



$$\begin{aligned} M &= \int_C m ds = \int_C cx \sqrt{dx^2 + dy^2} \\ &= \int_0^b cx \sqrt{1 + \left(\frac{dy}{dx}\right)^2} dx \\ &= \int_0^b cx \sqrt{1 + 4a^2x^2} dx \\ &= \left[\frac{c}{12a^2} (1 + 4a^2x^2)^{3/2} \right]_0^b \\ &= \frac{c}{12a^2} \left[(1 + 4a^2b^2)^{3/2} - 1 \right] \end{aligned}$$
