

Rough Idea

In some number theory problems, it helps to represent each number were represented by a bitmask of its prime divisors. For example, the set $\{6, 10, 15\}$ can be represented by $\{0b011, 0b101, 0b110\}$ (in binary)*, where the bits correspond to divisibility by $[2, 3, 5]$.

Then, here are some equivalent operations between masks and these integers:

- Bitwise AND is GCD
- Bitwise OR is LCM
- Iterating over bits is iterating over prime divisors
- Iterating over submasks is iterating over divisors

Choosing a set with GCD 1 is equivalent to choosing a set of bitmasks that AND to 0. For example, we can see that $\{6, 10\}$ doesn't have GCD 1 because $0b011 \& 0b101 = 0b001 \neq 0$. On the other hand, $\{6, 10, 15\}$ has GCD 1 because $0b011 \& 0b101 \& 0b110 = 0b000 = 0$.