Math Diversion 1092

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You will never plough a field if you only turn
it over in your mind.
— Irish Proverb

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Source:  https://www.youtube.com/watch?v=dX7KR1CrXwU
Title:  Solving a 'Harvard' University Entrance Exam Question
 Presenter: Maths Explorer
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1 Problem

Given the relation

$$4^x \cdot 8^x = 30\,, \tag{1}$$

solve for the real values of x

2 Solution

First, we recast the Given to

$$2^{2x} \cdot 2^{3x} = 30\,, \tag{2}$$

which simplifies to

$$2^{5x} = 30\,. \tag{3}$$

We could now take the logarithm base 2 across this last equation, but I'll take the natural log instead:

$$5x \ln 2 = \ln 30\,. \tag{4}$$

And lastly, we divide through by 5, to get

$$x = \frac{\ln 30}{5 \ln 2} = \frac{\ln 30}{\ln 32}\,. \tag{5}$$