Math Diversion Problem 758

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> I take the positivist viewpoint that a physical theory is just
> a mathematical model and that it is meaningless to ask
> whether it corresponds to reality. All that one can ask
> is that its predictions should be in agreement
> with observation. — Stephen Hawking
> [*The Nature of Space and Time*, p.3-4]

> The trick is to recognize when you have a special case at hand.
> — the Author

The material here is found at:

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Source: https://www.youtube.com/watch?v=IrU2gW3lCYQ
Title: an interesting logarithm question that everyone
    should be able to solve
 Presenter: Mathtastic
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1 The Problem

Given the relation

$$\phi = \log_{32} 0.125\,, \tag{1}$$

find the real values of ϕ more simply.

2 The Solution

First, we recognize that $0.125 = 1/8$. Then (1) becomes

$$\phi = \log_{32} \frac{1}{8} = \log_{32} \left(\frac{1}{2}\right)^3 = 3 \log_{32} \left(\frac{1}{2}\right) = -3 \log_{32} 2\,. \tag{2}$$

But

$$\log_{32} 2 = \frac{\log_2 2}{\log_2 32} = \frac{1}{\log_2 2^5} = \frac{1}{5}\,. \tag{3}$$

Hence,

$$\phi = -3 \times \frac{1}{5} = -\frac{3}{5}\,. \tag{4}$$