

The Ultimate Device

Solution sketch:

The problem eventually boils down to, given n distinct integers between 2 and 500, you have to find the sum of lcm of all possible subsets having at least two integers. $n \leq 100$. For example,

$n = 3$ and the integers are 2 6 7

subset:

2 6 lcm = 6

2 7 lcm = 14

6 7 lcm = 42

2 6 7 lcm = 42

result = 104

The solution is a bit tricky. If we observe carefully we see that the integers are between 2 and 500. So, if we prime factorize the numbers,

If we get maximum powers of the prime numbers in 500 we get:

2 8

3 5

5 3

7 3

11 2

13 2

17 2

19 2

Other than this, all the primes will have powers 1. So, we can easily calculate all possible states using these integers leaving $9 * 6 * 4 * 4 * 3 * 3 * 3 * 3$ states which is nearly 70000.

Now for other integers we can make dp like the following:

$dp[70000][i]$

where i can be 0 to 100. However as $dp[i]$ will be dependent on $dp[i-1]$ so, $dp[70000][2]$ is enough. Leaving the complexity to $n * 70000$ which is feasible.