Math Diversion Problem 548

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May 2, 2025

> Truth, like oil, will in time rise to surface.
> — Charlie Chan

The YouTube video is found at:

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Source: https://www.youtube.com/watch?v=hqux073_Ytc
Title: Harvard Entrance Exam Question
 Presenter: Math Beast
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1 The Problem

Given the relation

$$\log_4 (\log_3 x)^3 = 4.5\,, \tag{1}$$

find the real values of x.

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2 The Solution

Let's begin with some simple changes:

$$3\log_4 (\log_3 x) = \frac{9}{2}\,, \tag{2}$$

or,

$$\log_4 (\log_3 x) = \frac{3}{2}\,. \tag{3}$$

Now, raise 4 to the last equation:

$$\log_3 x = 4^{3/2} = 2^3 = 8\,. \tag{4}$$

Finally, raise 3 to the last equation:

$$x = 3^8 = 6561\,. \tag{5}$$