

Name \_\_\_\_\_

Date \_\_\_\_\_

Class # \_\_\_\_\_

Block \_\_\_\_\_

# Intro to Calculus

## Sangaku 7<sup>1</sup>

算額

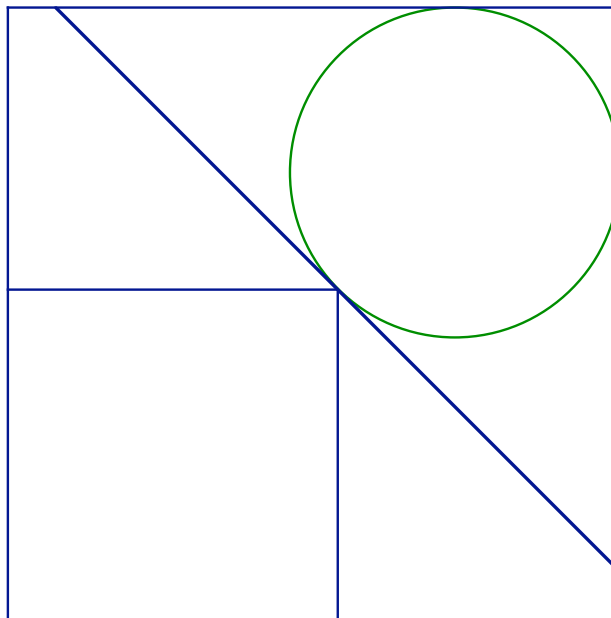
### Goals

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

Improve ability to formulate and solve problems.

Kobayashi Syouta proposed this problem on a table that was hung in the Shimizu shrin, Nagano prefecture, in 1828.

A big square of side  $a$ , encloses a smaller square of side  $2r$ , and a circle of radius  $r$ . The circle is tangent to two sides of the big square and is tangent to the small square at a corner (as shown in the diagram). Find  $r$  in terms of  $a$ .



### Extra Challenge

Use Geogebra to make this sangaku so that all of the objects move correctly as the result of changing the length of side  $a$ .

<sup>1</sup> Based on the work of F. Hidetoshi and T. Rothman

### Scoring Guide

Define variables and label drawing. (4 pt.s)

Clearly and convincingly guide the reader to the solution. (12 pt.s)

Correctly answer the question. (4 pt.s)