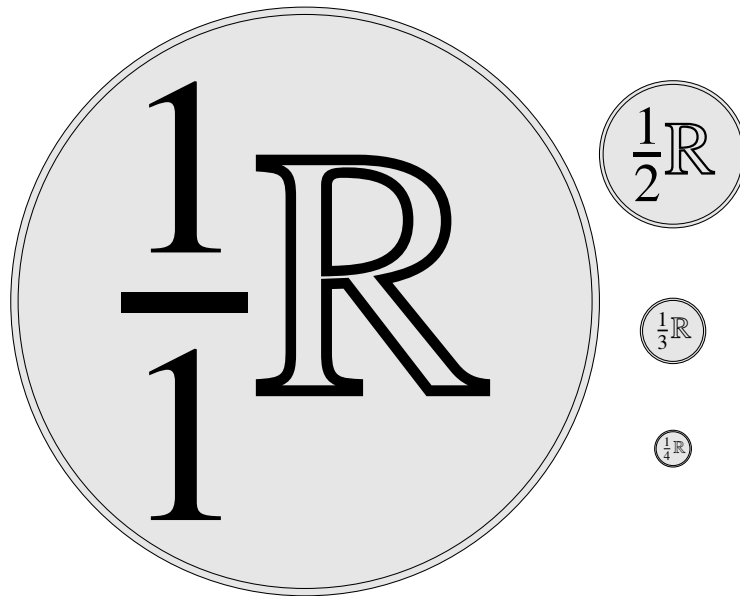


## E: Rational Coins

Source file name: coins.c, coins.cpp, coins.java, or coins.py

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Ratioland is a beautiful and highly rational country where the official currency is the *Ration* and the currency symbol is  $\mathbb{R}$ . Coins are available in denominations of  $\frac{1}{q}\mathbb{R}$ , for each natural number  $q = 1, 2, 3, 4, \dots$ . Some years ago, the Royal Bank of Ratioland promoted a law to define the properties of all coins: each coin of denomination  $\frac{1}{q}\mathbb{R}$  had to be a cylinder made of gold with a thickness of 0.1 inches, radius of  $\frac{1}{2 \cdot q^2}$  inches, and labeled with the fraction representing the magnificent Rational Number  $\frac{1}{q}$ .



Coins of denomination  $\frac{1}{q}\mathbb{R}$ , for values of  $q = 1, 2, 3, 4$ .

In order to celebrate the beauty of its currency, the Royal Bank of Ratioland wants to display some coins in its museum. For this purpose, it has designed a frame with a width of 2 inches, a height of 1 inch, and a thickness of 0.1 inches. In this frame, two coins of denomination  $\frac{1}{1}\mathbb{R}$  fit exactly. Moreover, many other coins can be placed in the frame. Raffaello, a renowned and rational artist born in Ratioland, was invited by the bank manager to design the layout to place the coins in the frame. After a week of hard work, Raffaello invented a rational procedure to place the coins inside the frame without any overlapping:

- Embed the frame in a Cartesian coordinate system, locating its corners at  $(-\frac{1}{2}, 0)$ ,  $(\frac{3}{2}, 0)$ ,  $(\frac{3}{2}, 1)$ ,  $(-\frac{1}{2}, 1)$ .
- Since it is possible to place only two coins of denomination  $\frac{1}{1}\mathbb{R}$ , these coins are to be placed with their centers at  $(0, \frac{1}{2})$  and  $(1, \frac{1}{2})$ , respectively.
- For each natural number  $q > 1$ , and each natural value  $p$  such that  $0 < \frac{p}{q} < 1$  and  $\frac{p}{q}$  is an irreducible fraction, a coin of denomination  $\frac{1}{q}\mathbb{R}$  is to be placed with center at  $(\frac{p}{q}, \frac{1}{2 \cdot q^2})$ .

All coins are placed tangent to the horizontal axis of the Cartesian coordinate system. In order avoid confusion, Raffaello decided to name the coin of denomination  $\frac{1}{q}\mathbb{R}$  with center at  $(\frac{p}{q}, \frac{1}{2 \cdot q^2})$  as  $M(p/q)$ . For example:

- $M(0/1)$  is the coin of denomination  $\frac{1}{1}\mathbb{R}$  with center at  $(0, \frac{1}{2})$ ;

- $M(1/1)$  is the coin of denomination  $\frac{1}{1} \mathbb{R}$  with center at  $(1, \frac{1}{2})$ ; and
- $M(1/2)$  is the coin of denomination  $\frac{1}{2} \mathbb{R}$  with center at  $(\frac{1}{2}, \frac{1}{8})$ .

Raphaello wants to know the *first*  $n$  coins that touch the coin  $M(p/q)$  inside the frame when sorting all these coins by decreasing order of radius (i.e., by increasing order of  $q$ ). If two coins share the same radius, he wants them sorted by increasing order of  $x$  coordinates (i.e., by increasing order of  $p$ ).

### Input

The input consists of several test cases. Each test case is described by a line containing three blank-separated integers  $p$ ,  $q$ , and  $n$  ( $0 \leq \frac{p}{q} \leq 1$ ,  $1 \leq q \leq 10^6$ ,  $1 \leq n \leq 10^3$ ), with  $\frac{p}{q}$  an irreducible fraction.

*The input must be read from standard input.*

### Output

For each test case, print a single line with the  $n$  blank-separated names of the first  $n$  coins that touch  $M(p/q)$  in the frame. The list of coins must be printed in the order previously described.

*The output must be written to standard output.*

Sample Input	Sample Output
2 5 4	M(1/2) M(1/3) M(3/7) M(3/8)
2 3 3	M(1/1) M(1/2) M(3/4)
0 1 2	M(1/1) M(1/2)
1 1 2	M(0/1) M(1/2)
1 2 5	M(0/1) M(1/1) M(1/3) M(2/3) M(2/5)