Rotating Painter

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Tamim is renovating his house, and there are many chores to be done. One of them is painting the old furniture. Painting furniture seemed simple — until he came across a peculiar table.

The tabletop consists of two boards: a top board and a bottom board. Both boards are regular convex polygons*. The top board is stacked on top of the bottom board. The boards are fixed at the same center† by a bolt.

The top board can rotate freely around its center, but it cannot be removed or repositioned. The bottom board remains stationary.

Tamim can easily paint the top board, but the bottom board is partially or completely covered by the top one. So it's hard to paint the bottom board. However, by rotating the top board, different portions of the bottom board become visible.

Tamim has an idea! He decides to paint the visible areas of the bottom board. To do this, he will do the following:

1. Paints the currently visible areas of the bottom board.
2. Rotates the top board by an arbitrary angle.
3. Paints any newly visible areas of the bottom board.
4. Repeats this process until no additional areas can be painted.

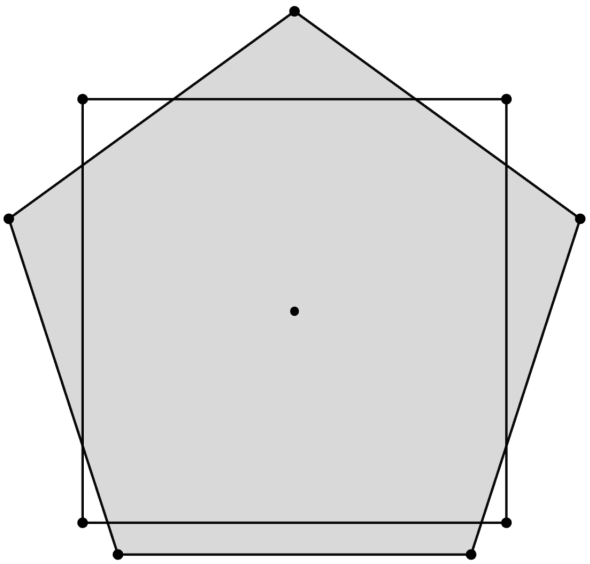

Figure: The pentagon is the top board and the square is the bottom board. Both have the same center.

After completing this process, Tamim calculates the total area of the bottom board that was successfully painted. Please help Tamim determine the maximum total area of the bottom board that can be painted.

*A regular convex polygon is a polygon where all the side lengths are equal, all the interior angles are equal, and all the interior angles are strictly less than 180°.

†The center of a regular convex polygon is the point equidistant from all its vertices.

Note: An animation has been provided to help you visualize the problem. Please check the attachments to view the animation.

Input

The first line contains an integer t ($1 \le t \le 10^5$) — the number of test cases.

The first line of each test case contains two integers n_t and a_t ($3 \le n_t \le 1000$; $1 \le a_t \le 1000$) where n_t is the number of sides of the top polygon and a_t is the length of each side of the top polygon.

The second line of each test case contains two integers n_b and a_b ($3 \le n_b \le 1000$; $1 \le a_b \le 1000$) where n_b is the number of sides of the bottom polygon and a_b is the length of each side of the bottom polygon.

Output

For each test case, output a single number — the maximum total area of the bottom board that can be painted.

Your answer will be considered correct if its absolute or relative error doesn't exceed 10^{-4}.

Example

standard input	standard output
6 5 5 4 6 10 6 11 5 11 6 13 8 10 10 12 8 3 1 3 1 1000 1000 1000 1000	2.820131 0.000000 515.943499 0.201572 0.171213 261798.698770