Question # 85485, Math / Calculus

Task: Find the volume of the solid of revolution formed when the arc of the parabola $y = 4ax^2$ between $x = 0$ and $x = a$ is revolved about the x-axis.

Solution:
Let $a > 0$. For $a < 0$ we have the same answer because the solid of revolution will be identical in both case.

$$V = \pi \int_0^a \left(4ax^2\right)^2 \, dx$$

$$= 16\pi a^2 \int_0^a x^4 \, dx$$

$$= \frac{16}{5}\pi a^7.$$