Corn

Math, social studies, science, language arts

SKILLS.....Knowledge, application, analysis, synthesis, evaluation
STRATEGIES.....Predicting, estimating, discussion, graphing, reconstructing
DURATION.....4 class periods, 3-hour field trip to Aztec Ruins
CLASS SIZE.....Any

OBJECTIVES

In their study of the prehistoric use and storage of corn, students will:

1. Observe, record, and discuss findings about the Ancestral Puebloan use of corn.

2. Create their own pottery for storing corn and estimate its volume.

3. Calculate the volume of corn contained in their vessels and make a graph of this value.

4. Estimate the amount of corn storage needed for Ancestral Pueblo people.

VOCABULARY

mano: small stone held in the hand used to grind corn and other substances by rubbing on a larger stone called a metate.

metate: large stone used to grind corn and other substances by rubbing with a smaller stone (mano).

corn or maize: a cultivated food important to ancestral pueblo people.

pottery: a container or object made from clay and fired for durability.

MATERIALS

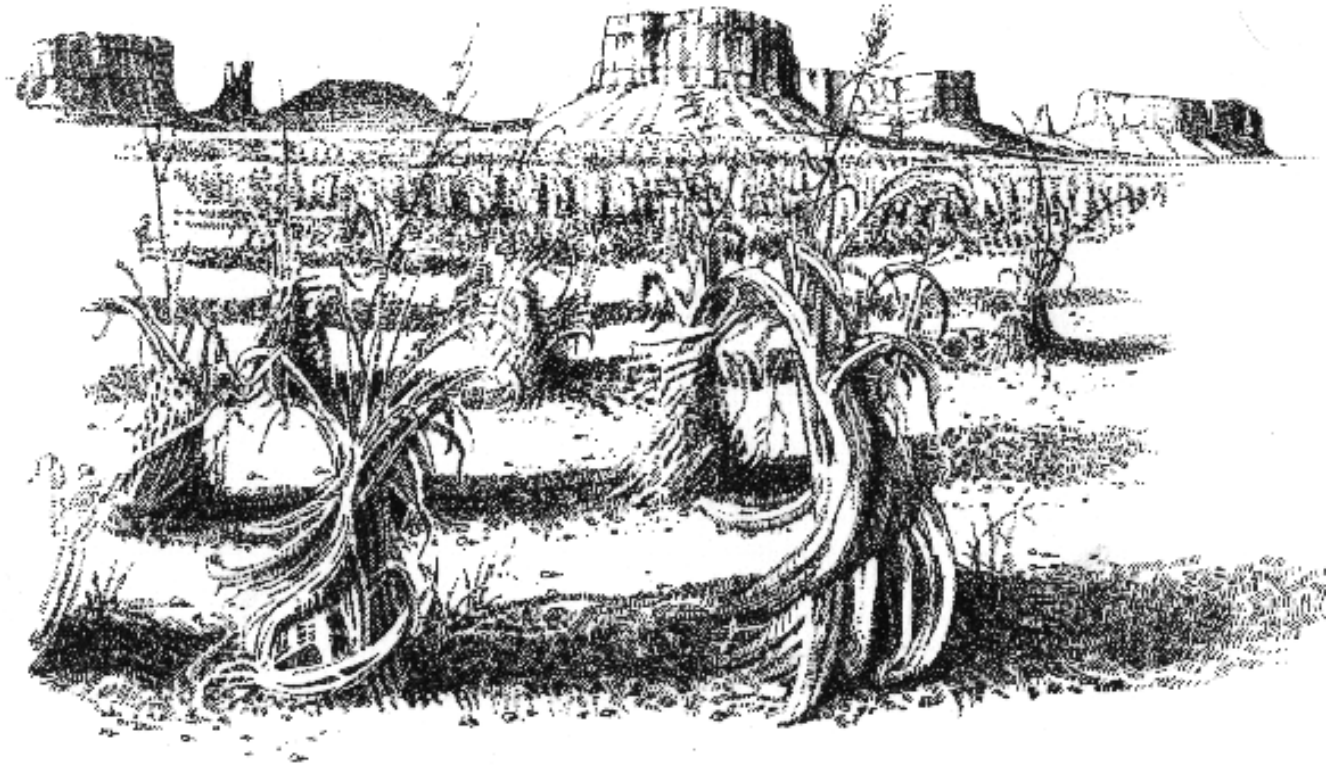
- Indian corn samples and corn poster (from Aztec Ruins trunk of replica artifacts)
- Pictures or samples of modern corn
- Pictures of prehistoric corn, mano and metate
- Dried popcorn kernels
- Popcorn popper
- Sacks to serve popped corn
- 2 large sheets of paper for graphs
- Rulers
- Golf-ball sized white air-dry clay for each student
- 2 small sticky notes (such as Post-it©) and one small thimble-size or medicine-dosage-size cup per student

BACKGROUND

Teachers could break this lesson into several, or omit some steps to reduce the amount of time needed. See the extensions at the end of this plan for ideas on how to do so.

The Ancestral Pueblo people probably felt about corn as their descendants do today. Corn is held in reverence and for many is considered the basis of life. Stories passed over many generations relate how the gift of corn was given to the Pueblo people, and suggest that it was the basis of ancient peoples' philosophy and religion. The Corn Dance, held during spring and summer at many pueblos, is a celebration to ensure rain, bountiful harvests, and abundant plants and animals. Corn and corn pollen play a role in nearly every life ceremony – for birth, puberty, marriage, and death, and in a variety of ceremonies conducted throughout the year. Pueblo people today use corn flour in porridge, bread, cakes, and drinks, prepare fresh corn in a variety of ways, and dry it for future use.

Ancestral Pueblo people of this region relied heavily on maize, or corn, for their survival. They devoted much effort to cultivating this plant in irrigated fields, where they also grew beans and squash. Besides eating it fresh, corn could be dried and stored to hedge against future crop failures. The dried kernels were ground into flour using stones called a *metate* and *mano*. The metate is a large stone on which the kernels were ground with the smaller stone, the mano, that was held in the hand. The cultivation and storage of corn allowed people to settle year-round in one place, rather than follow the availability of wild foods in different areas.

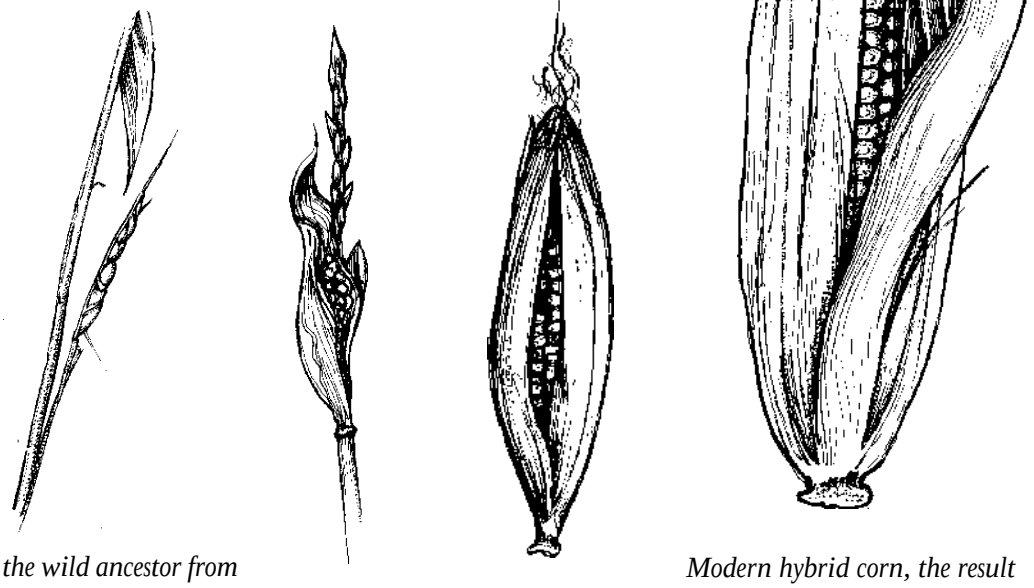


Pottery was invaluable for the long term storage of corn. Large vessels filled with dried corn kernels could be sealed and protected from rodents, insects, and moisture. They buried some beneath the floors of rooms, affording additional protection to their contents. Storing corn provided food for the people during poor growing seasons, and also maintained a supply of seed kernels for future years.

Aztec Ruins yielded much evidence indicating the importance of corn to the Ancestral Pueblo people who lived here. Remains found included stashes of corn stalks, tassels, husks, cobs, and kernels. One find included cobs, husks adhering, strung on wooden loops like keys on a ring. Presumably such rings of corn were hung to dry, allowing removal of one ear at a time. Other cobs were found with their husks tied together so they could be hung as a bunch to dry. One two story room had burned in early times – destroying the ceiling and allowing over 200 bushels of charred corn, some shelled but much still on the cob, to fall from the upper room.

The size of the corn grown at Aztec differs from today's corn. Most cobs were from three to seven inches long, with 12 to 14 rows of kernels on each cob. The kernels themselves were small, about the size of the kernels on miniature ears of decorative colored corn you see today.

Corn is also important to us in modern times. We eat fresh, canned, and frozen corn, but also use corn products such as corn syrup, flour and meal, corn bread, tortillas, popcorn, and corn starch. Corn is important as food for cattle and other domestic animals.



5000 B.C.
Teosinte grass, the wild ancestor from which corn was cultivated

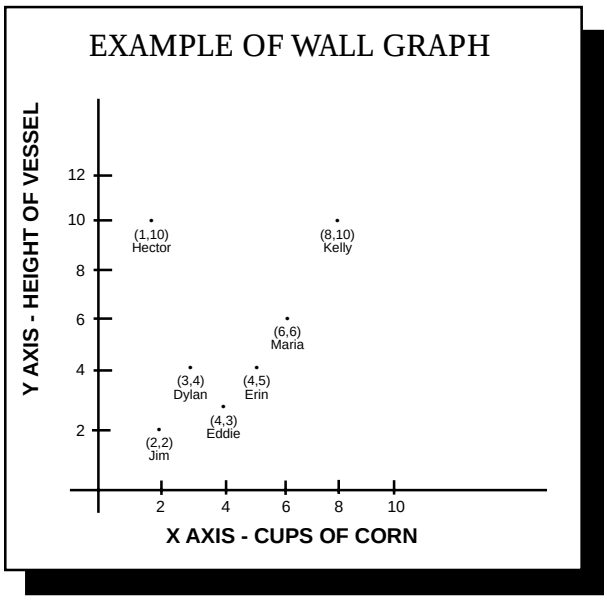
2500 B.C.

1200 A.D.

Modern hybrid corn, the result of 7,000 years of cultivation

Archeologists frequently answer questions and determine relationships of things by making estimates, or approximations, based on the information and variables at hand and his/her prior knowledge. For instance, an archeologist might estimate the size of a vessel based on observing and measuring the pottery fragments, called sherds, and his knowledge of other vessels. He then might estimate the number of cups of corn a storage vessel could contain based on its size. He could extend his estimates to answer questions such as: Based on the number of storage vessels found at a site, how many cups of corn could be stored over a winter? If one cup of corn could feed one person a day, how many people could have been supported for a year by storing corn in the vessels found at a site? Using good estimation skills is important to archeologists to decide on the plausibility of conclusions or answers about people of the past.

Archeologists can visually demonstrate these relationships by plotting them on a line or bar graph. The horizontal and vertical axes each represent a different value in the relationship.



The class will create two wall graphs, "Estimated Volumes" and "Actual Volumes," each with X and Y axes. Discuss the results, look for differences, and compare and contrast the graphs.

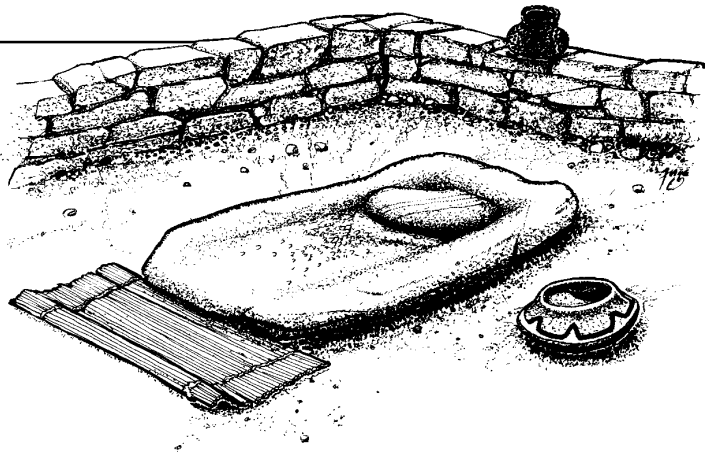
For instance, from the example about the size of the vessel and number of cups of corn, the vertical "Y" axis would represent the size of the vessel, and the horizontal "X" axis would represent the number of cups of corn.

SETTING THE STAGE

1. Display small dried ears of colored corn from the replica artifact trunk and modern ears of corn. Show pictures of prehistoric corn. Compare the sizes of both prehistoric and modern corn.

2. Discuss with the class the background information, emphasizing the importance and use of corn to Ancestral Pueblo peoples. Compare to modern uses.

3. Show the pictures of a mano and metate, and explain their uses.



Dried corn kernels were ground into flour using stones called a metate and mano.

PROCEDURE

1. Take a field trip to Aztec Ruins. Complete the following assignments:

    - Record information and thoughts in notebooks about corn – its cultivation, appearance, and use among the people of the Aztec Ruins area.

    - Research and record information about manos and metates and locate an example at Aztec Ruins.

    - Locate a large undecorated vessel on display in the museum that could have been used for the storage of corn.

2. Back in the classroom, give each student a ball of air-drying clay. Students make a small vessel with it.

3. Distribute 2 sticky notes to each student. Distribute rulers and small cups. Students label each sticky note with their name.

4. Students estimate the volume of corn kernels in terms of number of cups needed to fill their vessel. They write that number on their sticky note. Students measure the height of his/her vessel and record on the same sheet. Students should express the two values as ordered pairs, writing the X axis value first, followed by the Y axis value.

5. Distribute unpopped popcorn to each student. Students fill their vessel with the kernels.

6. Students calculate the actual number of cups of kernels in their vessel by emptying their vessel of corn into their small cup as many times as needed. They write that number followed by the height of the vessel on the second sticky note.

7. Create with the students two wall graphs, "Estimated Volumes" and "Actual Volumes," each with X and Y axes.

8. Students put their sticky notes on each wall graph at the appropriate points. Discuss the results, look for differences, and compare and contrast the graphs.

9. Students make the following calculations: Estimate the amount of corn needed for one person per day. How much would be needed for 100 people for one day? How much for 100 people for three months of winter storage? How many pottery vessels would be needed to store corn for this size population over a winter?

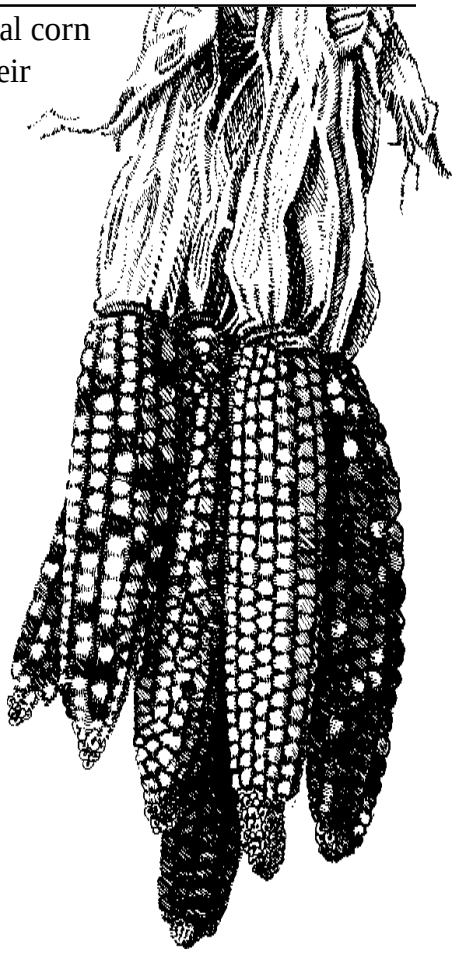
CLOSURE

Pop the corn that was not used and pass out in sacks. As the class eats the popcorn, review the lesson, including ideas about modern and ancient storage of corn and other foodstuffs. Drawing on the background information, speculate on the information that ceramic vessels can reveal about the storage capacity and corn needs of prehistoric people.

Display the pottery pieces and graphs in the room or in a public area of the school with a card of explanation.

EVALUATION

Evaluation is based on each student's participation in individual corn research on the field trip, contributions to class graphs, and their participation in class discussions.



EXTENSIONS

1. To shorten this lesson, break it down into several lessons taught individually, or in sequence. For example, one lesson could focus on the Ancestral Puebloan and modern uses of corn in objective one and include the field trip to Aztec Ruins. (SETTING THE STAGE and PROCEDURE 1.) Another lesson could focus on the math skills of estimation, volume, and graphing in objectives two and three. (PROCEDURES 2 through 8.) To shorten further, students do not create their own vessel from clay but instead bring a small vessel from home. A third lesson could focus on the Ancestral Puebloan storage and use of corn, estimating needs and calculating storage capacities of vessels. (SETTING THE STAGE, PROCEDURE 9.)

2. Students investigate and record decorative patterns on pottery while on the field trip. They incorporate these designs on their vessels.

3. Use a graduated glass measuring cup to measure the volume instead of the small paper cups.

4. Instead of placing sticky notes on the graph, students plot the values on the graph with their name marked next to it.

5. Weigh the corn instead of calculating the volume for the activities.

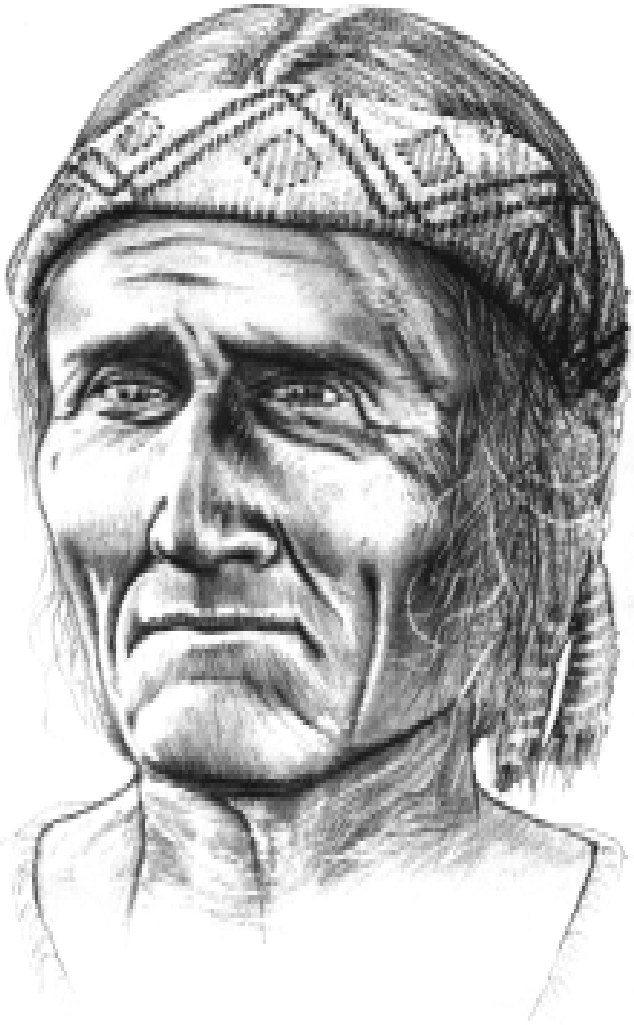
6. Graph the difference between the estimated volume of kernels and the actual volume of kernels. Express this difference as a ratio.

7. Express the size of the vessel by multiplying the height times the diameter at the widest point.

8. Cross curriculum integration can include:

- Literature – read *The Village of Blue Stone* by Stephen Trimble.
- Language – students research Ancestral Pueblo pottery patterns and present a report.
- Art – draw sketches of the pottery or pottery patterns displayed at the Aztec Ruins museum.
- Social studies – students conduct research on corn and make reports or posters concerning its ancient and modern uses; fill in a Venn diagram comparing these uses.
- Science – students prepare research papers or posters about a corn plant's life cycle.

from Vroman photo, circa 1900



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