



*This brainteaser was written by Derrick Niederman.*

What is the smallest positive number with exactly ten positive integer divisors?

And what is the next one after that?



**Solution: 48, 80.**

The smallest number with 10 divisors is  $48 = 2^4 \times 3$ .

In general, the number  $p^a \times q^b$  has  $(a+1)(b+1)$  divisors if  $p$  and  $q$  are prime numbers. Because 2 and 3 are the smallest prime numbers, a number of the form  $2^n \times 3$  is the smallest number with  $2(n + 1)$  divisors, as follows:

$n$	$2^n \times 3$	Number of divisors of $2^n \times 3$
0	3	2
1	6	4
2	12	6
3	24	8
4	48	10

From this pattern, it isn't hard to conclude that the next number with precisely 10 divisors can be obtained by replacing 3 with the next prime number, 5, to get  $2^4 \times 5 = 80$ .