Prime Ponds

Frog is touring through the Prime Swamp and is curious what Prime Ponds he can jump across. Prime Ponds are of size $L \times W$ and are laid out in a grid positions enumerated from the top left corner, going from left to right and top to bottom. At each prime pond position, there is a rock that Frog can hop on. Frog can jump to adjacent rocks in any of the 8 cardinal directions (N, NE, E, SE, S, SW, W, NW) from his current position.

Frog always starts on the top edge of each Prime Pond and wants to reach the bottom edge.

For instance, below is the 4×5 Prime Pond. Frog is able to make it across this Prime Pond by jumping on stones 2, 7, 11, and 17.

start				
1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
finish				

Print the minimum number of hops it takes for Frog to get across the pond, or -1 if it is impossible.

Input

The first line contains the number T ($1 \leq T \leq 5000$) giving the number of test cases. Each test case consists of two integers L, W ($1 \leq L, W \leq 1000$), the size of the Prime Pond.

Output

For each test case, print a line with the minimum number of hops it takes for Frog to get across the pond, or -1 if is impossible.

Sample Input/Output

Input	Output
4 1 1 2 2 4 5 8 17	-1 3 5 11