Multicultural Mathematics
the origins of mathematics around the world

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Course Goals. To strengthen and expand students’ understanding of fundamental mathematics, including arithmetic, algebra, and geometry, through comparative study of the mathematics of world cultures. To understand mathematics as a universal human endeavor. To appreciate the contributions of all cultures to the development of mathematics. To explore the connections between mathematics, art, and music. The course is particularly appropriate for majors in elementary education and fine arts and any student interested in non-European history or culture. Students may receive Gender Studies credit if they complete an additional project.

Syllabus.

Number Systems.
- Finger counting.
- Counting in different languages.
- A comparative study of the ancient Egyptian, Sumerian, Babylonian, Greek, and Indian number systems.
- Discussion of base and place value.
- Chronograms.
- History of the decimal system.

Arithmetic.
- Addition and subtraction in different number systems and bases.
- Algorithms for multiplication—the method of duplation, gelosia multiplication, and Vedic multiplication—and why they work.
- The distributive law.

Fractions, Ratios, and Proportions.
- Egyptian fractions.
- Proportion in art.
- Estimating the number π.

Areas and the Pythagorean Theorem.
- Finding areas by dissection.
- A dissection proof of the Pythagorean Theorem from China.
- The Plimpton tablet and Pythagorean triples.
The Math of Sona Drawings.
- Traceable graphs.
- Number theory of sona designs.

The Math of Drumming.
- Polyrhythms and the least common multiple.
- Fibonacci numbers and poetry.

Examples.

The Api counting system
from the South Pacific

1 tai 10 lualuna
2 lua 11 lualuna tai
3 tolu 12 lualuna lua
4 vari 13 lualuna tolu
5 luna 14 lualuna vari
6 otai 15 toluluna
7 ohua 16 toluluna tai
8 otolu 17 toluluna lua
9 ovari 18 toluluna tolu

What comes next?
What’s 25 in Api? What’s 30?

Gelosia multiplication
from Medieval Europe:

\[ 987 \times 961 = 948,507 \]

Why does it work?
Try 428 \( \times \) 790.

Antelope sona
from South Central Africa

How is it constructed?
How much of the graph is traceable?

Reading List.


