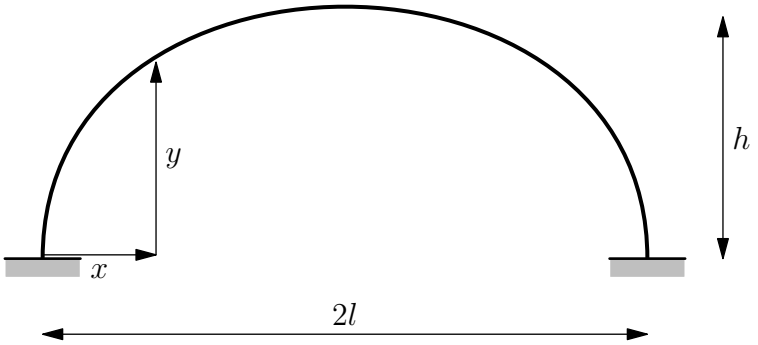
J00M.1—Shape of an Arch

Problem

The shape of an arch is determined by the condition that each brick is held in place by the normal force of its neighbors, with no need for mortar or "glue." To model this consider a thin course of bricks shaped so the normal force exerted on each brick by the neighbor on either side supports the brick against the uniform gravitational acceleration g. Then imagine the limit where the arch is a thin line with height $y = y(x)$ as a function of horizontal position x. The constant mass per unit length along the line of the arch is μ.



Find $y(x)$ for an arch with horizontal width $2l$ and height h. Give the equations that determine the constants in your solution, but you need not solve for the constants.