Project Euler #234: Semidivisible numbers

This problem is a programming version of Problem 234 from projecteuler.net

For an integer $n \geq 4$, we define the lower prime square root of n, denoted by $\text{lps}(n)$, as the largest prime $\leq \sqrt{n}$ and the upper prime square root of n, $\text{ups}(n)$, as the smallest prime $\geq \sqrt{n}$.

So, for example, $\text{lps}(4) = 2 = \text{ups}(4)$, $\text{lps}(1000) = 31$, $\text{ups}(1000) = 37$.

Let us call an integer $n \geq 4$ semidivisible, if one of $\text{lps}(n)$ and $\text{ups}(n)$ divides n, but not both.

The sum of the semidivisible numbers not exceeding 15 is 30, the numbers are 8, 10 and 12.

15 is not semidivisible because it is a multiple of both $\text{lps}(15) = 3$ and $\text{ups}(15) = 5$.

As a further example, the sum of the 92 semidivisible numbers up to 1000 is 34825.

Given two integers L and R, what is the sum of all semidivisible numbers $L \leq n \leq R$? Print your answer modulo 1004535809.

Input Format

The only line of each test file contains two space-separated integers: L and R.

Constraints

- $4 \leq L \leq R \leq 10^{18}$.
- $R - L \leq 10^{16}$.

Output Format

Print the answer modulo 1004535809.

Sample Input 0

```
4 15
```

Sample Output 0

```
30
```

Explanation 0

There are three semidivisble integers $4 \leq n \leq 15$: 8, 10 and 12.

Sample Input 1

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10 45
```

Sample Output 1

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290
```

Explanation 1

The only 11 semidivisble integers $10 \le n \le 45$: are 10, 12, 18, 20, 21, 24, 28, 30, 40, 42 and 45.

Sample Input 2

```
100 150
```

Sample Output 2

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708
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Explanation 2

The only 6 semidivisble integers $100 \le n \le 150$ are: 105, 110, 112, 119, 130 and 132.