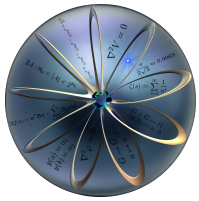

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introducing 0th power

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Let a be a number not equal to zero. Then for all $n \in \mathbb{N}$, we have that a^n is the product of a with itself n . Using the fact that the integer 1 is a multiplicative identity, ($a \cdot 1 = a$ for any a), we can write

$$a^n \cdot 1 = a^n = a^{n+0} = a^n \cdot a^0,$$

where we have used the properties of exponents under multiplication. Now, after canceling a factor of a^n from both sides of the above equation, we derive that $a^0 = 1$ for any non-zero number.