

Mayan Mathematics and Astronomy

Mathematics

The Mayas developed an important system of mathematics. It was more advanced than the systems used by the ancient Egyptians, Greeks, or Romans.

Zero and Other Numbers

The Mayas were perhaps the first people to use the idea of a zero. This was an important invention. They used a picture of a shell to equal zero. They also used a dot to equal one. A bar equalled five. The Mayas used a base of 20 the same way we use a base of ten. However, they wrote their numbers from top to bottom instead of from left to right as we do.

Mayan numbers looked like this:



Astronomy

An advanced system of astronomy was also developed by the Mayas. The priests studied the movements of the sun, moon, planets, and stars. They could predict eclipses and the orbit of the planet Venus. The Mayas believed that the heavenly bodies were gods. If they studied the sky, the Mayas hoped to learn to predict events on earth that these gods controlled.

To study the heavens, the Mayas built large observatories in many of their cities. The observatory at Chichén Itzá is one of the important Mayan buildings that still stands.

Calendars

The Mayan priests used their knowledge of astronomy and mathematics to develop accurate calendars. They had two different calendars. One was a sacred calendar, and the other was used for planning regular events.

The sacred calendar had 260 days. It used 20 day names, and each day had a god or goddess associated with it. They did not divide the sacred calendar into months. The Mayas used this calendar to determine religious events.

A 365-day calendar based on the movement of the earth around the sun was also used. This calendar had 18 months of 20 days each. The Mayas believed the five extra days at the end of the year were unlucky. The Aztecs later based their calendar on that of the Mayas.

Name: _____ Date: _____

Knowledge Check

Matching

- | | |
|---------------------|----------------------------------------------------------------------------------------------------------------|
| 1. zero | a. place where the Mayas studied the heavens |
| 2. astronomy | b. based on the movement of the earth around the sun; had 18 months of 20 days with five extra days at the end |
| 3. eclipse | c. studying the movements of the sun, moon, planets, and stars |
| 4. observatory | d. had 260 days with 20 day names, each associated with a god or goddess; used to plan religious events |
| 5. sacred calendar | e. the idea of using a symbol to represent the absence of all quantity |
| 6. 365-day calendar | f. when the sun or moon is blocked by another heavenly body and its light does not shine on earth |

Multiple Choice

- Mayas wrote their numbers from
 - left to right.
 - right to left.
 - top to bottom.
 - bottom to top.
- What did the Mayas use to equal the number one?
 - shell
 - dot
 - square
 - bar
- The Mayas' regular calendar had 18 months with 20 days each and five extra days at the end of the year. What was special about those five days?
 - They were feast days.
 - They were lucky days.
 - They were sacrifice days.
 - They were unlucky days.

Constructed Response

- How did the Mayan priests use their knowledge of astronomy and mathematics? Use details from the reading selection to help support your answer.

Mayan Agriculture

The Mayas used a variety of methods to obtain food. Which method they used depended on their location. For instance, methods used in the forest regions did not work in the swamps.

Hunting and Gathering

The earliest Mayas were hunters and gatherers. They fished and hunted for food. Wild animals they hunted included birds, rabbits, monkeys, and deer. The Mayas also picked or gathered wild fruits, nuts, and vegetables. However, hunting and gathering alone could not provide enough food as the population increased. The Mayas then had to plant crops to survive.

Slash and Burn

A method known as **slash and burn** is one of the oldest methods of farming. Men cut forests down with stone axes and then let the trees dry thoroughly. The men then burned the dried trees to clear the land. The ashes provided **fertilizer** for the soil. The Mayas planted seeds, mainly **maize** or corn, using a planting stick. The farmers used the stick to make a hole in the soil and put three or four seeds into each hole. The slash and burn method wore out the soil quickly. The fields had to lie fallow, or at rest, for two or three years before replanting.



Crops

Mayas raised a variety of crops. In addition to maize, they grew beans, chilis and other peppers, squashes, tomatoes, avocados, and pumpkins. In some regions at the edges of the empire, they grew **cacao** plants. The cacao plant was hard to grow, and its beans were valuable since they could be made into a Mayan delicacy called chocolate. The Mayas also had fruit orchards. In addition to food crops, Mayan farmers also grew hemp to make rope and cotton to make cloth.

Irrigation

Water for the crops was always a concern. Droughts often destroyed the crops. The Mayas built water reservoirs using man-made dams and created **irrigation** systems, but these were on a smaller scale than those of the Incas or Aztecs. They also built some terraces to help stop erosion.

The Mayas developed a special way of growing crops in the swampy areas. Workers dug soil up into mounds. They then planted and harvested the crops on the mound areas. The ditches they dug out provided **canals** around the mounds for irrigation.

Religion in Farming

Religion played an important part in Mayan farming. The priests chose the special days for planting and harvesting. The Mayas had special celebrations and rituals in honor of Chac, the god of rain. They believed that he would send the much-needed rain if the celebrations pleased him.

Name: _____

Date: _____

Knowledge Check

Matching

1. slash and-burn _____
2. fertilizer _____
3. maize _____
4. cacao _____
5. irrigation _____
6. canal _____

- a. plant whose beans are used to make chocolate
- b. substance that makes soil more able to produce crops
- c. a ditch that is dug to drain water either toward or away from an area
- d. method of farming where trees are cut down and burned to clear land and provide fertilizer for the soil
- e. another name for corn
- f. bringing water to dry land

Multiple Choice

7. Who chose the days for planting and harvesting in Mayan farming?
 - a. priests
 - b. farmers
 - c. seed salesmen
 - d. gardeners
8. What did the Mayas use to help them plant corn?
 - a. oxen
 - b. axes
 - c. plows
 - d. sticks
9. Where did the Mayas plant their crops in swampy areas?
 - a. on the riverbank
 - b. at the base of a tree
 - c. on mounds of soil
 - d. on the side of a hill

Constructed Response

10. List some of the advantages and disadvantages of the slash and burn method of farming. Use details from the reading selection to help support your answer.
