Project Euler #246: Tangents to an ellipse
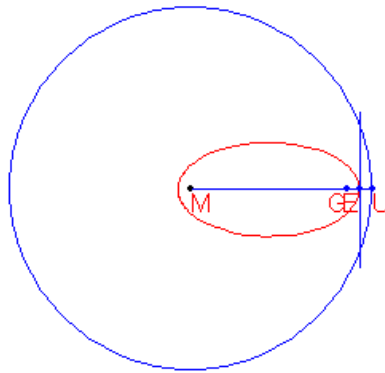
This problem is a programming version of Problem 246 from projecteuler.net

A definition for an ellipse is:

Given a circle c with centre M and radius r and a point G such that $d(G, M) < r$, the locus of the points that are equidistant from c and G form an ellipse.

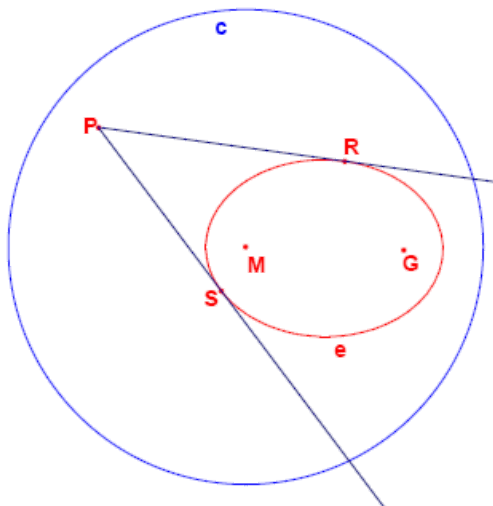The construction of the points of the ellipse is shown below.

Given are the points $M(x_1, y)$ and $G(x_2, y)$.
Given is also the circle c with centre M and radius r.
The locus of the points that are equidistant from G and c form an ellipse e.
From a point P outside e the two tangents t_1 and t_2 to the ellipse are drawn.
Let the points where t_1 and t_2 touch the ellipse be R and S.

For how many lattice points P is angle RPS greater than d degrees?

Input Format

First line of each test file contains three integers separated by single spaces: x_1, x_2 and y.

Second line of each test file contains a single integer r.

Third line of each test file contains two integers p and q separated by a single space which represent the angle d in such a way that $\tan d = \frac{p}{q}$.

Constraints

- $-10^5 \leq x_1, x_2, y \leq 10^5$
- $1 \leq r \leq 32000$
- $0 < |x_1 - x_2| < r$
- $|x_1 - x_2|$ is even
- $0 < p, q < 30$
- d is acute

Output Format

Print exactly one number which is the answer to the problem.

Sample Input 0

```
64817 64819 11420
3
30 1
```

Sample Output 0

```
4
```

Explanation 0

These 4 points are $(64817, 11419)$, $(64819, 11419)$, $(64817, 11421)$ and $(64819, 11421)$.

Sample Input 1

```
-13896 -13894 43360
3
1 1
```

Sample Output 1

```
32
```