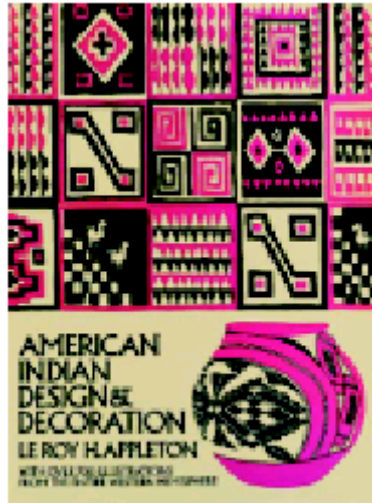


Mathematics Used by American Indians North of Mexico

For the American Indians north of Mexico, we may say that although their bonds of superstition and lack of an adequate number symbolism limited their mathematical progress, number still played an important role in their religious beliefs. In addition, they used many geometric figures in ornamentation and construction.



American Indian design

Sacred Numbers.

Specific reference to the use of three, four five, seven, and thirteen in religious ceremonies is extant, with four being the more prevalent. The may be due to the four points of the compass. Here are examples.

- Five was the mystical number of some of the Pacific Coast Indians. Three and five were sacred to the Iroquois.
- Seven was used by the Zuñi, Cherokee, Creeks, and most of the Plains tribes.

Thirteen was adopted by the Hopi Pawnee, and the Zuñi. It was also widely used in Central America.

- In the Pueblo Snake Dance the Snake Men prepared eight days for the ceremony; the snakes used were of four kinds obtained from a four days' hunt in the four directions.
- An Apache prayed to his gods at least once every four days, and if possible every day, for four times a day. Apache medicine men used this number in their remedies, e.g. four roots of one herb, roots of four varieties, ...
- Suppose a member of the Potawatomi tribe was accused of murder, but that the tribal chief thought he was not guilty, a pipe bearer would bring flint and steel and attempt to light the chief's pipe. If he was successful within four strokes of the steel the man went free, otherwise the man was executed. An influential man might get away with three murders, but for four

murders, nothing could save him.

- The Iroquois when smoking would take three puffs from a pipe. Only three trials were allowed in physical contests. Five days or multiple thereof must elapse between the announcement of and the beginning of a celebration.

Counting

Counting on fingers was nearly universal among Indian tribes. Sometimes the fingers were bent in during counting, other times the fingers were extended from a fist during counting.

- Usually, both hands, beginning with the left hand were used to count ten. To get the next ten, some tribes used the toes; others used the fingers again. The Zuñi counted the second ten on their knuckles.
- Tally marks (vertical strokes) were used to denote one. Grouping was not generally evident. The Dakotas used only the vertical stroke. The Creeks also used this but a cross was used for ten.
- Evidence of subtraction has been found. For example in the Bellacoola language of British Columbia we have:

16 = one man less four

18 = one man less two

26 = one man and two hands less four

36 = two men less four

- Traces of multiplication can be found in the number words of the Zuñi. We have

10 = all the fingers

20 = two times all the fingers

100 = the fingers all the fingers

1000 = the fingers all the fingers times all the fingers

Mounds and Other Earthworks.

Most Indian mounds have been found in the eastern United States. Most were conical. The typical pyramidal mound was a truncated quadrilateral pyramid. The largest is located in Illinois. It is one hundred feet high and has a seven hundred foot base. Mounds have also been discovered and some excavated in Minnesota, Wisconsin, Ohio, Iowa, Georgia, and Mississippi. Many of the mounds were constructed well before Europeans arrived in the new world, some as early as 1000 BCE. The practice seems to have ending in about 1300 CE.

One group of mounds found in Ohio have bases in the shapes of circles, squares, and octagons --- all being quite accurate to true figures. The angles of one measuring more than 900 feet on its base made angles differing from right angles by less than one degree. Could this have been achieved by line of sight? It is an interesting exercise to explain how a people, living in the wilderness, with no tradition of

geometry and little tradition of construction could have made not just one but four nearly right angles on so gigantic a scale. Below is the Adena Serpent mound near Locust Grove, Ohio. Constructed in the second century BCE, it measures 1336 ft (405 meters) long by about 3-6 feet high. Note the use of spirals and semicircles as a part of a quite regular wavy line.



One mound in Georgia constructed by the Etowah Indians is the tallest structure in the area (about 61 feet), and furnishes an impressive view of the Etowah River Valley. The top covers about an acre of land. Another quadrilateral pyramid was a near accurate square with sides pointing in the compass directions. Below is a picture of the terraced-pyramidal Monk's mound rising 100 feet above the surrounding landscape, which is a part of the Cahokia mounds in Illinois, just across the Mississippi river from St. Louis. Cahokia is the largest pyramids construction north of Mexico. At its peak it was home to 30,000-50,000 people. Depending on the elevation used it measures 954 ft in the north-south direction and 775 ft in the east-west direction.



Monk's mound

Two purposes of these mounds emerge. They were a location of temples and dwellings for the upper crust of the tribes. These sites were clearly more defensible in the event of rather common attacks from neighboring tribes. The other purpose was for burial, and some mounds were exclusively for this purpose. Though these mounds have supplied archeologists with a steady supply of artifacts about the the customs and daily life of the tribes, there has been little by way of mathematical abilities uncovered.

Ornamentation.

Anyone who has visited New Mexico has seen the beautiful blankets still woven by the local Indians. These blankets and other objects of Indian art throughout North America have an assortment of geometrical patterns and themes. Navajo pottery, for example, exhibits opposed sets of isosceles triangles, line bordering dots, hooked spirals, double spirals, vertical and horizontal lines, and stepped figures.



Navaho Indian design

- The Sioux separated designs into numerous designs which include:



Sioux design

The Apaches used trapezoids. The Mojave used the hexagon. Eskimos have used circles and

combinations of lines.



Apache design

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