Problem A. Glorious Stadium

Input file:	`glorious.in`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	1024 megabytes

A lot of people want to attend the World Cup, so we would like to construct a glorious stadium using the following algorithm:

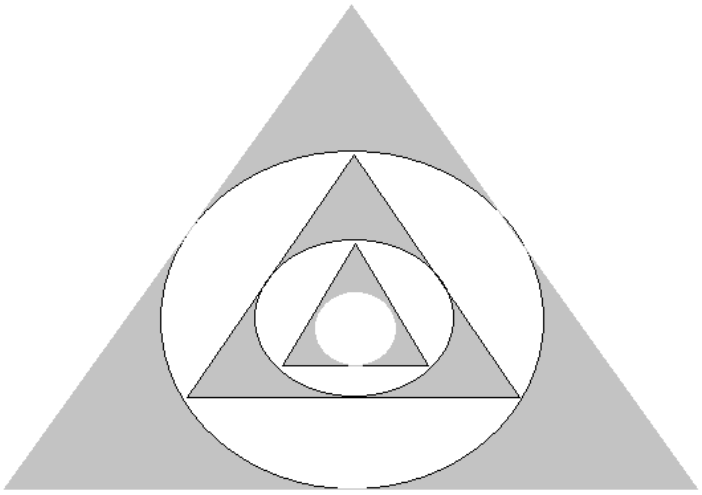
1. Construct 1st layer of the stadium by building a fence shaped like a regular polygon P_1 with K sides and its in-circle C_1 (with radius R) is the field of the stadium.
2. Construct 2nd layer of the stadium by building a fence shaped like a regular polygon P_2 with K sides and its in-circle C_2, such that C_2 is the circumcircle of P_1, so it surrounds the layer 1.
3. Construct 3rd layer of the stadium by building a fence shaped like a regular polygon P_3 with K sides and its in-circle C_3, such that C_3 is the circumcircle of P_2, so it surrounds the layer 2.

   Until $\cdots$

N. Construct $n-$th layer of the stadium by building a fence shaped like a regular polygon P_N with K sides and its in-circle C_N, such that C_N is the circumcircle of P_{N-1}, so it surrounds the layer $N-1$.

For each layer of the stadium, the area of the polygon that is not included in its in-circle tells us the amount of the people who can stay to cheer for the teams (because this is the only place they can sit). We would like to calculate the sum of cheerers areas of all the N layers of the glorious stadium, that is:

$$\sum_{i=1}^{N} Area(P_i \setminus C_i)$$



Input

The first line of the input consists of a single integer $1 \leq T \leq 10^5$ the number of test cases. Each test case consists of one line containing 3 space separated integers N, R, K. N is the number of layers of the stadium, R is the radius of the stadium C_1 and K is the number of sides of the polygons; where $1 \leq N \leq 10^5, 1 \leq R \leq 100, 3 \leq K \leq 2 \cdot 10^4$ and $5 \cdot K \geq N$.

Output

For each test case output a single line displaying the case number and the area of the cheerers rounded to exactly 5 decimal places. The output will be checked with a relative error.

Example

glorious.in	standard output
3 3 10 3 2 10 4 5 100 6	Case 1: 4314.57552 Case 2: 257.52220 Case 3: 31096.23444

Note

- in-circle is the largest circle the will fit inside a polygon that touches every side.
- circumcircle is the circle that passes through each vertex of the regular polygon.
- The given figure is a demonstration of the first test case, where the radius of the smallest circle is the given R, and the answer is the area of the grey parts.
- The formula $P \setminus C$ denotes the area covered in P and not covered in C, as shown in the figure.