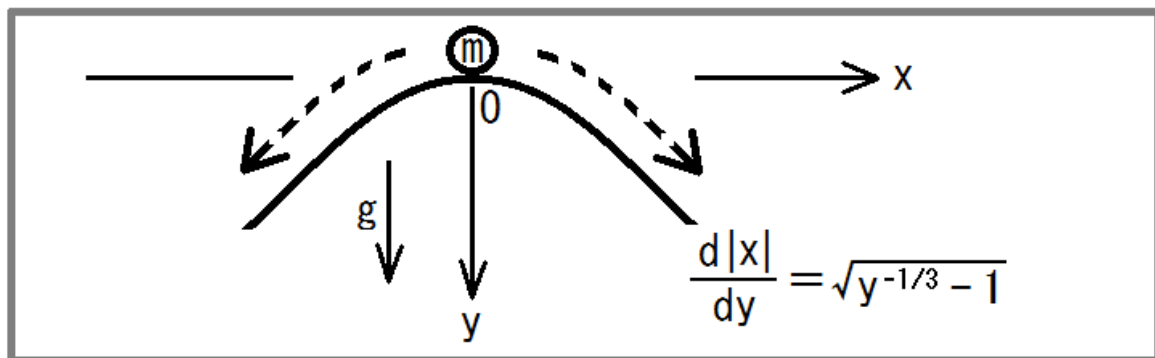


A



$$\begin{aligned}
 T &= \int_0^Y dy \frac{dt}{dy} = \int_0^Y dy \frac{\sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2}}{\frac{dy}{dt}} \cdot \frac{\sqrt{\frac{m}{2}}}{\sqrt{\frac{m}{2} \left[\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2 \right]}} \\
 &= \int_0^Y dy \sqrt{\left(\frac{dx}{dy}\right)^2 + 1} \cdot \frac{\sqrt{m/2}}{\sqrt{mgy}} = \int_0^Y dy \sqrt{y^{-1/3}} \cdot \frac{\sqrt{m/2}}{\sqrt{mgy}} \\
 &= \frac{1}{\sqrt{2g}} \int_0^Y dy y^{-2/3} = \frac{1}{\sqrt{2g}} 3Y^{1/3} < \infty
 \end{aligned}$$

