

# Intro to Calculus

## Sangaku 10<sup>1</sup>

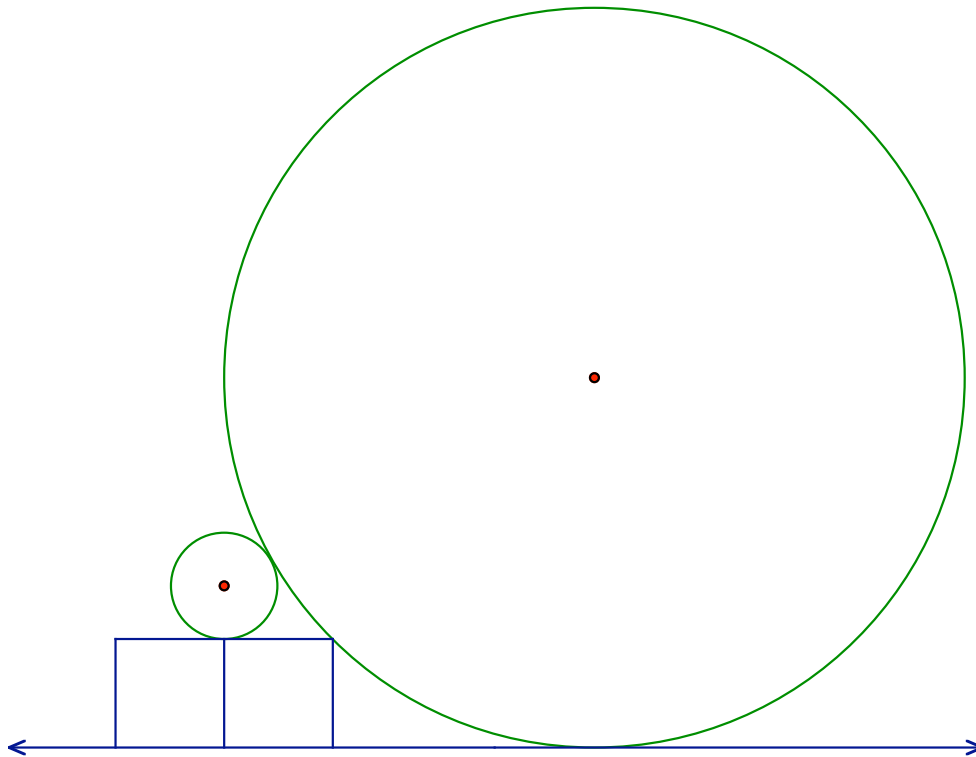
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### Goals

Appreciate mathematics as a human activity with a deep and complex history.  
Improve ability to formulate and solve problems.

This problem is from the Shimizu shrine from the sangaku presented in 1828 by Kobayashi Nobutomo.

As shown in the figure a small circle of radius  $b$  sits on the point of contact between two squares of side  $2b$  that in turn sit on a line. A big circle of radius  $a$  is tangent to line  $l$ , the small circle, and the corner of the nearest square. Find  $a$  in terms of  $b$ .



### Extra Challenge

Use Geogebra to make this sangaku so that all of the objects move correctly as the result of changing the radius of the small circle.

<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)