number of divisors

(another Prime Pages' Glossary entries)

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The number of positive divisors of *n* is denoted by **d(*n*)** (or **tau(*n*)** or better, $\tau(n)$). Here are the first few values of this function:

integer *n*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
d(*n*)	1	2	2	3	2	4	2	4	3	4	2	6	2	4	4	5

Clearly, for primes *p*, d(*p*)=2; and for prime powers, $d(p^n)=n+1$. For example, 3^4 has the five (4+1) positive divisors 1, 3, 3^2, 3^3, and 3^4.

Since d(*x*) is a multiplicative function, this is enough to know d(*n*) for all integers *n*--if the canonical factorization of *n* is

$$\prod_{i=1}^{k} p_i^{e_i}$$

then the number of divisors is

$$\tau(n) = (e_1+1)(e_2+1)(e_3+1) \ldots (e_k+1).$$

For example, 4200 is $2^3 3^1 5^2 7^1$, so it has (3+1)(1+1)(2+1)(1+1) = 48 positive divisors.

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