Math Diversion 970

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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]

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Source: https://www.youtube.com/watch?v=OnvFLXVqYZQ
Title: nice solution, lil' bro
 Presenter: Wrath of Math
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1 Problem

Given the relation

$$2^x + 2^y = 160\,, \tag{1}$$

solve for the integer values of x and y.

2 Solution

Since we are only interested in summing two powers of 2, namely 2^x, 2^y, what are these powers of 2? First, what do the (low) powers of 2 look like?

$$2^2 = 4, \quad 2^3 = 8, \quad 2^4 = 16, \quad 2^5 = 32, \quad 2^6 = 64, \quad 2^7 = 128, \quad 2^8 = 256\,. \tag{2}$$

We can see that 2^8 is too much, so we restrict ourselves to powers between 2 and 7.

Now, since 128 is close to 160, let's start there. From the list of powers of 2, what can we add to 128 to get 160? Yes, 32. So, one solution is

$$x = 5, \quad y = 7\,, \tag{3}$$

but we also have the solution

$$x = 7, \quad y = 5\,. \tag{4}$$