

# Math Diversion 1100

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History seems to show us that God is rarely in a  
hurry to deliver a people or a nation from the  
self-inflicted misery of their own folly.

— The Author

Source: [https://www.youtube.com/shorts/z2H\\_JxmVeog](https://www.youtube.com/shorts/z2H_JxmVeog)

Title: Logarithms

Presenter: MindSphereYT

## 1 Problem

Simplify

$$\phi = \log_{\sqrt{8}} 4^{1/3}. \quad (1)$$

## 2 Solution

First, we notice that both 4 and 8 are powers of 2; hence, we convert to logarithms base 2.

$$\phi = \log_{\sqrt{8}} 2^{2/3} = \frac{2}{3} \log_{\sqrt{8}} 2 = \frac{2}{3} \frac{\log_2 2}{\log_2 \sqrt{8}}. \quad (2)$$

This becomes

$$\begin{aligned} \phi &= \frac{2}{3} \frac{1}{\log_2 8^{1/2}} = \frac{2}{3} \frac{1}{\log_2 2^{3/2}} \\ &= \frac{2}{3} \frac{1}{\frac{3}{2} \cdot 1} = \frac{4}{9}. \end{aligned} \quad (3)$$