

Let the number be x

Given: The sum of the number and its inverse is (-4)

$$\Rightarrow x + \frac{1}{x} = (-4)$$

Required sum of their cubes

$$\Rightarrow (x)^3 + \left(\frac{1}{x}\right)^3 \left[a^3 + b^3 = (a+b)^3 - 3ab(a+b) \right]$$

Expanding the same, we'll get

$$\begin{aligned} & \left(x + \frac{1}{x}\right)^3 - 3 \cdot x \cdot \frac{1}{x} \left(x + \frac{1}{x}\right) \\ &= (-4)^3 - 3 \cdot (-4) \left[\text{Given } x + \frac{1}{x} \text{ is } (-4) \right] \end{aligned}$$

$$\begin{aligned} &= -64 - (-12) = -64 + 12 \\ &= (-52) \end{aligned}$$

Answer