The Archaeology of Wichita Indian Shelter in Kansas

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Project Archaeology is a national heritage education program for educators and their students. Project Archaeology uses archaeological inquiry to foster understanding of past and present cultures; improve social studies, science, and literacy education; and enhance citizenship education to help preserve our archaeological legacy. Project Archaeology operates through independent state programs that offer workshops, educational materials, and continuing support for educators.
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Overview

This unit supports you in teaching reading in the content areas. It can be completed in 7 to 15 hours.

Understanding By Design

The unit is designed using the Understanding By Design model, developed by Grant Wiggins and Jay McTighe. Students will come to know these enduring understandings:

- Archaeologists investigate how people lived in the past.
- Evidence of the past is worth protecting.
- Ideas from the past can solve problems today.

Content, skills, and assessments will guide students to answer these essential questions:

- How do archaeologists investigate the past?
- Why is protecting archaeological resources important?
- How can ideas from the past solve problems today?

Understanding is performance as transferability of core ideas, knowledge, and skill, on challenging tasks in a variety of contexts. Thus, assessment for understanding must be grounded in authentic performance-based tasks. An assessment task, problem, or project is authentic if it

- is realistically contextualized
- requires judgment and innovation
- asks the student to “do” the subject
- replicates key challenging situation in which adults are “tested” in the workplace, in civic life, and in personal life
- assesses the student’s ability to efficiently and effectively use a repertoire of knowledge and skill to negotiate a complex and multistage task
- allows appropriate opportunities to rehearse, practice, consult resources, and get feedback on and refine performances and products (Understanding by Design, 2nd Edition, Chapter 7: Thinking Like An Assessor, pages 153-154).

Teaching Reading in Social Studies

In their book, Teaching Reading in Social Studies, Jane K. Doty, Gregory N. Cameron, and Mary Lee Barton state, “Working with students to help them gain the knowledge and skills necessary to become informed decision makers in a democratic society is a powerful responsibility. The study of social studies is much more than memorizing historical facts; geographical statistics; or government, civic, and economic terminology. It is really about problem solving, decision making, reflective inquiry, and
critical thinking. More than any other academic area, it is about helping students become strategic thinkers responsible for decisions that impact our society. They must be strategic in their reading and be able to comprehend and use what they read to make informed decisions and choices in the world in which they live.

Teaching reading in social studies is not so much about teaching students basic reading skills as it is about teaching students how to use reading as a tool for thinking and learning. Research, in general, indicates that learning and reading are active processes where readers construct meaning from the words they read by interacting with the text, using prior knowledge and experience to make connections, generating hypotheses, and making sense of what they read.

**Teaching Instructions for This Unit**

- It is recommended that you read the Student Magazine and Student Journal before teaching the unit. This should fully prepare you to teach.
- The teacher guide will provide you with instructions and answers to Student Journal activity sheets and section reflections (Show What You Have Learned) in the Student Magazine.
- On page 7 you will find a parent guide to this unit. Before beginning the unit you may choose to photocopy and distribute the guide to parents so they can reinforce the learning process.
- Do not give students the magazine and journal to read and complete on their own. It is intended that the teacher guide students and participate with them in uncovering and understanding the unit’s enduring understandings and essential questions.
- Every teacher has her or his own teaching style, and every classroom has its unique and varied achievement abilities. It is assumed that teachers will adjust their teaching styles and the unit’s activities to meet the unique needs of their classrooms.

**Why Archaeology Is Worth Teaching in Fourth Grade**

As an integrative and interdisciplinary subject, archaeology is all about connections—between the sciences and humanities, between times and places, between one human being and all others. Studying the human past gives students a chance to examine their place in time and discover connections with other people through time. Equally important, it promotes a sense of responsibility for the stewardship of Kansas’ cultural heritage. Archaeology is an innovative way to capture students’ attention while addressing many educational concerns in the classroom—scientific inquiry, problem solving, cooperative learning, and citizenship skills.
Readability Level of Text
The student text ranges from fourth to seventh grade due to the rich nature of the vocabulary. The primary author believes that the acquisition of new vocabulary in the context of science and history content, under expert guidance from the teacher, increases student intelligence. This increase in intellect will be reflected in higher standardized test scores on questions often removed from rich context. More importantly, a higher intellect also supports students in their ability to think critically, a skill that determines success in adult life.

Unit Objectives
In this unit students will use reading, writing, science, geography, economics, and history skills to:

• In Section One: Archaeology of the Wichita Grass House
  
  use the science of archaeology to conduct investigations of the Wichita grass house in Kansas 500 years ago

• In Section Two: Protecting Archaeological Resources Is a Civic Responsibility
  
  explore the importance of protecting archaeological resources and share their ideas

• In Section Three: Learning From the Archaeological Past: The Straw Bale House and a Market Economy
  
  be entrepreneurs and create companies that build shelters, inspired by the Wichita concept of using local resources to build grass houses

Students will show what they have learned in these ways:

• Technical Writing: summarize what they learned in their archaeological inquiry of the grass house.

• Visual Display: design a persuasive poster that communicates the importance of protecting archaeological resources.

• Design a Company: apply what they learned about the grass house in the past and about the straw bale house today to design companies that build shelters.

• Letter: write for information for their businesses.

• Final Performance of Understanding: apply their knowledge by creating a RAFT (Role Audience Format Topic) to advertise their companies.
Dear Parents:

Our class will soon begin a unit on archaeology. We will be studying the archaeology of the Wichita grass house. The table below describes what students will learn and how they will show what they have learned. Included are questions for you to ask your child to help reinforce his or her learning and help you stay involved with the learning process. This sheet is for you to keep. Your child will not be responsible for turning it in, nor will he or she be graded on it.

<table>
<thead>
<tr>
<th>Section</th>
<th>Students will understand</th>
<th>Students will learn/do</th>
<th>Assessment – students will</th>
<th>Ask your child</th>
</tr>
</thead>
<tbody>
<tr>
<td>One: The Archaeology of the Wichita Grass House</td>
<td>Archaeology investigates how people lived in the past.</td>
<td>Investigate the natural environment of the Wichita Indians. Investigate the grass house footprint. Investigate Wichita artifacts.</td>
<td>Write a technical report.</td>
<td>How do archaeologists investigate the past?</td>
</tr>
<tr>
<td>Two: Protecting Archaeological Resources Is a Civic Responsibility</td>
<td>Evidence from the past is worth protecting.</td>
<td>Examine the protection of archaeological resources. Decide the importance of preserving archaeological resources.</td>
<td>Design a persuasive poster that teaches the importance of protecting archaeological resources.</td>
<td>Why is it important to protect archaeological resources?</td>
</tr>
<tr>
<td>Three: Learning from the Archaeological Past: The Straw Bale House and Market Economy</td>
<td>Ideas from the past can solve problems today.</td>
<td>Examine local materials to build shelters today. Create a business as they come to understand market economy.</td>
<td>Apply what they have learned to a real world setting by writing a letter asking for help.</td>
<td>How can ideas from the past solve problems today?</td>
</tr>
<tr>
<td>Final Performance of Understanding</td>
<td></td>
<td></td>
<td>Create an advertising campaign for a business.</td>
<td>What do you like about a straw house?</td>
</tr>
</tbody>
</table>
Getting Started

What Do I Know? What Do I Want To Know?
Help students create the KWL charts on Student Journal page 1. At this point they should only complete Columns A and B. They will be referred back to the chart throughout the lesson.
Mystery of the Bone Tool

Use Student Magazine page 2 to interest students in how the science of archaeology is used to study Wichita Indian shelter in Kansas. In this unit the mysterious bone tool is the hook for uncovering answers about past cultures through archaeological methods. Working through the lessons, students will conclude that the grassing needle (the mysterious tool) was the implement that the Wichita Indians used to fasten grass bundles to the wooden frames of their houses. Furthermore, experimental archaeology aided researchers in recognizing the artifact found in an excavation.
Archaeology of the Wichita Grass House

Enduring Understanding: Archaeologists investigate how people lived in the past.
Essential Question: How do archaeologists investigate the past?

Curriculum Standards Integration for Fourth Grade

Kansas College and Career Ready Standards

Reading

• RI.4.3: The student will explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

• RI.4.4: The student will determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.

• RI.4.5: The student will describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.

• RI.4.7: The student will interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Writing

• W.4.2 (a-e): The student will write informative/explanatory texts to examine a topic and convey ideas and information clearly.

• W.4.7: The student will conduct short research projects that build knowledge through investigation of different aspects of a topic.

Science

Standard 1: Science as Inquiry: The student will experience science as full inquiry. In the elementary grades, students begin to develop the physical and intellectual abilities of scientific inquiry.

Benchmark 1: The student will develop the skills necessary to do full inquiry. Full inquiry entails answering simple questions, through completion of an investigation, and communicating

Indicator 1: The student asks questions that he/she can answer by investigating.
Indicator 2: The student plans and conducts a simple investigation.
Indicator 3: The student employs appropriate equipment, tools, and safety procedures to gather data.
Indicator 4: The student demonstrates the ability to communicate, critique, analyze his/her own investigations, and interpret the work of other students.

**Geography**

**Standard:** The student uses a working knowledge and understanding of the spatial organization of Earth’s surface and relationships between peoples and places and physical and human environments in order to explain the interactions that occur in Kansas, the United States, and in our world.

Benchmark 1: Geographic Tools and Location: The student uses maps, graphic representations, tools, and technologies to locate, use, and present information about people, places, and environments.

Indicator 2: The student uses a data source as a tool (e.g., graphs, charts, tables).

Benchmark 2: Places and Regions: The student analyzes the human and physical features that give places and regions their distinctive character.

Indicator 1: The student identifies and compares the physical characteristics of eastern and western Kansas and regions of the United States (e.g., rainfall, location, land and water features, climate, vegetation, natural resources).

Benchmark 5: Human-Environment Interactions: The student understands the effects of interaction between human and physical systems.

Indicator 1: The student examines natural resource challenges and ways people have developed solutions as they use renewable and nonrenewable resources (e.g., lack of water, eroding soil, lack of land, limitations of fossil fuels).

**History**

**Standard:** The student uses a working knowledge and understanding of significant individuals, groups, ideas, events, eras, and developments in the history of Kansas, the United States, and the world, utilizing essential analytical and research skills.

Benchmark 4: The student engages in historical thinking skills.

Indicator 4: The student identifies and compares information from primary and secondary sources (e.g., photographs, diaries/journals, newspapers, historical maps).
Section One Objectives

- The students will learn about archaeology.
- The students will use archaeology to investigate the Wichita grass house.

Note to teachers: CE stands for Common Era, the time period from the year 0 to current time, also known as AD.

Directions for Section One:
1. Read aloud the Enduring Understanding and Essential Question.
2. Read the text features and vocabulary words (in bold) of Section One of the Student Magazine as a class.
3. Have students predict what they will learn after reviewing the text features.
4. Direct students to read Student Magazine pages 3-4. (beginning of section 1 through Virgil Swift)
5. You may want the students to read “Meet Virgil Swift” aloud. Discuss Mr. Swift’s quotation in the last paragraph. Have them define the words “prejudices” and “plague.” Help them answer the question, “What do you think Mr. Swift means?”
6. Direct students to read Student Magazine pages 5-8 (Begin with “How Do Archaeologists Learn about People Who Lived Long Ago?” stopping before “Your Turn to Investigate.”)
7. Discuss with students:
   a. Name different ways to learn about the past.
   b. Is it important to learn about the past? Explain.
   c. Is it important to know about the American Indian past in Kansas? Explain.
   d. How can the past solve problems today?
8. Direct students to read Student Magazine page 9 “The Natural Environment of the Wichita Indians.”
9. Have students complete Columns A and B of the chart “Investigate the Natural Environment of the Wichita Indians” on Student Journal page 2.
10. Direct students to read “How a Grass House Was Built” on Student Magazine pages 10-11.

11. Have students complete Column C of the chart “Investigate the Natural Environment of the Wichita Indians” on Student Journal page 2.
12. Direct students to read “The Mystery Artifact” on Student Magazine page 12.

13. Have students complete Column D of the chart “Investigate the Natural Environment of the Wichita Indians” and answer the two questions on Student Journal page 2.

Answer Key: “Investigate the Natural Environment of the Wichita Indians”

Column A: What did the Wichita eat?

• Bison
• Deer
• Rabbits
• Birds
• Plants

Column B: Where did the Wichita get their drinking water?

• Rivers
• Creeks
• Springs

Column C: What natural resources did the Wichita use to build their grass houses, according to Chief Jim?

• Cedar poles
• Willow poles
• Elm bark
• Tall grass

Column D: What natural resources did the Wichita use to make tools?

• Wood
• Rocks
• Animal bones

1. What factors were important to the Wichita in deciding on the best place to build their houses and villages? A place in close proximity to things they needed to survive, such as water, food (plants and animals), housing materials (wood and grass), fuel (wood or buffalo chips), and materials to make tools (stone, wood, bone).

2. What missing tool used for building a grass house was discovered through experimental archaeology? Bone needle now called a grassing needle by archaeologists.
15. Instruct students to read “The Grass House Footprint” on Student Magazine page 13 and examine the drawing of the Wichita grass house.

16. Refer students to Student Journal page 3 to answer the questions. As part of the second question, students will be learning how to figure diameter, although this may be a new concept for fourth graders. Explain that the diameter of a circle is similar to measuring the width of the house footprint at the widest point. Model how to use a scale to figure distance. Have the students do this using both metric and English measurements.

**Answer Key: “Investigate the Grass House Footprint”**

1. How many cedar posts were used to build the main frame of the grass house? 24

2. Measure the house between the widest points. Use the metric and English scales to figure the width of the house. *about 5 meters or 16.4 feet*
17. To form a human footprint of the grass house, have the students use their bodies to form a circle. You may want to do this in an area where you have at least 20 feet of clear space, such as the playground. Ahead of time prepare a string 8 feet (or 2.5 meters) in length. First have the students form a circle that they think is 16 feet (or 5 meters) in diameter. Ask two students to come to the center of the circle. Give each opposite ends of the string. One student remains in the center of the circle as the other student, holding the string tightly, walks around the perimeter. If the rest of the students are not in the right place, have them move to the proper place as the student walks the perimeter. Now discuss if and how this changes their perception of the size of the grass house.


1. Start with your investigation question: “How did the Wichita use the natural environment to build houses?”

2. Describe how you conducted your investigation.

   I gathered evidence to answer this question by reading about the natural environment of the Wichita Indians, looking at Chief Jim’s story about how a grass house was built, and studying a grass house footprint.

3. Answer your investigation question. Use the data that you gathered from your investigation. Data is facts and figures, especially for use in making decisions.

   They used several different kinds of trees and bundles of grass to build their houses. The whole family collected the materials, and women and children built the house. Posts and poles made a circular frame. They used 23 cedar posts to build a house that was 5 meters or more than 16 feet in diameter. The poles were tied together at the top with cordage. Bundles of grass were tied onto the frame. Their houses were shaped like beehives.
19. Direct your students to “Wichita Artifacts” on Student Magazine pages 14-15.
20. Complete “Investigate Wichita Artifacts” on Student Journal page 6. Instruct students to complete the columns titled “Tool Used” and “Explanation.” Remind the students to use the glossary for additional information.
## Answer Key: “Investigate Wichita Artifacts”

<table>
<thead>
<tr>
<th>Column A: Material</th>
<th>Column B: Tool Used</th>
<th>Column C: Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gathering Materials</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>chopping small cedar trees</td>
<td>ax</td>
<td>The sharp edge of the ax could cut through fairly large tree branches.</td>
</tr>
<tr>
<td>cutting thin willow</td>
<td>ax, knives</td>
<td>The sharp edge of the ax or knives could cut through small tree branches.</td>
</tr>
<tr>
<td>stripping strings of inner tree bark</td>
<td>scraper, knives</td>
<td>The sharp edge of the scraper or knives could strip string for cordage from the inner bark of a tree.</td>
</tr>
<tr>
<td>cutting tall grass</td>
<td>knives</td>
<td>Knives of sharpened stone could be used to cut grass stems.</td>
</tr>
<tr>
<td><strong>Building the House</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>digging postholes</td>
<td>digging stick, bone hoe</td>
<td>The strong bones from the leg and shoulder of a bison could be sharpened and used to loosen even dry, hardened soil.</td>
</tr>
<tr>
<td>tying grass bundles to the frame</td>
<td>grassing needle, drill, cordage</td>
<td>A drill was used to make the hole in the bone grassing needle. The smooth bone needle was then threaded with cordage. It was passed back and forth through the frame of the grass house to attach the bundles.</td>
</tr>
</tbody>
</table>

Answer Key: “Your Work as an Archaeologist: The Technical Report Part Two”

1. Start with your second investigation question: “What tools did the Wichita use to build the grass house?”

2. Describe how you conducted part two of your investigation.

   I gathered evidence to answer this question by studying the artifacts and deciding which tools were used for which jobs in gathering materials and building the grass house. I wrote the information in the data collection chart.

3. Answer the investigation question, based on your evidence. Use data that you gathered from your investigation.

   For gathering materials, the Wichita used stone tools with sharp cutting edges. They chopped down small trees with an ax. To cut thin willows they used an ax or stone knife. They stripped strings of inner bark from the tree for cordage with a scraper or knives. They cut grass with a stone knife.

   To build the house, the Wichita had to dig postholes with a bison tibia digging stick tip and bison scapula hoe. They tied grass to the wood frame of the house with cordage and a bone grassing needle. They had used the stone drill to make the hole in the grassing needle.
21. Refer students to “Show What You Have Learned” Student Magazine page 15 that refers them to Student Journal page 1.

22. Have them complete Column C of “What Do I Know? What Do I Want to Know?”

23. Reflect with students:
   1. How close was your prediction for what you would learn in this section?
   2. How did you use archaeology to learn about the Wichita grass house?
   3. Is archaeology an important way to learn about the past? Explain.
   4. Why should you and others leave artifacts where you find them and report them to archaeologists?
   5. From this lesson, predict how our knowledge of the Wichita and the grass house can be used to solve environmental and shelter problems today.
Protecting Archaeological Resources Is a Civic Responsibility

Enduring Understanding: Evidence of the past is worth protecting.

Essential Question: Why is protecting archaeological resources important?

Curriculum Standards Integration for Fourth Grade

Kansas College and Career Ready Standards

Reading
• RF.4.4 (a-c): The student will read with sufficient accuracy and fluency to support comprehension.
• RI.4.3: The student will explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.
• RI.4.4: The student will determine the meaning of general academic and domain-specific words or phrases in a text relevant to a grade 4 topic or subject area.
• RI.4.5: The student will describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.
• RI.4.7: The student will interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

Writing
• W.4.1 (a-d): The student will write opinion pieces on topic or texts, supporting a point of view with reasons and information.

Civics-Government

Standard: The student uses a working knowledge and understanding of governmental systems of Kansas and the United States and other nations with an emphasis on the United States Constitution, the necessity for the rule of law, the civic values of the American people, and the rights, privileges, and responsibilities of becoming active participants in our representative democracy.

Benchmark 4: The student identifies and examines the rights, privileges, and responsibilities in becoming an active civic participant.
Section Two Objectives:
• The students will examine the protection of archaeological resources
• The students will decide the importance of preserving archaeological resources
• The students will create a poster communicating the importance of protecting archaeological resources.

Directions for Section Two:
1. Read aloud the Enduring Understanding and Essential Question.
2. Read the text features and vocabulary words (in bold) of Section One of the Student Magazine as a class.
3. Have students predict what they will learn after reviewing the text features.
4. Direct students to Student Journal pages 8-9 “Missing Evidence.” Have them complete the activity.

Answer Key: “Missing Evidence”

1. Imagine that these artifacts had never been found with the Wichita grass house footprint. Perhaps they were buried under a building site or picked up by people and never studied by archaeologists. List how the missing evidence would change what you have learned about how the Wichita lived in the past.

3. Draw a line to match these artifacts to their use in building the grass house.

[Student Journal page 8]

[Student Journal page 9]
5. Help students imagine that these artifacts had never been found. Discuss: How would the missing evidence change what we know about how the Wichita lived in the past?

6. Instruct the students to read both “Farming Those Artifacts” and “Moving in on Ancient Sites” on Student Magazine pages 16-17.

7. Divide the class into small groups.

8. Have half of the groups read and discuss “Farming Those Artifacts” and the other half read and discuss “Moving in on Ancient Sites.”

9. Instruct the groups to choose the best answer from the options listed for their story.

10. Give each group an opportunity to explain the reasons for its choice.

11. List the reasons on a class chart for each story. Save this list for review before the students create their posters. At that time have the class discuss which reasons do not support civic responsibility.
12. Have students read “Kermit Hayes: Protecting the Past” and “Is Kermit Hayes a Role Model?” on Student Magazine pages 18-19.

13. Lead a discussion using these questions:
   - Was Mr. Hayes wrong to pick up the artifacts? Explain.
   - How would Mr. Hayes’ story have been different if he had not shared the artifacts with archaeologists and Kansas citizens?
   - Is Mr. Hayes a role model for you? Explain.
   - How did his actions influence Lynn Gentine?
   - How did his actions influence Lynn Gentine’s daughter?
   - You are encouraged to be a civic participant. A civic participant is someone who is connected to her or his community and takes responsibility for meeting the needs of the community. Are Kermit Hayes and Lynn Gentine civic participants? Explain.
14. Direct students to read “Preserving Artifacts for the Future” on Student Magazine page 19.
15. Conduct a student discussion of the question “Is the Coronado Quivira Museum a civic participant?”
16. Direct students to read “How Can People Help When They Find an Artifact?” on Student Magazine page 19.
17. Conduct a student discussion of the question “Are you being a civic participant when you report artifacts?”
18. Have students silently read the poem “A Farmer Who Loves History” on Student Magazine page 20.
19. Divide the class into five groups. Conduct a choral reading of the entire poem. Each group recites one stanza, and everyone recites the last stanza.
20. Review the class chart resulting from the reading of “Protecting Archaeological Resources: What Would You Do?” Discuss the reasons that do not support civic responsibility.
21. Instruct students to create a persuasive poster that teaches the importance of protecting archaeological resources. Review the assessment criteria for the poster:

Assessment Criteria for Poster

Name _________________________

The poster should

_____ contain accurate information

_____ be easy to read

_____ include colorful drawings, pictures, or symbols that catch people’s eye

_____ include words that persuade

_____ include drawings, pictures, or symbols that persuade

_____ be big enough to hang in a store window
22. After the students have completed their poster, use “Show What You Have Learned” on Student Magazine page 20 to reflect with students on their new knowledge.
   a. How well did you predict what you would learn in this section?
   b. Record what you learned from this section in Column C of “What Do I Know? What Do I Want to Know?” on Student Journal page 1.

23. Use these questions to reflect with students what they have learned:
   - What did you enjoy learning the most? The least?
   - What will you teach your parents about what you learned? Why?
   - Is it important to preserve artifacts and sites from the past? Explain.
   - What else would you like to learn about protecting archaeological resources?
Learning from the Archaeological Past:
The Straw Bale House and a Market Economy

Enduring Understanding: Ideas from the past can solve problems today.

Essential Question: How can ideas from the past solve problems today?

Curriculum Standards Integration for Fourth Grade

Kansas College and Career Ready Standards

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• W.4.1 (a-d): The student will write opinion pieces on topic or texts, supporting a point of view with reasons and information.
Civics-Government

**Standard:** The student uses a working knowledge and understanding of governmental systems of Kansas and the United States and other nations with an emphasis on the United States Constitution, the necessity for the rule of law, the civic values of the American people, and the rights, privileges, and responsibilities of becoming active participants in our representative democracy.

Benchmark 4: The student identifies and examines the rights, privileges, and responsibilities in becoming an active civic participant.

**Standard:** The student uses a working knowledge and understanding of major economic concepts, issues, and systems, applying decision-making skills as a consumer, producer, saver, investor, and citizen of Kansas and the United States living in an interdependent world.

Benchmark 2: The student understands how the market economy works in the United States.

Geography

**Standard:** The student uses a working knowledge and understanding of the spatial organization of Earth’s surface and relationships between peoples and places and physical and human environments in order to explain the interactions that occur in Kansas, the United States, and in our world.

Benchmark 1: Geographic Tools and Location: The student uses maps, graphic representations, tools, and technologies to locate, use, and present information about people, places, and environments.

Indicator 2: The student uses a data source as a tool (e.g., graphs, charts, tables).

Benchmark 5: Human-Environment Interactions: The student understands the effects of interaction between human and physical systems.

Indicator 1: The student examines natural resource challenges and ways people have developed solutions as they use renewable and nonrenewable resources (e.g., lack of water, eroding soil, lack of land, limitations of fossil fuels).

Section Three Objectives:

- The students will examine local materials to build shelters today.
- The students will create a business as they come to understand market economy.
- The students will apply what they have learned to a real world setting.
Teacher Background Information on Straw Bale House Construction

What is a straw bale house?

A straw bale house is a shelter whose exterior walls are made of straw bales.

Building a straw bale house is very similar to building other houses. The builder starts with a foundation or basement as for a conventional house. At the top of the foundation wall (typically 8 inches), the builder forms an expanded pad to accept 18-inch-wide straw bales. The Nebraska Style straw bale house is one-story, and the exterior walls are made of straw bales stacked like bricks, usually 8-10 feet tall. A concrete beam is poured on top of these walls or a lumber plate is installed to provide the base for conventional roof trusses or framing.

Another construction method is to build a wood post and beam frame, similar to a pole barn or park pavilion. Vertical columns and horizontal beams support the roof, and bales infill between the columns. This building technique is often chosen for a number of reasons. If the roof is on prior to straw bale delivery, the bales can be kept dry during construction. This style also allows multi-story construction and installation of tornado anchors to improve the resilience of the structure. It also increases the number of finance and insurance companies willing to lend and insure the house.

In either case straw bales are placed on top of each other to make the walls. The bales are stacked in overlapping rows, just like bricks are laid. This makes the walls strong and straight. The straw bale walls are covered with chicken wire, which gives the plaster and stucco coatings something to grab onto. The straw bale walls are first coated inside and out with cement stucco. On the exterior second and third coats of concrete stucco are applied. Each successive coat has a unique recipe of cement, hydrated lime, sand, water, and colorant to increase elasticity and achieve the desired exterior color. On the interior a coat of ground gypsum plaster is followed by successive coats of finish plaster to achieve the desired smoothness. The plaster and stucco dry to a hard finish.

What is straw?

Straw is the stem of grain crops such as wheat. Farmers cut the grain with a combine when it is fully grown. The combine removes the grain (seeds) from the top of the stem and puts the grain in a truck. The stem of the plant is left standing in the field. These stems are called straw.

What is a straw bale?

Many farmers cut the straw and bundle it into a bale with a baler. The bales are sold for things like bedding for farm animals or for ground cover to protect soil from erosion. They can also be used to build a straw bale house.
The shape of the bale can be a problem. In the old days bales were rectangular. Today many bales are very big and round. A straw bale house needs rectangular bales. Finding a farmer who is willing to use old machinery to make rectangular bales can solve this problem.

What troubles do people fear that they might have with a straw bale house?
Many people do not know much about straw bale houses. They think that the house will burn easily, that the straw will get wet and moldy, and that insects and rodents will get inside the walls and eat the straw. Some of the first straw bale houses ever built are more than 100 years old, and they are still in good shape.
Tests prove that straw bale walls do not start on fire easily. Fire needs air to burn. The farmer bales the straw so tightly that there is very little air inside the bale. Once the walls are finished with plaster and stucco, the bales are entombed in non-combustible materials so the house is further protected from fire.
The bales need to be protected from rain or other moisture when the walls are going up. If the bales stay dry during building, the straw cannot rot. If the roof is put on correctly, then water cannot get into the straw walls after the house is finished, so it does not get moldy.
Insects and rodents like to squeeze in through openings where they can find food. There is very little grain in the straw after the grain is harvested. This means there is very little food for insects and rodents to eat. Once the plaster and stucco are applied to the walls, there is no place for insects or rodents to squeeze inside.

How does a straw bale house protect the environment?
Building with straw bales protects the environment because straw bales are good insulation. Insulation is a product inside the walls of a house that helps a house stay warm in the winter and cool in the summer. A well-insulated house uses less gas, oil, or coal for heat. When people use less gas, oil, or coal, there is more left for future use, and less pollution is created.
Kansas grows a lot of grain. Building with straw bales protects the environment because straw is made all over Kansas every year. There is a good chance that there will always be a supply of straw. When straw is used to build a house, less wood is used. Using less wood helps conserve our country’s forests. Transporting building materials short distances (from area farms to home sites) instead of long distances (west coast forests to home sites) saves fuel and reduces air pollution.
Directions for Section Three:
1. Read aloud the Enduring Understanding and Essential Question.
2. Read aloud to students “An Afternoon Storm on the Prairie in CE 1503” on Student Magazine page 21.
3. Lead a discussion using these questions:
   • What materials were used to build the shelter where the people in the story lived?
   • Where did the materials come from?
   • Which materials came from Kansas?
4. Have the students read “Fast Forward to the Present.”
5. Lead a discussion of the material using the question, “What can we learn from the Wichita about using local materials from nature to build shelters?”
6. Read the text features and vocabulary words (in bold) of remainder of Section Three of the Student Magazine page 22 beginning with “Creating a Business in a Market Economy.”
7. After reviewing the text features, have students predict what they will learn in Section Three.
8. Read the introductory paragraph to “Creating a Business in a Market Economy” on Student Magazine page 22.

9. Guide students to read in segments “Learning About Straw Bale Houses” on Student Magazine pages 22-23 and complete the graphic organizer “Straw Bale House Graphic Organizer” on Student Journal page 10.

- Have students read the segment “What materials found in Kansas can be used to build a straw bale house?”
- Have students complete the graphic organizer box: “What materials used in a straw bale house are found in Kansas?”
- Have students read the segments “What is a straw bale house?” through “What is a straw bale?”
- Have students complete the graphic organizer box: “What are the building materials for a straw bale house?”
- Have students read the segment “What problems to people fear that they might have with a straw bale house?”
- Have students complete the graphic organizer box: “How are these potential problems prevented?”
- Have students read the last segment, “How does a straw bale house protect the environment?”
- Have students complete the graphic organizer box: “How does a straw bale house protect the environment?”
Answer Key: “Straw Bale House Graphic Organizer”

What materials used in a straw bale house are found in Kansas? straw, cement, gypsum plaster

What are the building materials for a straw bale house? straw bales, wood, chicken wire, cement, plaster

How are these potential problems prevented?

- **Fire**—tightly packed bales, plaster covering
- **Mold**—keeping straw dry during building, good roof
- **Rodents**—little grain left in straw, plaster covering

How does a straw bale house protect the environment?

- **Renewable resource**—straw
- **Natural resources saved**—gas, oil, coal, trees (wood), air (unpolluted)
10. Direct students to study the photos and captions in “Steps to Building a Straw Bale House” on Student Magazine page 23.

11. Conduct a discussion of the process.

12. Have students read and discuss “Being Part of a Market Economy” on Student Magazine page 24.


**Answer Key: “How Much Will It Cost to Buy Straw Bales?”**

1. You need 500 straw bales to build one house. How many bales will you need for five houses?  
   2,500 bales

2. If a farmer sells one bale for $2.00, how much will you pay for all the bales that you need to build five houses? $5,000

3. If a farmer sells one bale for $3.00, how much will you pay for all the bales that you need to build five houses? $7,500

4. How many bales can Farmer A bale if he has 20 acres of grain? 1,000 bales

5. How many bales can Farmer B bale if she has 40 acres of grain? 2,000 bales

6. How many bales can Farmer C bale if he has 80 acres of grain? 4,000 bales

7. Which farmer would be able to supply you with enough bales to build five houses in a good year?  
   Farmer C

8. Do you think this will increase the demand for straw bale houses? Yes No  
   Explain. Accept various supported answers

9. How would your supply have to change if you had more demand for straw bale houses?  
   I would have to increase my order from my present supplier or find additional farmers to supply the bales.
10. Assign the Section Three assessment “Write to a County Extension Agent” on Student Journal page 13. Use the criteria to evaluate the letter.

Criteria to Write to a County Extension Agent

Name ____________________________________

The letter should include:
- who the student is
- the name of student’s business
- what student is going to produce
- how many houses student will build
- how many straw bales student will need
- the price student hopes to pay for each bale
- why a straw bale house is good for the environment
- how the Wichita Indians inspired the idea

Write to a County Extension Agent

Write a letter to a county extension agent, asking for help in finding farmers who might sell you enough straw bales to build five houses. The county extension agent is a person who works for the government and goes to farmers.

Your letter should include:
- who you are
- the name of your business
- what you are going to produce
- how many houses you will build
- how many straw bales you need
- the price you hope to pay for each bale
- why a straw house is good for the environment
- how the Wichita Indians inspired your business

[Student Journal page 13]
16. After the students have completed their letter, use “Show What You Have Learned” on Student Magazine page 24 to reflect with students on their new knowledge.
   a. How well did you predict what you would learn in this section?
   b. Record what you learned from this section in Column C of “What Do I Know? What Do I Want to Know?” on Student Journal page 1.

17. Use these questions to reflect with students what they have learned:
   • How can learning from the past make our lives better today?
   • What did you learn about a market economy?
   • What did you enjoying learning the most/least in this unit?
   • What did you enjoying doing the most/least in this unit?
   • What else would you like to know as a result of what you learned?
Marketing Campaign

As a final assessment for The Archaeology of Wichita Indian Shelter in Kansas unit, assign the RAFT on Student Magazine page 25. By using the RAFT exercise, students will apply what they have learned through archaeology about the environment, Wichita Indian culture, and the value of preservation. They will also show how this knowledge can be applied to a modern business model. You may want your students to work individually or in groups on this project.

Name ____________________________

Include:

• words
• visuals

Explain and show:

• how straw bales and plaster are used to build houses
• how houses use local materials
• how houses protect the environment
• how archaeology helped students learn about the Wichita grass house
• how the history of the Wichita grass house inspired the business
Websites for More Information

Kansas Archaeology
- kshs.org/archeologists/index.htm
- kshs.org/resource/archepubs.htm#reports

Wichita Indians
- wichita.nsn.us
- cqmuseum.org
- omaha.lib.ne.us/transmiss/congress/wichita.html
- texastians.com/wichita.htm

Kansas Straw Bale Houses
- chrysalisfarm.com/straw_bale_home.html
- purpleprairie.net/StrawBaleHomes
- strawbale-houses.com
- republicofgrass.com/index.html
ancestor: a family member who lived in the past
archaeological resources: artifacts, sites, and features that archaeologists use to investigate past cultures
archaeologist: a scientist who studies past cultures
archaeology: a science that investigates how people lived in the past
artifacts: objects made and used by people in the past
ax: a tool made of stone with a sharpened edge that was used to cut trees and wood. The edge could be resharpened many times.
circular: shaped like a circle
civic participant: a citizen who is connected to her or his community and takes responsibility for meeting the needs of the community
civic responsibility: caring and being involved in your community
cordage: string made by twisting strips from the inner bark of trees or other plants. It was used for tying grass bundles onto the frame of a grass house and many other tasks.
culture: the set of learned beliefs, values, and behaviors generally shared by a group of people
data: facts and figures, especially for use in making decisions
decay: decompose; rot
demand: the number of consumers willing and able to purchase a good or service at a given price
descendant: a person related to one that lived in the past
digging stick tip: a tool made from a bison tibia (leg bone) and tied to a wooden handle. The digging stick was used for digging, even in dry hard soil, and for gardening.
distribution: the arrangement of items over a specified area
drill: a tool made of stone that was used to make holes in softer materials, such as a bone and animal hides. A drill could have been used to make the hole in the grassing needle.
entrepreneur: a person who takes a risk to set up a business to make money
evidence: facts that show whether or not something is true
excavation: the removal of layers of soil from the earth for the purpose of studying past cultures
experimental archaeology: making tools and shelters in the same way as people in the past
footprint: a mark made by a person’s shoe, an animal’s foot, or the remains of a house
grassing needle: a tool made from a bison rib bone. It was used with cordage to fasten bundles of grass onto the Wichita house frame. It was very smooth and could pass easily between the grass bundles.

hoe: a bone tool made from the scapula (shoulder blade) of a bison. It was tied to a wooden handle and used for digging and gardening.

insulation: a product inside the walls of a house that helps a house stay warm in the winter and cool in the summer

investigate: to carry out a detailed examination of something in order to find out about it

investigation: a detailed way to look at something in order to find out about it

knife: a thin stone tool with sharp edges used for cutting all kinds of materials. The Wichita Indians made a special style of beveled knife that was very good for butchering animals. A beveled knife is sharpened on all sides to make steep cutting edges.

market economy: a system in which buyers and sellers make major decisions about production and distribution, based on supply and demand.

natural environment: the climate, plants, animals, water, and rocks of a certain area

oral history: passing information to the next generation by word of mouth

plaster: lime or clay, sand, and water that is made into a paste and spread on walls to finish them

preserve: to keep something protected from anything that would cause it harm

primary source: a first-hand account of an event, person, or place, such as an official document, diary, letter, historical photograph, or oral testimony

sacred: relating to religion

scraper: a tool made of stone used to scrape the inner bark of a tree. It was also used to scrape and cut other plants, hides, and many other materials.

scientific inquiry: an investigation that asks a question, collects information to answer the question, and communicates the results to others

secondary source: an account of an event, person, or place that is not first-hand, such as textbook information, historically based movies, or biographies

straw: the hollow stem of grain crops such as wheat, barley, rye, or oats

straw bale house: a shelter whose walls are built of straw bales