

# Intro to Calculus

## Sangaku 1

### Goals

Appreciate mathematics as a human activity with a deep and complex history.

Improve ability to formulate and solve problems.

No visitor to a foreign country has failed to experience the fascination and unease that accompanies an encounter with unknown traditions and customs. Some visitors attempt to overcome their fears, while the majority quickly retreats to familiar shores, and in this lies a distinction: Those who embrace culture shock are travelers; those who do not are tourists.

The most profound culture shock comes about when one is confronted by a different way of thinking. Most of us can hardly imagine walking into a Western church or cathedral to encounter a stained glass window covered by equations and geometrical figures. Even if we can conceive of it, the thought strikes us as alien, out of place, perhaps sacrilegious. Yet for well over two centuries, Japanese mathematicians— professionals, amateurs, women, children— created what was essentially mathematical stained glass, wooden tablets adorned with beautiful geometric problems that were simultaneously works of art, religious offerings, and a record of what we might call "folk mathematics." The creators of these *sangaku*— a word that literally means "mathematical tablet"— hung by the thousands in Buddhist temples and Shinto shrines throughout Japan, and for that reason the entire collection of *sangaku* problems has come to be known as "temple geometry", sacred mathematics.

— Tony Rothman, Sacred Mathematics

### Problem 1 — Suanfa Tong Zong (Systematic Treatise on Mathematics) by Chang Da-Wei, 1592

Find the radius of a circle that is inscribed in a right triangle whose short sides are 36 and 27.

