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Q. Given the three integers n, a and b return the n^{th} magical number. Since the answer is very large return $10^9 + 1$. A positive integer is magical no. when number is divisible by either a or b .

Test case: $n=1, a=2, b=3$
outcome = 2

②
 $n=4, a=2, b=3$
outcome = 6

Approach \rightarrow ① Counting magical numbers $\leq n$

② Binary Search on answer

③ Search boundaries

left = 1

Right = $n * \min(a, b)$

④ Binary search steps

⑤ Modulo

Cook :- Class solution:
 def nthMagical(n , int a , int b) ;
 $m = 10^9 * 9 + 7$
 def gcd(x, y)
 while $y \neq 0$
 $x, y = y, x \% y$
 lcm = $a * b // \text{gcd}(a, b)$
 left, right = 1, $n * \min(a, b)$
 while $\text{left} < \text{right}$:
 $\text{mid} = (\text{left} + \text{right}) // 2$
 $\text{count} = \text{mid} // a + \text{mid} // b - \text{mid} // \text{lcm}$
 if $\text{count} < n$:
 $\text{left} = \text{mid} + 1$
 else:
 $\text{right} = \text{mid}$
 return $\text{left} \% m$

$\text{print}(\text{Solution}().\text{nthMagical}(5, 2, 3))$

Output :- 8

Time complexity $\rightarrow O(\log(n * \min(a, b)))$

Space complexity $\rightarrow O(1)$

```
105
106 class Solution:
107     def nthMagicalNumber(self, n: int, a: int, b: int) -> int:
108         MOD = 10**9 + 7
109
110     def gcd(x, y):
111         while y:
112             x, y = y, x % y
113         return x
114
115     lcm = a * b // gcd(a, b)
116
117     left, right = 1, n * min(a, b)
118
119     while left < right:
120         mid = (left + right) // 2
121         count = mid // a + mid // b - mid // lcm
122
123         if count < n:
124             left = mid + 1
125         else:
126             right = mid
127
128     return left % MOD
129
130
131 print(Solution().nthMagicalNumber(5, 2, 3))
132
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

● anmolpreetssingh@Anmolpreets-MacBook-Air Code % python3 -u "/Users/anmolpreetssingh/Desktop/Code/ui.py"
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