

Chess Knights - MathGames

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Difficulty: ★ ★ ★ ☆ ☆

Key words: Discrete Mathematics, Chess

One of the best things to do on a cold winter night is to play a nice game of chess. Of course, as there are only 64 squares, this can be quite boring. Therefore, one of the mu games organisers invited infinite chess, which is played on an infinite chess board. In infinite chess, there are a lot of different tactics, one of which involves only the knight. This knight-fleeTMtactic basically says that it could be advantageous to move the knight as far away from the battle as possible, only to later strike into the battle for victory. Assume that the knight starts on $(0, 0)$.

Part 1: Minimum Moves

Determine the minimum number of moves required to move the knight to $(x, 0)$, given an integer $x \in \mathbb{Z}$.

Input

- A single integer $0 < x \leq 10000$.

Output

- A single integer representing the minimum number of moves.

Examples

Input	Output	Input	Output
5	3	8	4

Part 2: Counting Paths

Determine how many distinct paths of minimum length exist for the knight to travel from $(0,0)$ to $(x,0)$.

Input

- A single integer $0 < x \leq 10000$.

Output

- A single integer representing the number of distinct paths of minimum length. (Consider using modular arithmetic if the number is very large.)

Examples

Input	Output	Input	Output
1	6	12	20