

# R M M

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**Find:**

$$\Omega = \int \left( \sum_{n=1}^{\infty} 3^n \sinh^3 \frac{x}{3^n} \right) dx$$

**Proposed by Daniel Sitaru – Romania**

**Solution by Shafiqur Rahman-Bangladesh**

$$\begin{aligned} \int \left( \sum_{n=1}^{\infty} 3^n \sinh^3 \left( \frac{x}{3^n} \right) \right) dx &= \frac{1}{4} \int \left( \sum_{n=1}^{\infty} 3^n \sinh \left( \frac{x}{3^{n-1}} \right) - 3^{n+1} \sinh \left( \frac{x}{3^n} \right) \right) dx = \\ &= \frac{1}{4} \int (3 \sinh(x) - 3x) dx \\ \therefore \int \left( \sum_{n=1}^{\infty} 3^n \sinh^3 \left( \frac{x}{3^n} \right) \right) dx &= \frac{3}{4} \left( \cosh(x) - \frac{x^2}{2} \right) + C \end{aligned}$$