

# Math Diversion Problem 234

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The secret to perseverance is to just keep doing it.  
— The Author

The YouTube video is found at:

Source: <https://www.youtube.com/watch?v=dGLjIPkV9GY>  
Title: An Interesting Nonstandard Equation  
Presenter: Syber Math

## 1 The Problem

Given the relation

$$256^x = \frac{1}{x}, \quad (1)$$

find the values of  $x$  over the real numbers.

I have already solved this problem earlier, but this time I have a new approach to it.

## 2 The Solution

First, I want to recast (1) to the form

$$x256^x = 1, \quad (2)$$

and note that

$$256 = 2^8. \quad (3)$$

On making this substitution, we get

$$x2^{8x} = 1. \quad (4)$$

Thus  $x$  and  $2^{8x}$  are inverses of each other. Let's solve this with a table of values.

$x$	$2^{8x}$
$1/2$	$2^4 = 16$
$1/4$	$2^2 = 4 \checkmark$

Table 1: Heuristic: We try various  $x$ 's as powers of 2.

Therefore

$$x = 1/4. \tag{5}$$