

SOLUTION TO MMM33

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Problem: What's the prime factorization of the smallest whole number that is divisible by all integers from 1 up to and including 50?

Step 1: Find out all the prime numbers less than or equal to 50.

A. I listed the numbers from 1 to 50 in a 10x5 grid, and deleted 1 (not prime or composite).

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

B. I removed multiples of 2 and 5 by deleting columns 2, 4, 5, 6, 8 & 10 (except "2" and "5").

	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

C. I then deleted all other composite numbers under 50 by checking multiples of all prime numbers up to $50/2=25$ (3, 7, 11, 13, 17, 19, 21, 23). After 25, the first multiple (times 2) > 50.

	2	3		5		7		9	
11		13				17		19	
21		23				27		29	
31		33				37		39	
41		43				47		49	

Answer: There are 14 prime numbers less than or equal to 50.

2	3	7	11	13	17	19	23	29	31	37	41	43	47
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Step 2: Find the largest power of each prime that is still less than or equal to 50.

$2^5=32$	$3^3=27$	$5^2=25$	$7^2=49$	All other primes must have power of 1
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ANSWER:

$2^5 \cdot 3^3 \cdot 5^2 \cdot 7^2 \cdot 11 \cdot 13 \cdot 17 \cdot 19 \cdot 23 \cdot 29 \cdot 31 \cdot 37 \cdot 41 \cdot 43 \cdot 47$
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