Cordage** diagram (pages 11-12).
5. Review the Teacher Background Essay (pages 3-4).



Vocabulary

artifacts: objects made or modified by humans

cordage: several strands of fiber twisted together; string or rope

culture: the customs, beliefs, laws, ways of living, and all other results of human work and thought that belong to people of the same society

experimental archaeology: scientific studies designed to discover processes that produced and/or modified artifacts and structures that are found in archaeological sites

fiber: a single piece of plant material or animal fur. It is usually long, with a roughly round cross-section. A fiber is often twisted with other fibers to make yarn or thread. **Bast** fibers are the long fibers from a plant stalk.

replication: the act or process of reproducing artifacts, structures, and patterns of tool usage

sinew: an animal tendon prepared to use as cord or thread

technology: the technique or means for making or doing something, often associated with tool making

textiles: objects woven from two distinct sets of elements (cordage or yarn) – a warp and a weft

Teacher Background Essay

Archaeologists cannot ask ancient Native peoples how they made their tools. Thus, archaeologists must find other ways to learn about past **technological** systems.

Experimental archaeologists use techniques that ancient peoples may have used. They learn through observing craftspeople who are using these techniques today and from their own experiments. When possible, experimental archaeologists learn from descendants of the peoples whose technological systems they study.

Their experiments provide possible interpretations and a basis for further study of past technologies, although they do not directly prove how those peoples used or made tools, materials, or structures. These studies help researchers better understand the processes that produced the artifacts and structures found at archaeological sites.

Experimental **replication** of structures, tools, and wear patterns on tools is one way to do this. Replication studies include the reproduction of stone tools, basketry, ceramics, and **cordage**.



Veteran Living Archaeology Weekend demonstrator Roberta Burnes (left) and volunteer Rebecca Nimmo (right) demonstrate cordage making at the in-person event. Photograph courtesy Darlene Applegate.

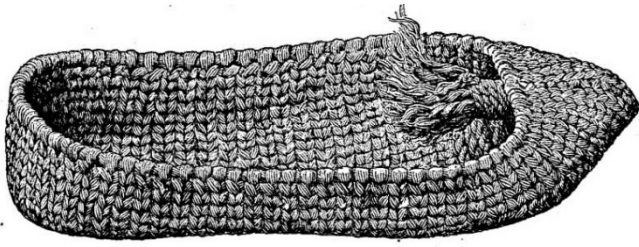


Veteran Living Archaeology Weekend demonstrator Johnny Faulkner uses an animal bone pressure flaker to serrate a replica chipped stone spearpoint. Photograph courtesy Kary Stackelbeck.

Using ancient indigenous techniques to make these items, archaeologists can address many questions about how people lived in the past. Examples include: How long would it have taken to make an arrowhead or spearpoint? Are some raw materials better for stone tool manufacture than others? What kind of clay is the best for ceramic vessels and where might ancient Native potters have found it? How long would it have taken Native people to make a small snare from plant fibers? What kinds of plant fibers did Native people use when weaving fabrics used for clothing?

Experimental archaeologists make cordage to learn how ancient Native peoples prepared the fibers, how they made the cordage, and how much time it took them to make the finished pieces. They also make cordage to understand the details and artistry involved in producing these important items. Listen to Narrator Erika Brady describe the evidence archaeologists use to study archaeological textiles: [Evidence of Textiles](#).

Native weavers made cordage from a variety of materials, including the leaves of rattlesnake master and the stem or **bast fibers** of milkweed and dogbane. They also used human hair and animal **sinew**.



Ancient Native-made slipper woven of plant fibers from a Kentucky cave. Engraving in *Prehistoric Textile Art of Eastern United States* by William Henry Holmes, Figure 9, page 35, 1896.

Listen to Living Archaeology Weekend Demonstrator Christina Pappas describe how to make a slipper like this from rattlesnake master: [Weaving a Slipper](#).

Finished cordage varied in diameter from very thin (0.0394 inches or 1 millimeter) to very thick (over 1 inch or 25.4 millimeters - archaeologists who study ancient Indigenous cultures use the metric system). The fibers selected and the intended purpose of the finished object likely determined the relative thickness of the cordage.

Archaeologists have found fragments of cordage and **textiles** in the dry rockshelters of the Red River Gorge in eastern Kentucky, as well as in some of Kentucky's dry caves, like Mammoth Cave.

Teaching the Lesson

Uncover Prior Knowledge

1. Share information from the **Teacher Background Essay** with your students. You also may wish to show the video - [American Indian Textiles](#) - to your class.
2. Distribute one length of jute or twine to each student. Ask if they can determine how the jute/twine was made. Encourage them to pull it apart as part of their examination.
3. Explain that the techniques Indigenous people used to make the tools necessary in everyday life are unknown today. Thus, archaeologists are confronted with problems similar to what the students just experienced with the jute/twine. To better understand how ancient peoples made and used objects, archaeologists must sometimes learn the manufacturing techniques used by long-ago craftspeople, occasionally by trial and error. This is called **experimental archaeology**.
4. Ask students how they think archaeologists, who study **artifacts**, figure out the technologies and processes used by ancient Native peoples. Discuss these questions:

How difficult do you think it would be to make twine or rope from natural materials?

What materials could be used?

How long would the process take from collecting the materials to completing the twine or rope?

Have students record their answers in a journal to compare to their thoughts after trying to make cordage.

5. Ask students to identify the characteristics of useable cordage. Specific characteristics would depend on the intended use of the cordage - whether for making hard-wearing items like slippers or for delicate items like a shawl - but all cordage will have certain characteristics that make it useable. For example:
 - It will not untwist
 - It will be strong
6. Discuss student suggestions and work with students to create criteria for a successful cordage project. Explain that they will not be graded on the expertise of their cordage making, but on their ability to assess the success of their efforts and to explain what they have learned from the activity.

Discover New Knowledge - Making Cordage

Making Cordage Activity

1. Begin by using raffia to demonstrate for students how to make cordage. **Practice this at home before demonstrating for your students.**
2. You may want to view this 5-minute video - **Make Natural Cordage in Minutes** (by survival and bushcraft training company *Coalcracker Bushcraft* - <https://coalcrackerbushcraft.com/>). It shows the technique of making 2-ply cordage from natural materials. The demonstrator makes S-twist cordage and Z-twist cordage; and shows how to splice materials into the already-made cordage to lengthen it (https://www.youtube.com/watch?v=X3I_ele6Ums).
3. **Steps in Making Z-Twist Cordage** (see diagram on pages 11-12)

The process of making cordage is difficult to describe, and it sounds more complicated than it really is. Try it! It's surprisingly easy. The steps below assume the cordage-maker is right-handed.

Hold Strand A and Strand B side-by-side, in your left hand between your forefinger and thumb.

Step 1. Pick up Strand A with your right forefinger and thumb, and twirl the strand away from your body (clockwise).

Step 2. Bring Strand A toward your body, crossing it over Strand B (counterclockwise).

Hold strands A and B between your left forefinger and thumb - about where you crossed A over B.

Step 3. Pick up Strand B with your right forefinger and thumb, twirl it away from your body (clockwise). And then

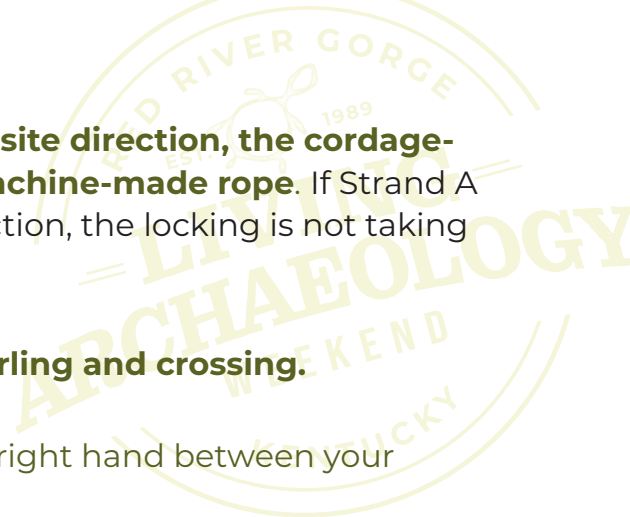
Step 4. Bring Strand B toward your body, crossing it over Strand A (counterclockwise). And then

Hold strands A and B between your left forefinger and thumb about where you crossed B over A.

That's it. Now it's just a matter of repeating this process again and again.

Step 5. Pick up Strand A, twirl it away from your body (clockwise). And then

Step 6. Bring Strand A toward your body, crossing it over Strand B (counterclockwise).



By twirling in one direction and crossing in the opposite direction, the cordage-maker creates an interlocking pattern like that of machine-made rope. If Strand A and Strand B are twisted and crossed in the same direction, the locking is not taking place.

Left-handed people will reverse the directions of twirling and crossing.

Hold Strand A and Strand B side-by-side, in your right hand between your forefinger and thumb.

Step 1. Pick up Strand A with your left forefinger and thumb, and twirl the strand toward your body (counterclockwise).

Step 2. Bring Strand A away from your body, crossing it over Strand B (clockwise).

Hold strands A and B between your right forefinger and thumb - about where you crossed A over B.

Step 3. Pick up Strand B with your left forefinger and thumb, twirl it toward your body (counterclockwise). And then

Step 4. Bring Strand B away from your body, crossing it over Strand A (clockwise). And then

Hold strands A and B between your left forefinger and thumb about where you crossed B over A.

That's it. Now it's just a matter of repeating this process again and again.

Step 5. Pick up Strand A, twirl it toward your body (counterclockwise). And then

Step 6. Bring Strand A away from your body, crossing it over Strand B (clockwise).

4. Now it's your students' turn! Pass out the diagram **Steps in Making Z-Twist Cordage**. You may also want to show **Make Natural Cordage in Minutes** (*Coalcracker Bushcraft*) to your students: https://www.youtube.com/watch?v=X3I_ele6Ums

5. Then, divide the class into groups of 4 to 5 students. Give each student about 15 inches of raffia fibers.

6. Assist each group, asking students who successfully learned the procedure to help other students.



Discussion

7. Revisit the answers to these questions your students recorded before the experience of making cordage:

How difficult do you think it would be to make twine or rope from natural materials?

What materials could be used?

How long would the process take from collecting the materials to completing the twine or rope?

Have their thoughts changed? In what ways? Did all students have the same reaction to the experience?

Clean Up

8. Involve the students in cleaning up and putting away any left-over materials. Discuss why it would have been important for ancient Indigenous people to take care of their tools and materials. Why is it still important today?

Closure

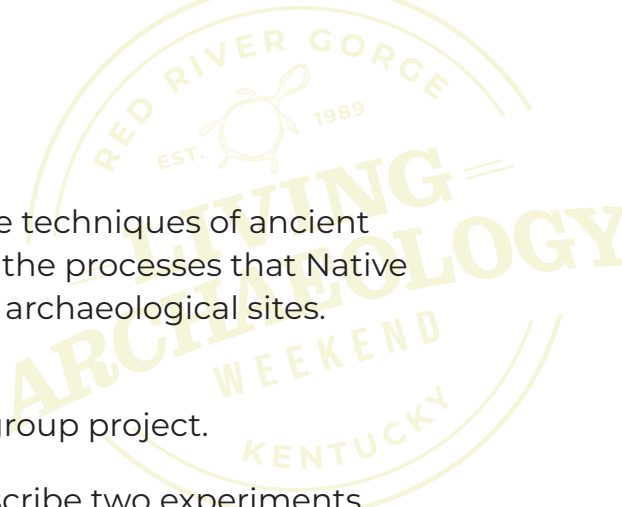
Based on their experience with making cordage, ask students to share their impressions of what daily life might have been like for Kentucky's ancient Native peoples. In what ways might the lives of those long-ago peoples have been similar to the students' lives? In what ways were they different?

Engage students in creating a physical or virtual exhibit of their work. Who is their intended audience? What information will that audience need in order to understand the exhibit? Will you want photos of the steps in the process? Do you need other images? Where could you find them? How can you create an attractive display and signage?

Evaluation

Exit Slip or Short Essay

Ask students to assess their effort to make useable cordage. What was successful? What did not work out as well as they had hoped? What did they learn about making cordage? What did they learn about the daily lives of ancient American Indians in Kentucky?



Open Response Assessment

Prompt

Experimental archaeologists replicate artifacts using the techniques of ancient peoples. Their studies help everyone better understand the processes that Native peoples used to make the tools and structures found at archaeological sites.

Direction

This can be done as an individual assignment or small group project.

Pick a tool or object created by ancient peoples and describe two experiments archaeologists might conduct to determine the object's purpose and how the people made it. Explain how the experiments would help determine the purpose and production process.

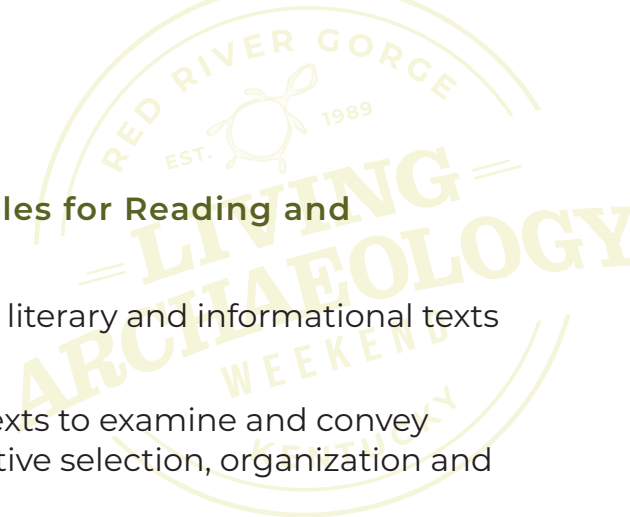
Objects might include:

- chipped stone spear points or arrowheads
- chipped stone knives, scrapers, or drills
- ground stone nutting stones, or manos/metates
- stone smoking pipes
- animal bone tools, like awls
- animal bone or shell beads
- ceramic vessels, like bowls, jars or bottles

If your class created an exhibit, you could engage students in self-assessment of the exhibit or ask for comments from exhibit viewers.

Open Response Scoring Guide

0	1	2	3	4
Non participation	<ul style="list-style-type: none">• The student describes one experiment.• The student has little or no success in explaining how these experiments help determine the selected artifact's purpose and production process.	<ul style="list-style-type: none">• The student describes one to two experiments.• The student is partially successful at showing how these experiments help determine the selected artifact's purpose and production process.	<ul style="list-style-type: none">• The student describes two experiments that generally help determine the selected artifact's purpose and production process.	<ul style="list-style-type: none">• The student clearly and effectively describes two experiments that accurately help determine the selected artifact's purpose and production process.



Kentucky Academic Standards

Reading and Writing Standards - Guiding Principles for Reading and Composition

- Students will read, comprehend and analyze complex literary and informational texts independently and proficiently.
- Students will compose informative and explanatory texts to examine and convey complex ideas clearly and accurately through the effective selection, organization and analysis of content.
- Students will conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.
- Students will use a variety of strategies to determine or clarify the meaning of words and phrases, consulting reference material when appropriate. Students will acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking and listening in order to be transition ready.

Reading and Writing Standards - Literacy Practices

1. Recognize that text is anything that communicates a message.
2. Employ, develop and refine schema to understand and create text.
6. Collaborate with others to create new meaning.
8. Engage in specialized, discipline-specific literacy practices.

Visual and Performing Arts Standards

Anchor Standard 1: Generate and conceptualize artistic ideas and work.

Anchor Standard 2: Organize and develop artistic ideas and work.

Anchor Standard 3: Refine and complete artistic work.

Anchor Standard 4: Select, analyze, and interpret artistic work for presentation.

Anchor Standard 5: Develop and refine artistic technique and work for presentation.

Anchor Standard 6: Convey meaning through the presentation of artistic work.

Anchor Standard 9: Apply criteria to evaluate artistic work.

Anchor Standard 11: Relate artistic ideas and works with societal, cultural and historical context to deepen understanding.

Steps in Making Z-Twist Cordage

The steps below assume the cordage-maker is right-handed.

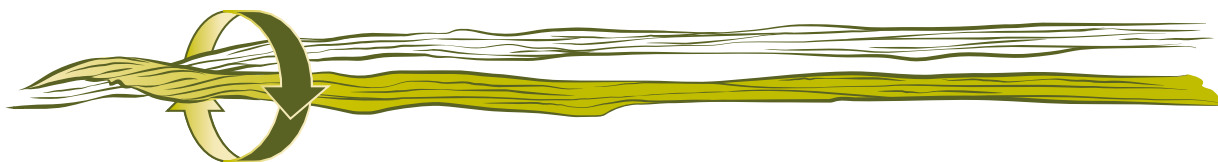


Step 1



Holding Strand A and Strand B side-by-side in your left hand, pick up Strand A with your right forefinger and thumb, and twirl the strand away from your body (clockwise).

Step 2



Bring Strand A toward your body, crossing it over Strand B (counterclockwise).

Step 3



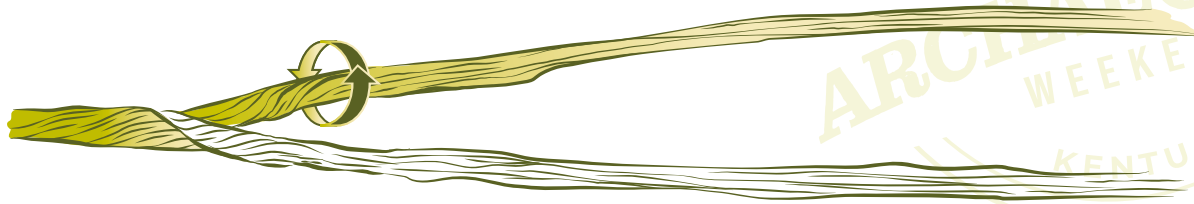
Holding strands A and B between your left forefinger and thumb - about where you crossed A over B - pick up Strand B, and twirl the strand away from your body (clockwise).

Step 4

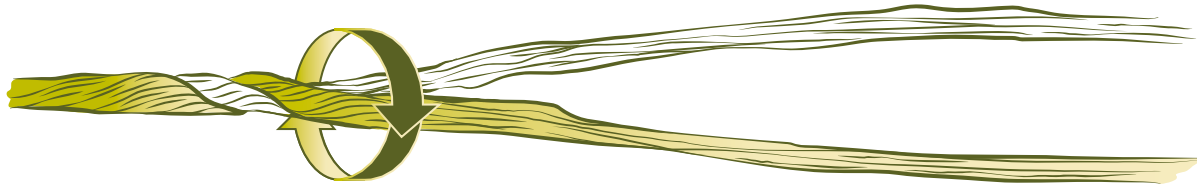


Bring Strand B toward your body, crossing it over Strand A (counterclockwise).

That's it. Now it's just a matter of repeating this process again and again.



Twirl the strand farthest from you away from your body.



Take the strand you just twirled and cross it over the other strand.

By twirling in one direction and crossing in the opposite direction, the cordage-maker creates an interlocking pattern like that of machine-made rope.



Lesson adapted with permission from *Intrigue of the Past: A Teacher's Activity Guide for Fourth Through Seventh Grades*, by Shelley J. Smith, Jeanne M. Moe, Kelly A. Letts, and Danielle M. Patterson, U.S. Department of the Interior, Bureau of Land Management (1993), pages 81-86: *Lesson 16 - Experimental Archaeology: Making Cordage*. Also adapted from *Living Archaeology Weekend: Lesson 3 Experimental Archaeology: Making Cordage* (2009) and *Visual Arts Toolkit: Lesson Plan - Experimental Archaeology*, KET and Judy Sizemore (2016).

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